



EMAS

GESTIONE AMBIENTALE
VERIFICATA

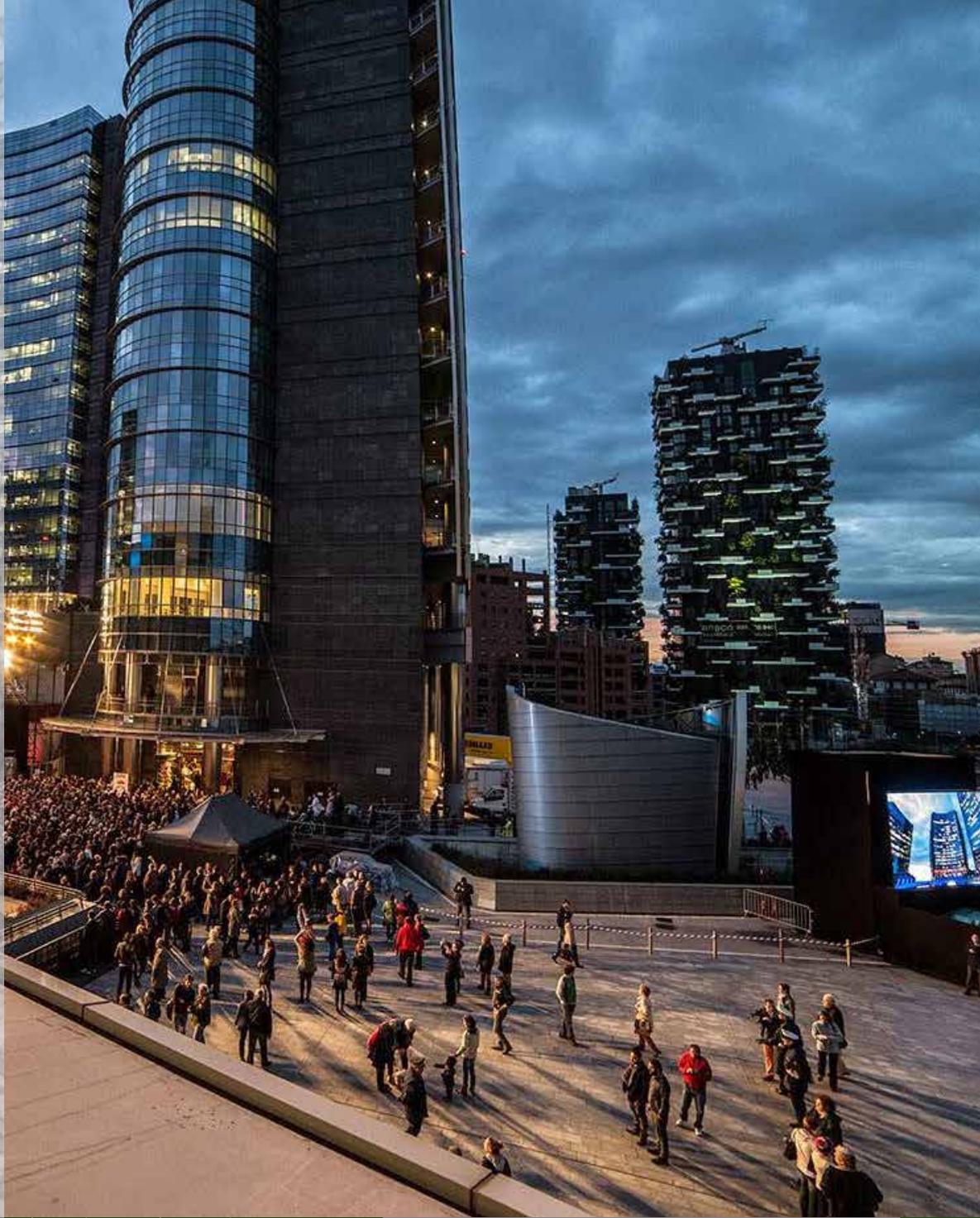
Reg. n. 800009

EPD

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

S.P.00427

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GREEN BOOK 2.0



SIAMO I PRIMI E GLI UNICI IN QUESTA MATERIA.

Aspetti tecnici e ambientali, controlli e monitoraggi ambientali, sostenibilità, applicazione nei progetti di Green Building.



FOR THE ENVIRONMENT, WITH TRANSPARENCY AND AWARENESS

DEAR FRIENDS,

It is now 15 years since Officina dell'Ambiente began its adventure as an industrial supplier of alternative materials for the production of cement clinker.

They have been very demanding years but also very satisfying ones, during which we came to realise that, as well as the cement sector, we could also service the building industry as a whole, although to be able to do so, in a systematic and regular manner, we needed to make some radical choices, such as that of discarding the option of mixing different types of waste to favour the exclusive use of MSW incinerator bottom ash. With the Matrix Family range, Officina dell'Ambiente is now a leading player in all sectors of the building industry in general, placing a particular focus on those projects which, for their size and prestige, are now driving the environmental sustainability trend on the new Italian construction scene.

The achievement of this objective is certainly the result of our continued hard work, aimed at constantly improving our products, obtaining all the possible environmental credentials and perfecting our production chain as a whole, but, first and foremost, is the outcome of the perfect alchemy that has developed over the years with many leading operators in the Italian building industry.

It is not a coincidence that Matrix is currently the only manmade aggregate in Europe to have obtained the EPD and that many companies with which we work can now aim to achieve the same result with their Matrix Inside product ranges.

This is a journey that we couldn't even imagine a few years ago, when the use of recycled materials was something to be kept hushed, while today it is a vital objective for our future and for that of our planet.

For us at ODA, being sustainable doesn't only mean working with the environment in mind, it also means doing so while ensuring maximum awareness and transparency to all the stakeholders concerned.

For this reason, Officina dell'Ambiente has made it its task to give account of its actions in the most transparent manner possible, including through its communication tools, such as our website, (www.matrixoda.it), one of the most complete in the industry, or our Greenbook - our industrial statement- which has accompanied us over recent years. It is therefore our pleasure to present our latest Greenbook version 2.0, which illustrates our operations, as well as the speed at which the environmental sustainability sector is developing.

Thank you for reading.



THE FOUNDATIONS OF ODA'S ACTIVITIES

WHAT IS MATRIX®?

An end-of-waste product.

The Matrix® Family is a range of products obtained from the industrial treatment of the bottom ash generated during the incineration of Municipal Solid Waste (MSW). These products, which were previously known as Secondary Raw Materials (SRM), are now classified as End-of-Waste (EOW) and are used as a replacement of newly-extracted raw materials in the production of cement and other building materials.

THE 3 PRODUCTS IN THE MATRIX® FAMILY

Matrix® Standard A grey granular material, with a grain size ranging from 0 to 10 mm.

AGMatrix® Wet-refined grit, with a grain size ranging from 2 to 10 mm.

Sand Matrix® A range of sand products, with grain sizes 0-2 mm, 0-4 mm and 2-4 mm.

WHO MAKES IT?

Officina dell'Ambiente S.p.A.

The matrix® family products have been made by officina dell'ambiente s.p.a. - In a modern plant for the treatment of msw incinerator bottom ash - since 2001. **Oda is an innovative company**, who has chosen to develop its core business implementing the most modern environmentally-sustainable industrial development policies, on its iso 14001-certified and emas-registered site, its approach focusing, in particular, on the recovery and exploitation of a single waste-type for the purpose of its re-use in replacement of newly-extracted materials, in line with the most advanced indications of eu and national regulators and the most current materials recovery and recycling trends.

WHERE IS IT MADE?

Lomello Plant (Pavia, Italy).

For some 15 years, Officina dell'Ambiente has been conducting its incinerator bottom ash recovery operations in its modern up-to-the-minute facilities in Lomello (Pavia, Italy), having a production capacity of 200,000 tons/year and comprising also two photovoltaic systems (which are designed to meet the site's energy requirements), plus all the additional facilities that may be required on a modern EMAS-registered industrial site.

WHERE ELSE IS IT MADE?

Conselice plant (Ravenna, Italy).

Given the industrial success obtained by Oda in its Lomello site, a new plant has been built and authorised - in cooperation with the HERAmbiente group - in the municipality of Conselice (Ravenna, Italy), having a production capacity of approximately 200,000 tons/year. The Conselice site too is able to rely on a photovoltaic system designed to meet its future energy requirements. This plant is even more modern than the one in Lomello, as it is the result of 15 years of experience in the treatment of MSW incinerator bottom ash.

WHAT IS IT MADE OF?

Exclusively MSW incinerator bottom ash.

The Matrix® Family products are the first example in Italy of an industrial approach - involving significant economies of scale - to the recovery and exploitation of MSW incinerator bottom ash, which constitutes their only raw material.

From an industrial perspective, the decision to use a single waste-type has allowed:

1 To guarantee the total traceability of the waste treated, from its origin to its final re-use

2 To deal with a stable and repetitive chemical matrix

3 To achieve the required technical standards (as prescribed by the applicable UNI EN regulation and REACH certification) to ensure the correct use of the Matrix® Family products in the industry sectors in which they are marketed, with appropriate certifications and CE markings

4 To supply end users with products that have characteristics of stability and repetitiveness - requirements that must be met if the industrial and long term use of the Matrix® Family products is to be pursued. Coming from the treatment and mixing of a single waste-type, Matrix® presents a highly uniform and repetitive composition, consisting mostly of silica and smaller amounts of calcium, with the quality and quantity of macro components remaining largely stable

5 To ensure the accurate and totally transparent management of all environmental aspects linked to the production cycle, with full approval by the competent supervisory bodies

6 To obtain the first EPD Certification in Europe for an aggregate of industrial origin for the building industry

MATRIX
FAMILY ●●●●



WHERE DOES THE WASTE/BOTTOM ASH (I.E. THE RAW MATERIAL) COME FROM?

Exclusively from bottom ash produced by Municipal Solid Waste incinerators in Northern Italy implementing controlled processes and environmental management practices.

The entire waste workflow, from arrival to the plant and pre-assessment in the Company's lab to continual processing, is regulated in a specific Workflow Protocol approved by the Pavia Province Council, which is regularly implemented in all operations carried out in the Lomello Plant.

SELF-LIMITING CODE ON INCOMING INCINERATOR BOTTOM ASH

OdA's production cycle involves a series of SELF LIMITATIONS, whose purpose is that of further increasing the - already high - technical standards of the Matrix® products:

NO bottom ash is accepted under any circumstances from waste-to-energy plants that treat Industrial Special Waste, even when chemical and physical characteristics are in theory compatible; only bottom ash from MSW incinerators.

NO other types of waste are accepted or treated under any circumstances, despite the fact that OdA's authorisation includes other categories of waste; no mixing of any type takes place.

NO waste is accepted under any circumstances from intermediate storage centres, only bottom ash coming directly from individual MSW incinerators is treated, ensuring the traceability and specificity of all incoming materials.

THE NORMATIVE REFERENCE

Officina dell'Ambiente's operations fall within the normative framework regulating the treatment/recovery of waste for the purpose of its re-use as an end-of-waste product in replacement of newly-extracted raw materials, in line with the most advanced indications of EU and national regulators.

For the latest requirements, refer in particular to articles 4) and 6) of Italian Legislative Decree No. 205/2010, according to which waste management should focus primarily on prevention, secondarily on "preparation for re-use" (a novelty introduced by Directive 2008/98/EC), recycling and recovery and only as a last resort on disposal.

In this context, ODA's operations fall clearly within the meaning of article 184 ter of Italian Legislative Decree No. 205/2010, introducing the concept of "End of Waste" (EOW - End of Waste): once it has undergone specific recovery processes, waste ceases to be classed as waste and can once again be sold on the market as a product.

ODA'S AUTHORISATIONS

Officina dell'Ambiente's treatment and recovery operations in the Lomello plant are currently regulated under Integrated Environmental Authorisation No. 12566 of 25/10/2007, issued by the Lombardy Region Council, and Authorisation No. mns01/09 Ref. No. 4606 of 27/07/2009, issued by the Pavia Province Council, as supplemented by the subsequent authorisation orders No. n. 03/11 Ref. No. 13955 of 03/03/2011 and No. 04/11 Ref. No. 14611 of 07/03/2011, issued by the same province council.

The above authorisations regulate both the treatment/recovery of waste (R13, R4 and R5 operations) and the production and marketing of the Matrix EOW products.

Introduction into a specific industrial sector is **never accidental**, rather it is always the result of a preliminary technological process, aimed at verifying technical feasibility on a laboratory level, followed by an accurate and selective industrial trial period, seeking to verify the actual possibility of wide-scale application, as well as compliance with the relevant operating standards.

The use of a Matrix® Family product in a specific industrial sector is the outcome of a gradual and in-depth process, conducted at all times under the supervision of governmental supervisory bodies and culminating in the issue of the relevant authorisation order. Obviously, the Conselice plant too has been granted the necessary authorisation, that is **Integrated Environmental Authorisation No. 4071 of 19/12/2013**, issued by the Ravenna Province Council.



THE MATRIX® FAMILY PRODUCTION CYCLE

1 INCOMING WASTE CHECKS

Officina dell’Ambiente’s production operations are organised so that incoming waste can be effectively and repetitively monitored through strict and accurate preventive routine checks, as described in the Waste Acceptance and Management Procedure set out in the Integrated Environmental Authorisation.

2 INCINERATOR BOTTOM ASH STOCKPILING AND AGEING

Incoming waste is stockpiled in specific covered areas called LITHO-STABILISATION® CELLS, where it remains for approx. 30 days, to undergo an ageing process called LITHO-STABILISATION® (see page 10). Here, the material is stored in a safe condition, under cover, on an impermeable floor surface.

3 TREATMENT

The entire treatment process for the production of Matrix® is carried out indoors, within enclosed buildings, again with impermeable floor surfaces.

After the initial LITHO-STABILISATION® phase, in the dedicated cells, the waste is led - through a complex system of hoppers and conveyor belts – to a system of crushing mills and screens, with dedicated equipment for the separation of ferrous and non-ferrous metal fractions, whose purpose is that of refining the material to the expected standard.

The entire plant is highly automated and is enclosed within **soundproofed external walls**, insulated with expanded polyurethane foam, so as to minimise noise impact.

Production areas are fitted with **an extensive and efficient air extraction/treatment system**. During the production process, a system of precision extractors connected to “cyclone”-type separators allows to intercept and separate small particles of unburnt material (mainly plastic and paper), which are then sent to authorised external plants for final disposal.

All floor surfaces, external and internal, are cleaned on a daily basis (morning and afternoon) by an operator using a rider sweeper.

All Eternit roofing - which was already in place when the building was bought from the previous owner - has been removed, thus enabling Officina dell’Ambiente to reduce its overall environmental impact. The entire plant is now asbestos-free.

In replacement of the asbestos roofing, a large photovoltaic system has been installed, which is able to generate a rated power of 695 kW, more than it is required to meet internal energy requirements.

4 EXTERNAL STORAGE

The Matrix® finished product is stored outside, again on purposely-surfaced external yards, where the LITHO-STABILISATION® process continues and is eventually complete after 90 days.

Dedicated **watering** systems allow to keep the material humidified during the summer season.

Due to production requirements, some Matrix® Family products are stored in the covered warehouses before delivery to the final customer.



ENVIRONMENTAL SUSTAINABILITY OF THE PRODUCTION PROCESS

The technical and environmental choice of using only one type of waste makes our production process a lot simpler than others in our sector, where waste is heavily mixed in ways that cannot be easily monitored. Oda's approach translates into a highly repetitive process, which is synonymous with predictability, stability and environmental control obtained through the use of a single waste-type.

THE LITHO-STABILISATION® PROCESS

Let's start with describing the technical characteristics of **bottom ash from MSW incineration**, the only raw material used by ODA. **Incinerator bottom ash is a heterogeneous, yet statistically repetitive mixture, whose overall chemical composition is similar to that of natural minerals** (basalt, marl, etc.) and is characterised by a minimal presence of metals, from some of the objects, or part of the same, that are normally found in domestic waste (small metal objects, cutlery, etc.). Metals are found in all natural raw materials and therefore do not represent a reason for concern as such, especially since the stable form in which they are found does not make them directly available to the external environment.

Due to the effects of the incineration process and subsequent putting out with water, incinerator bottom ash presents technical, operating and workflow-related aspects - both in physical terms (high humidity) and chemical terms (highly alkaline pH) - which require careful industrial management.

This is why preliminary **chemical and physical stabilisation is essential** to enable the correct upstream management of the treatment process and successful downstream recovery of the material. If the above process is carried out correctly, it will eventually lead to the production of Matrix® Inside products in which the bio-availability of metals is minimised and is, in any case, fully under control in the production process.

As is often the case, the means to obtain effective chemical and physical stabilisation is provided directly by nature: litho-stabilisation®.

Indeed, Oda adopts a simple and natural solution for the promotion of lithification: a process internationally known as "natural weathering", which was successfully developed in Japan at the beginning of the '90s and involves a specific methodology for the natural ageing of incinerator bottom ash during its various processing stages, over a total period of at least 2 months.

In a nutshell, LITHO-STABILISATION® is a true chemical process, completely natural, which does not require the use of chemical substances or additives and whose outcome is the "CONTROLLED CHEMICAL AND PHYSICAL STABILISATION" of incinerator bottom ash.

Incoming incinerator bottom ash is stockpiled in **LITHO-STABILISATION® CELLS**, where a series of natural and spontaneous phenomena take place, including: the rising of the temperature, the oxidation of aluminium, the absorption and pH neutralisation processes performed by atmospheric carbon dioxide (carbonation), the precipitation of insoluble carbonates, the partial adsorption of heavy metals by iron oxide, the formation of new mineralogical phases, etc.

As a whole, these natural phenomena contribute to lowering the natural pH of incinerator bottom ash and promote its chemical stabilisation.

Note that the above processes take place and develop in a continual manner, from the initial stockpiling phase (pre-treatment) up to and during the final storage of Matrix® (post-treatment).

The LITHO-STABILISATION® CELLS are the TRUE HEART of ODA's production system.





MATRIX® IN FINAL PRODUCTS: NATURAL STABILITY

This section describes some of the characteristics of the **final products** made using the **Matrix® Family** materials to become Matrix® Inside products of everyday use. OdA has chosen **NOT** to market Matrix® in sectors where traceability and control are not guaranteed and where contact with the external environment is to be expected.

The above despite the fact that the effectiveness of the “natural weathering” technique is so well-substantiated that European regulations are now authorising the use of stabilised incinerator bottom ash as road sub-base, a sector which Officina dell’Ambiente has never even considered due to the potential lack of traceability.

Indeed, OdA has made a technical choice to introduce Matrix® only in industrial processes that are subject to clear identification and monitoring requirements and stringent operating standards, in both firing (cement) and cold processes (concrete, mortar, bituminous conglomerates, cement products) involving the presence of cement, bitumen or clays.

Indeed, the above substances have a high binding power and facilitate the chemical stabilisation of those products in which Matrix® is introduced in limited and carefully-calculated percentages, as part of specific pre-defined formulations.

Stability is also favoured by the significant pozzolanicity properties inherent in incinerator bottom ash, which has a natural tendency to act as a binder, so much so that the stockpiling phase in the **LITHO-STABILISATION® CELLS** must be carefully managed so as to avoid the occurrence of hardening effects, which would slow down the treatment process and consequently reduce the plant’s production capacity.

To further OdA’s control over this aspect, a decision was made to measure the effectiveness of the above processes in the long term, in an effort to understand what sort of impact Matrix® Inside products will eventually have on their micro-environment.

In order to do so, Officina dell’Ambiente has voluntarily introduced a strict verification procedure - which unfortunately is still not required by law but is deemed ethically and technically essential by us - designed to assess the actual sustainability of the Matrix® Inside products, in line with the guidelines provided under article 1847ter.

On a micro-environmental level, this brings in the notion of “END OF LIFE” (see page 17), while on a macro-environmental level it refers to the notion of “LIFE CYCLE” assessment (see page 18).

THE ENVIRONMENTAL MONITORING OF THE MATRIX® FAMILY PRODUCTS

WHAT MONITORING?

All products obtained through the above treatment are subjected to strict monitoring of **content values of the main inorganic constituents and heavy metals**. The main organic pollutants are also regularly measured (dioxins/furans, polycyclic aromatic hydrocarbons and polychlorobiphenyls), with results always turning out to be either zero or extremely low in value. Indeed, the above substances are not found in incinerator bottom ash at the end of the incineration process and, therefore, are not found in Matrix® either.

WHY?

So as to ensure that the products offer constant quality standards and feature environmental characteristics that are compatible with the applicable legislation and operating standards.

WHEN?

Chemical analyses on the Matrix® Family products are normally conducted **on a monthly basis** using average samples that are representative of the plant’s production.

PERFORMED BY WHOM?

OdA can rely on a modernly equipped chemical laboratory, headed by a Chemist duly enrolled in the relevant professional association.

All the necessary instruments are available to perform inorganic analyses on compounds with a mineralogically complex matrix, like incinerator bottom ash (ball mills, microwave digester, muffle furnace for alkaline fusion, inductively-coupled plasma spectrometer for the detection of metal). The laboratory is also equipped to perform the physical/mechanical tests required to maintain the products’ CE marking, to prepare concrete and mortar mixes independently and to carry out the necessary determinations under the relevant UNI EN standards. Alternatively, highly-qualified external laboratories are used.



THE ENVIRONMENTAL MONITORING OF THE MATRIX® FAMILY PRODUCTION PLANT

WHAT MONITORING?

OdA's plant is monitored in accordance with a rigorous plan, as required by the relevant Integrated Environmental Authorisation (No. 12566 of 25/10/2007, issued by the Lombardy Region Council, as well as by Authorisation No. mns01/09 Ref. No. 4606, issued by the Pavia Province Council), ensuring systematic control over environmental aspects.

WHY?

OdA's Integrated Environmental Authorisation and voluntary certifications (ISO 14001 and EMAS) impose careful monitoring of the environmental conditions of the internal industrial site and of the neighbouring area, involving specific **checks on the incoming and outgoing waste, as well as on air, water, soil and noise values.**

PERFORMED BY WHOM?

The above monitoring is carried out either as a self-monitoring activity (using the Company's internal lab) or through accredited external labs. As the plant is subject to an **Integrated Environmental Authorisation**, monitoring results are to be immediately transmitted for review to the relevant government agencies (**ARPA Pavia and Osservatorio Rifiuti della Provincia**), via dedicated on-line applications. During our 15 years of operation, monitoring results have always been found to comply with the applicable regulatory requirements.

As an addition to its standard environmental monitoring activity, in 2007 OdA joined a three-year environmental monitoring project involving the assessment of conditions in terms of impact on human health in the area around the plant.

The project was conducted by the prestigious Milan-based Istituto Mario Negri di Milano (www.marionegri.it), as part of a collaboration with the Lomello Municipal Council.

The project was completed in 2010 and established that OdA's operations have no environmental impact and do not affect in any way the condition of the surrounding area, whether with reference to soil, groundwater or air.

During the validity of the Integrated Environmental Authorisation, the Company undergoes regular auditing cycles by ARPA inspectors. **To date, 3 inspection cycles have been successfully completed which have found the Company to be fully compliant** with the requirements set out in the Integrated Environmental Authorisation.

HOW OFTEN?

The monitoring plan with the related frequency is summarised in the table below:

ENVIRONMENTAL MONITORING		
	LEGALLY REQUIRED FREQUENCY	ODA FREQUENCY
Air emissions	Yearly	Yearly
Quality of external air	Every Two Years (Odd Years)	Every Two Years (Odd Years)
Discharge water	Monthly	Monthly
Soil	Yearly	Yearly
Groundwater	Six-Monthly	Six-Monthly
External noise	Yearly	Yearly



THE MATRIX® FAMILY ENVIRONMENTAL CHARACTERISTICS

DIOXINS

Notoriously, the combustion of MSW generates minimal traces of dioxins, which are then found in the flue gases and are abated at the incinerator's stack in the form of light ash, a hazardous waste type which is disposed of in dedicated authorised plants.

The ash which collects at the bottom of the furnace and constitutes the raw material for the production of Matrix® is practically dioxin-free, because of the high temperatures reached during the thermal destruction process.

In an effort to confirm this, a leading international cement manufacturer has carried out a scientific study (lasting over a period of approximately 2 years) into the potential dioxin emissions from the plant's stack associated with Matrix®.

The results showed that a use of Matrix® in replacement of natural marl in percentages ranging on average between 1% and 5% of the total raw meal does not negatively affect the quality of the cement or of the emissions into air, but instead **allows for a reduction of the CO2** normally produced in the kiln during the clinkerisation process.

DUSTS

Like natural raw materials, Matrix® is made up of silicon carbonates and oxides, aluminium, iron, calcium and, in smaller amounts, Na, K, P, S, Mg and other metals. Silica, both in its amorphous and crystalline form, is the main component and accounts for almost 50% of the total.

During industrial handling and use, **Matrix® does not generate dusts**, as it retains a level of humidity that is normally higher than 10% and therefore makes for a limited dispersion of free silica. In addition, due to the product's grain size, the presence of silica in the breathable fraction of the dusts is extremely low (< 0.1%).

ODOURS

The raw material for the production of **Matrix®**, i.e. the bottom ash from the incineration of MSW, has undergone a thermal destruction process and, as such, it is characterised by an extremely low organic residue, which is practically **free of odorous substances**. The only olfactory aspect of Matrix®, and an almost insignificant one, is the slight odour, similar to that of cement, that can be smelled in the immediate vicinity of the piles.

HEAVY METALS

The Matrix® Family products, as incinerator bottom ash in general, contain significant but constant levels of microconstituents (mostly heavy metals).

These components, however, are present in an extremely stable chemical form, to the point that **Matrix® has been recognised as a NON-ecotoxic product under EU Regulation 1272/2008/EC (CLP)**.

However, anticipating future regulatory requirements on recovered materials, OdA has long chosen to operate under strict rules for the control of the long-term impact of the use of Matrix® in the building industry.

For this purpose, all final products containing Matrix® Family materials carrying the CE marking are regularly subjected to compliance test for leaching under UNI EN 12457-2, so as to measure the potential release of pollutants at **"END OF LIFE"** (when they will be demolished).

An example of this type of approach is that involving **AGMatrix®**, which is used as an aggregate for concrete. A study was carried out in cooperation with the recognised research centre The Energy Research Centre of the Netherlands (www.ecn.nl - Methodology for testing processed incinerator bottom ash (IBA) for application in concrete production, professor H.A. van der Sloot).

The study found that once it reaches the end of its useful life and is demolished, concrete containing AGMatrix® generates rubble that is compliant with the strict requirements of Dutch legislation for re-use as road sub-base.

An important result, which further confirms the eco-compatibility of the Matrix® Family products, even at "end of life".

Apart from this specific example, all Matrix Family products for all applications for which CE marking is required are accompanied by a specific Declaration of Performance (DoP) attesting conformity with the requirements of a specific technical standard and indicating the maximum percentage quantities to be used in production.

The final goal is that, at the end of its life, the cement or bitumen-based product containing Matrix has pollutant release levels that are lower than the limits set out in Italian Ministerial Decree No. 5/02/1998, as amended and supplemented, and can therefore be classed as "conventional" demolition waste and disposed of through the normal authorised inert waste plants.





Raw material extraction



Material processing



Part manufacturing



Assembly



Product use



End of life

SAFETY DATASHEETS

All Matrix® Family products have their own Safety Datasheet, in compliance with the requirements of EU Regulations 1907/2006/EC (REACH) and 453/2010/EC.

LIFE CYCLE

The most innovative approach to determine the environmental performance of a product is the so-called **Life Cycle Assessment (LCA)**.

An LCA study allows to assess the environmental impacts associated with the various stages in the life cycle of a product and may include the entire life cycle, from extraction of raw materials to final disposal of the product (from cradle to grave), or a significant part of it (from cradle to gate or from gate to gate).

For AGMatrix® and Sand Matrix®, a cradle to gate LCA study was carried out for the obtainment of the EPD® Certification.

The study was conducted by one of the main companies in the field (AMBIENTE ITALIA) and was then validated by certification body Bureau Veritas.

The in-depth study of the product's Life Cycle and the rigorous assessment carried out through the LCA methodology have allowed to validate the actual performance of the Matrix® products in terms of their environmental aspects, that is of their interaction with the environment.

The LCA study was conducted with a view to preparing and validating the EPD® (Environmental Product Declaration), as illustrated further below (see page 21).

Note:

LCA (Life Cycle Assessment): a process that allows to assess the environmental impacts associated with a product, process or activity through the identification and quantification of the materials and energy used and of emissions into the environment, as well as the identification and assessment of opportunities to reduce these impacts (SETAC) during its entire life ("from cradle to grave").

EPD (Environmental Product Declaration): a declaration of environmental performance providing verified and comparable information regarding the environmental impact of a product or service. It is obtained through the completion of an LCA assessment in accordance with the framework rules set out for the various product categories (PCR – Product Category Rules), indicating the rules, requirements and technical characteristics for each specific product category.

The EPD® Certification is issued by the Swedish Environmental Management Council, who manages the International EPD® System, following verification by an accredited external body.

(www.environdec.com)

THE MATRIX® FAMILY CERTIFICATIONS

ODA'S PLANT CERTIFICATIONS

Since 2005, *Officina dell'Ambiente's* plant has been certified to **UNI EN ISO 14001** (certification conducted by prestigious international certification body **DET NORSKE VERITAS**) for the "treatment and recovery of non hazardous special waste through weighing, unloading, storage and manual and mechanical separation" (certificate dated 01/02/2005).

In 2006, the **Lomello site** obtained **EMAS registration** (IT-000555) under EU Regulation 761/2001, now at its third successful three-yearly renewal.

As required under the EMAS Regulation, Oda has prepared **the site's environmental declaration, which is also regularly reviewed** by **DET NORSKE VERITAS**.

This document can be directly downloaded from www.matrixoda.it

As highlighted in the Environmental Policy statement issued by the management, *Officina dell'Ambiente* is committed to the continuous improvement of its environmental performance and pollution prevention practices.

During the year 2015, the Company plans to complete the integration between its current Environmental Management System - complying with technical standard ISO 14001 - and a Safety Management System - complying with standard OHSAS 18001.



ODA'S PRODUCT CERTIFICATIONS

Since 2008, Oda's Production Control System has been certified first to the requirements of Directive 89/106/EEC and then to the requirements of EU Regulation 305/2011 by recognised building sector certification body ICMQ. In addition, all aggregates marketed by Oda carry the CE marking, indicating compliance with a series of technical standards.

Last but not least, **all products in the Matrix® Family have completed the process under UNI EN ISO 14021** authorising the issue of a self-declared environmental claim, validated by **certification body ICMQ**, to attest recycled content.

100% post-consumer recycled content



THE EPD® CERTIFICATION

In March 2013, Officina dell'Ambiente obtained from Bureau Veritas, the validation of its **EPD® (Environmental Product Declaration) for its products Sand Matrix® and AG Matrix®**.

This was the first and only case in Europe of an EPD applied to building aggregates and is now a reference for Green Building. The in-depth study of the product's Life Cycle and the rigorous assessment carried out through the LCA methodology allowed to determine the actual performance of the Matrix® products in terms of their environmental aspects, that is of their interaction with the environment.

The LCA Study then led to the preparation and validation of the EPD® and Officina dell'Ambiente is now the first company in Europe to have obtained the EPD® product certification in the aggregates sector. The positive aspects associated with this validation are:

- the consolidation of the Company's commitment towards sustainability;
- the guarantee, for consumers and commercial partners, that they can make informed and scientifically validated purchase choices;
- the possibility for Matrix users to create specific green ranges (cement products, mortars, etc.) with a known and validated environmental footprint, calculated using - for the part of recycled material consisting of the Matrix product - the data already available through the EPD®;
- the possibility to be included in supply chains for green procurement and large purchase groups (government procurement, large supermarket chains, etc.);
- the implementation of a system for the continuous improvement of the environmental quality of products, using the EPD® results as the starting point for the overall process.



Dichiarazione Ambientale di Prodotto (EPD) delle materie prime seconde o aggregati di origine industriale



Rev. 03 - Febbraio 2015
Numero di registrazione: S.P. 00327
Data approvazione: 21/03/2015
Protocollo di validazione: 20/03/2015
Gruppo CPC: Conoscitore prodotti PCR
2012/01/12, data 2013/05/15



Dichiarazione Ambientale di Prodotto (EPD) delle materie prime seconde o aggregati di origine industriale



Rev. 03 - Febbraio 2015
Numero di registrazione: S.P. 00327
Data approvazione: 21/03/2015
Protocollo di validazione: 20/03/2015
Gruppo CPC: Conoscitore prodotti PCR
2012/01/12, data 2013/05/15



MATRIX® FAMILY PRODUCTS OVERVIEW

MATRIX FAMILY PRODUCT	AGMATRIX	SAND MATRIX	SAND MATRIX	SAND MATRIX	MATRIX
UNI EN 12620 Concrete	System 2+	System 4		System 4	
UNI EN 13043 Bitumen		System 4	System 2+	System 2+	System 2+
UNI EN 13242 Cement-bound mixture	System 4			System 2+	
UNI EN 13139 Mortar			System 4	System 4	

Matrix® is the first aggregate in Europe to have obtained the EPD® Environmental Product Declaration for its products Sand Matrix® and AG Matrix®. (www.environdec.com)

The latest protocol for the LEED® Certification - standard LEED® v4 - awards additional credits (Materials and Resources section) to those construction products and materials that have an EPD® Environmental Product Declaration, and, more in general, to those products for which life cycle information is available (LCA). The attention given by the LEED® Certification system to the LCA/EPD element shows how much demand there is in the sustainable building industry for products and materials with these credentials (and this can only grow in future).



MATRIX® AND THE REACH

EU Regulation 2006/1907/EC, better known as **REACH**, is the **EU standard establishing the criteria for the Registration, Evaluation and Authorisation of Chemicals**. The public body responsible for verifying compliance with REACH requirements and issuing the relevant sale authorisation is the European Chemicals Agency (ECHA), based in Helsinki. The ECHA-issued document "Guidance on waste and recovered substances" (Rev. 2, May 2010) clarifies that:

- waste is exempt from registration;
- Secondary Raw Materials whose physical and geometrical characteristics prevail over chemical composition are classified as Articles and are exempt from registration;
- Secondary Raw Materials whose chemical characteristics prevail over form are to be regarded as Preparations.

The Matrix® Family products and, in particular, Matrix® Standard (used in the production of cement) and Sand Matrix® (used in the production of brick blocks) are classified as Preparations and, as such, are subject to compliance with REACH requirements.

From the start of the REACH registration system, no specific consortium has ever been set up by European producers of MSW incinerator bottom ash in relation to the REACH registration process (like it has instead been done for other types of waste). As a consequence, Officina dell'Ambiente has proceeded to register the main chemical components of its Matrix products independently, without leaving out any critical elements and strictly following the specific classification and labelling criteria set out in the CLP Regulation.

Matrix® is a mixture of a variety of substances and its main 4 components - calcium carbonate, iron oxides, aluminium and calcium – are all subject to registration. The bureaucratic procedure lasted over 2 years and reached its crucial stage on 30/11/2010, when the registration dossier was sent out. The four substances have now obtained final registration under the numbers indicated in the table below.

PRODUCT REGISTRATION		
SUBSTANCE	SUBMISSION NUMBER	ECHA REGISTRATION NUMBER
Al ₂ O ₃	WT197717-85	D1-2119529248-35-0153
Fe ₂ O ₃	XP963332-10	01-2119457614-35-0067
CaO	YU197890-85	01-2119475325-36-0215
CaCO ₃	RV197892-86	01-2119486795-18-0114

As these substances are the main components of all of our products, we can safely say that the entire Matrix® Family is REACH compliant.

THE MATRIX® FAMILY APPLICATIONS IN THE BUILDING INDUSTRY

The Matrix® Family products have wide-ranging applications as a replacement of newly-extracted raw materials in a variety of industrial cycles, as well as in the modern building industry. Here below are the most popular applications, as used by leading Italian and international companies.

CEMENT CLINKER

Thanks to its conformity to REACH requirements, **Matrix®** is used, together with other natural raw materials, as a component of the meal (the finely ground raw material) that is cooked in the cement plant kilns (at a temperature of around 1500°C) **to produce clinker**.

Matrix® is used as a silica-containing material for the adjustment of meals that are too rich in lime or in addition to natural marl, of which it imitates the composition, although with a lower lime content and a higher silica content. It is also valued for its flux content and, because it has already undergone a firing process and partial decarbonation, it also helps reducing the overall CO₂ amount produced by the process.

PREMIXED CONCRETE

Premixed concrete is a conglomerate obtained by mixing (normally with the addition of additives) cement, large and fine aggregate (gravel, grit, sand) and water.

AGMatrix® is used in premixed concrete as a replacement of natural gravel and sand by leading premixed concrete manufacturers.

This product carries the CE marking under standard UNI EN 12620, level of attestation of conformity 2+, which is compulsory in this sector for aggregates. Its use in concrete mixtures counts towards the award of various credits under the "Materials and Resources" section of the LEED® Certification system, both in the LEED® 2009 version and the LEED® v4 version. Sand Matrix® 0-4 mm is also used successfully in this field for the production of "cement-bound mixtures", which is used in civil engineering works and in road construction. Indeed, Sand Matrix 0-4 mm carries the CE marking under standard UNI EN 13242, level of attestation of conformity 2+.

CONCRETE PRODUCTS

In this sector too, both **AGMatrix®** and **Sand Matrix®** are used as aggregates in replacement of sand and gravel (in both their 0-4 mm and 2-4 mm grain sizes) to make a variety of concrete products, including: concrete anti-slip blocks in all shapes, lane dividers, aggregate concrete blocks, etc.





BRICK BLOCKS

The main materials used for the production of brick blocks are clay, aggregates and organic fillers and stuffers (sawdust, polystyrene, perlite, etc.).

When clay is too plastic, sand-type aggregates need to be added to the mixture so as to diminish water requirements and thus reduce shrinking during the drying and firing phases. As identified in a 2007 study, conducted with the cooperation of the Centro Ceramico di Bologna (Bologna Ceramic Centre), **Sand Matrix® 0-2 mm** is particularly suitable as a filler and is an ideal solution to reduce the quantity of natural sands used in the brick-making industry, in conformity with REACH requirements.

CERAMIC

A cooperation between Officina dell'Ambiente, the University of Modena and Reggio Emilia and a leading manufacturer in the Sassuolo district has allowed to demonstrate that **AGMatrix®** can be successfully used as a replacement of feldspar in glazed technical porcelain stoneware. With the necessary technological adjustments, it is possible to replace high percentages of feldspar, with no effect on the mechanical and aesthetical properties of the final product.

BITUMINOUS CONGLOMERATE

Bituminous conglomerate is an artificial mix consisting of a variety of aggregates and a bituminous binder. It is generally employed in the construction of drivable surfaces (roads, runways, etc.).

Aggregates are normally sand, grit and gravel extracted from quarries or deriving from the crushing of rocks. **Sand Matrix®**, both in the 0-2 mm and 0-4 mm sizes, can be used as an industrial fine aggregate in replacement of natural aggregates in the asphalt's base and intermediate (binder) layers.

A study entrusted to a leading materials testing laboratory (accredited with the Italian Supreme Council of Public Works) on the possible use of Sand Matrix® in this sector has been able to demonstrate that all the parameters set out in the general specifications laid down by ANAS (the Italian state-owned company entrusted with the management of roads of national interest) are met.

In recent years, Sand Matrix, in its 2-4 mm grain size, has found an excellent application as recycled sand for the production of cold-laying bitumen, that product, normally sold in bags, that is used for the repair of potholes on the road surface.



STREET FURNITURE

Other possible fields of applications include:

- Paving. Concrete anti-slip blocks: a valid alternative to natural stone and bitumen in the paving of external areas.
- Road infrastructure. Possible applications in this sector include different types of lane dividers of very high quality

PRE-MIXED MORTARS

A constantly-growing sector, in which the product **Sand Matrix 0-2 mm** - carrying the necessary CE marking as required in accordance with standard UNI EN 13139 (Aggregates for Mortar) - is used.

Sand Matrix is used as partial replacement of natural sands for the production of pre-mixed mortars in bags (both standard and fibre-reinforced).



MATRIX IS LEED

The Matrix® Family products can be used to contribute to the achievement of credits for the LEED® (Leadership in Energy and Environmental Design) Certification, the most important energy and environmental performance voluntary assessment system for buildings.

The LEED® scheme, developed by USGBC and currently used all over the world, promotes a sustainability-oriented approach that rewards the performance of buildings in key sectors, such as energy and water savings, reduction of CO2 emissions, improvement of indoor environmental quality, materials and resources, design and site choice.

www.usgbc.org
www.gbccitalia.org

LEED® 2009

The Matrix® Family products can be used to contribute to the achievement of the following credits in the Materials and Resources section of the LEED® 2009 protocol:

MRc4

RECYCLED CONTENT

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

1 TO 2 POINTS

All products in the Matrix® Family can be valued at 100% of their cost as post-consumer recycled content and can therefore be used to contribute to the achievement of the 10% or 20% recycled content threshold required under this credit.

MRc5

REGIONAL MATERIALS

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

1 TO 2 POINTS

All products in the Matrix Family can be valued at 100% of their cost for projects located within the following distances of the production site in Lomello (Pavia, Italy):

- 500 miles (LEED 2009 US);
- 350 km (1050 km if transportation of the material takes place by rail or water) (LEED 2009 Italia).

Matrix products can therefore be used to contribute to the achievement of the 10% or 20% regional content threshold required under this credit.

LEED® v4

Also thanks to their EPD, the Matrix® Family products can be used to contribute to the achievement of the following credits in the Materials and Resources section of the LEED® v4 protocol:

MRc2

ENVIRONMENTAL PRODUCT DECLARATIONS

To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

1 TO 2 POINTS

Option 1

AG Matrix® and Sand Matrix® are EPD®-certified and can therefore be used to contribute to the achievement of the 20 EPD® -certified products required under this credit.

Option 2

AG Matrix® and Sand Matrix® - for which a reduction of environmental impacts below the industrial average has been proven in at least three of the following categories - can be valued at 100% of their cost:

- Global warming potential;
- Depletion of stratospheric ozone layer;
- Acidification of land and water sources;
- Eutrophication;
- Formation of tropospheric ozone;
- Depletion of nonrenewable energy resources.

In addition, for projects located within 160 km from the production site in Lomello, the same products can be valued at 200% of their cost.

The use of AG Matrix® and Sand Matrix® as ingredients for the production of building products contributes and simplifies the LCA assessment of products and the achievement of the EPD® Certification.

MRc3

SOURCING OF RAW MATERIALS

To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

1 POINT

Option 1

All products in the Matrix® Family can be valued at 100% of their cost as post-consumer recycled content; in addition, for projects located within 160 km from the production site in Lomello, they can be valued at 200% of their cost.

The use of the Matrix® Family products as ingredients for the production of building products contributes to increasing the recycled content of said products.



MRc4

MATERIAL INGREDIENTS

To reward project teams for selecting products for which the ingredients in the product are inventoried using an accepted methodology and for selecting products which minimise the use and generation of harmful substances.

1 POINT

Option 1

All products in the Matrix® Family have safety datasheets listing their ingredients together with their CAS numbers and can therefore be used to contribute to the achievement of the 20 products with a chemical inventory; in addition, for projects located within 160 miles from the production site in Lomello, they can be valued at 200% of their cost.

MRc1

BUILDING LIFE-CYCLE IMPACT REDUCTION

To optimize the environmental performance of products and materials.

1 POINT

AG Matrix® and Sand Matrix® are EPD®-certified and their use contributes to simplifying the LCA assessment of buildings.



EXCELLENCE IN LEED® AND GREEN BUILDING APPLICATIONS

1 PORTA NUOVA GARIBALDI

CERTIFICATION

LEED v2.0 Core&Shell Gold

MATERIALS

Concrete blocks,
lightweight screeds



2 PORTA NUOVA VARESINE

CERTIFICATION

LEED v2.0 Core&Shell Gold

MATERIALS

Lightweight
screeds



3 PORTA NUOVA ISOLA

CERTIFICATION

LEED v2.2 NC Gold;
LEED v2.0 Core&Shell Gold

MATERIALS

Cement conglomerate for
non-reinforced foundations
(cement) and concrete



MATRIX® FOR EXPO

In perfect harmony with EXPO 2015 environmental objectives, Officina dell'Ambiente and its Partners have presented their initiative **MATRIX® FOR MILAN 2015 UNIVERSAL EXPOSITION**, a project thought to create and promote a platform of selected manufacturers of **"MATRIX Inside"** building materials and products for the event and the connected initiatives.

PROJECT TARGETS:

- **Organisers and guest countries;**
- **Architects and designers** involved in the design of the various pavilions;
- **Building companies** working in innovative one-theme exhibition areas, such as the so-called clusters;
- LEED and BREEAM-certified **green building and sustainable building markets**

Fill in the online request form to receive by email our "MATRIX® BOOKLET FOR EXPO":

www.matrixoda.it/richiasta-booklet
www.sexpo2015.it



4 TORRE ISOZAKI CITY LIFE

CERTIFICATION

LEED 2009 Core&Shell

MATERIALS

Cement
conglomerate



5 TORRE HADID CITY LIFE

CERTIFICATION

LEED 2009 Core&Shell

MATERIALS

Cement conglomerate for
reinforced structural works
(cement), concrete blocks



6 EDIFICIO LA SERENISSIMA

Via Turati 25/27

CERTIFICATION

LEED Italia 2009 Gold

MATERIALS

VIBECO
concrete blocks



LOOKING AHEAD: FUTURE GOAL

A DEVELOPMENT OF A PRODUCTION CHAIN CERTIFICATION SYSTEM for Matrix Inside product lines

In order to promote the "Matrix Inside" green product lines developed by our Customers, not only in terms of their Environmental Performance, but also in terms of their Traceability, Officina dell'Ambiente is now working with Bureau Veritas to create a "Production Chain Certification System", designed to track recycled content from origin to EOW.

B CREATION OF A NATIONAL ASSOCIATION

Given the need to make our industrial model stand out against other less structured and organised MSW incinerator bottom ash recycling scenarios, we are now working with our customers to create a National Association of Matrix Consumers, i.e.: Matrix Inside manufacturers.

The goal is that of promoting the recycling of MSW incinerator bottom ash in the Sustainable Building sector, and doing so, not only on a commercial level - like, for example, on the occasion of EXPO Milano 2015 or of GREENBUILD Euromed in Verona - but also at an institutional and international level, in line with the environmental sustainability objectives that have long been set out by the European Community.

MATRIX® FAMILY IS MATRIX® INSIDE

ALL PRODUCTS MADE USING THE MA-
TRIX® FAMILY MATERIALS CAN BE MAR-
KED AS MATRIX® INSIDE.

www.matrixoda.it



MATRIX
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