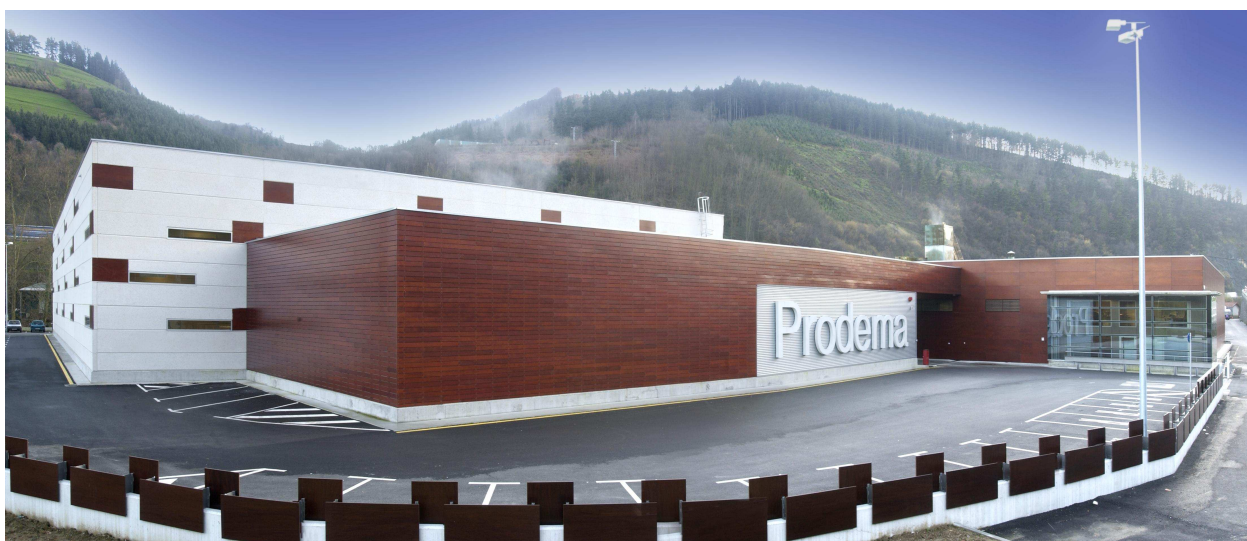


ENVIRONMENTAL
PRODUCT
DECLARATION
ENVIRONMENTAL PRODUCT DECLARATION OF "ProdEX "



1. PRODUCT RELATED INFORMATION

1.1 Specification of the manufacturing company

Name of the manufacturing company:

PRODEMA,S.A.

Production site(s)

This document refers to façade panels from Legorreta's plant (Spain), marketed under the trademark ProdEX®.

Issuer and contacts:

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Information on environmental management system

Prodema is engaged in a comprehensive approach to improving its environmental performance. The production plant is certified Environmental ISO 14.001:2004 and Ecodesign ISO 14.006:2011 (approach to design products with special consideration for the environmental impacts of the products during their whole lifecycle) management systems.

In addition certificates can be provided upon request with the PEFC stamp, which guarantees that the wood and other products with a wood origin used for the manufacturing of the ProdEX panels are from forests that are managed in an environmentally sustainable fashion from a non-controversial origin.

Specific aspects regarding the production

Quality control by a continuous plant-specific production monitoring and regular checking by building-inspection-approved regulatory agency (AENOR).

CE declaration of conformity according to the stipulations of section ZA.2.2 of EN 438-7 External monitoring of the product by TECNALIA Certification in accordance with the general building inspection approval nº: 080110104

Z-33.2-590 by the German quality control and material check organization IFBT GmbH - Institut für Fassaden - und Befestigungstechnik, Leipzig

ATEC 2/09-1355 and ATEC 2/09-1356 by the French quality control and material check organization CSTB - Centre Scientifique et Technique du Bâtiment, Marne-La-Vallée.

Manufacturer's logotype



1.2 Specification of the product

ProdEX panels are a composite panel faced with a natural wood veneer and coated with a proprietary coating, based on synthetic resins and PVDF which protect the panels from the effects of sunlight, chemical attack (anti-graffiti) and the damage caused by atmospheric agents (rain, frost,.....).

ProdEX is used as a cladding material in curtain-type rear-ventilated façades as well as for decorative interior works. Façade panels are also used for suspended ceilings, jambs and access covers

Dimensions of the ProdEX façade panels in accordance with the approvals are:

- Length: 2440 mm (± 2 mm)
- Width: 1220 mm (± 2 mm)
- Thickness: 8 mm ($\pm 0,5$ mm)
- Weight per square meter: 10,80 (kg/m²)

PROPERTIES

Characteristics		Method	Result	Property or attribute	Measure unit
Flexural strength	Long-grain	EN ISO 178	> 80	Resistance	Mpa
	Cross-grain	EN ISO 178	> 80		
Elastic modulus	Long-grain	EN ISO 178	> 9000	Resistance	MPa
	Cross-grain	EN ISO 178	> 9000		
Thermal resistance		EN 12664	0,263	Thermal conductivity (λ)	W/m k
Resistance to climatic shock		EN 438-2 (19)	≥ 4 $\geq 0,8$ $\geq 0,8$	Appearance Flexural strength Elastic modulus	Rating Index Ds Index Dm
Density		EN ISO 1.183	$\geq 1,35$	Density	g/cc
Resistance to humidity		EN 438-2 (15)	≤ 5 ≥ 4	Moisture absorbed Aspect	% Rating

Functional or declared unit

The declared unit is the reference in which all of the life cycle assessment data is expressed. The declared unit is 1 m² of panel Prodex of 2440mm x 1220mm and 8mm thickness.

The declared unit is recommended by the specific PCR for the product (Product category rules construction products 09/01/2012).

1.3 Content of materials and chemical substances

All materials / componets	Substances	Weight %	Weight (g)
Plastics	Acrylic polymer mixture coated with polivinydiflouride (50% of weight is recycled)	1,12	129,6
Synthetic resins	Phenol-formaldehyde resins	34,27	3.956,7
	Melamine-formaldehyde resins	3,41	393,6
Pigments	titanium dioxide, iron oxides	0,03	3,5
Wood veneer	Real wood veneer	4,90	565,4
Paper	Kraft paper (7% of weight is recycled)	54,13	6.249,9
	Bleach paper	2,15	248,5

Availability of raw materials

The natural resources mainly use are:

- Petroleum or crude oil (plastics and synthetic resins): these are present in about 35% of the finished product.
- Mineral resources (pigments): Total content in the product is less than 0,05%.
- Wood based material (wood veneer and paper fibres): Present in about 65% in the finished product.

Raw materials are mainly from sites located close to Prodema site.

Material explanation:

Plastics: An acrylate polymer belongs to a group of polymers which could be referred to generally as plastics. They are noted for their transparency and resistance to breakage and elasticity.

Synthetic resins: thermosetting resins fully polymerized (cured) during the manufacturing process by heat and pressure.

Pigments: Iron and titanium oxides are widespread in nature as minerals and are used as durable pigments in paints. Colours commonly available are in the "earthy" end of the yellow/orange/red/brown/black range or white (titanium dioxide).

The wood veneer is obtained by "peeling" the trunk of a tree. The type of veneer-making equipment used is a rotary lathe in which the wood is turned against a very sharp blade and peeled off in one continuous roll.

Bleached paper: is obtained by the bleaching of wood pulp. Bleaching is the chemical processing carried out on various types of wood pulp to decrease its colour, so that it becomes whiter.

Kraft paper: is produced from chemical pulp produced in the kraft process. Pulp produced by this process is stronger than that made by other processes, and removes most of the lignin present originally in the wood.

Auxiliary /additional materials:

The packaging unit per square meter is:

- Wooden cleat: 0,0210 kg/ m²
- Particleboard: 0,0538 kg/ m²
- Recovered panel: 0,1873 kg/ m²
- Cardboard corner : 0,0025 kg/ m²
- Cardboard plate: 0,0173 kg/ m²
- Packaged film: 0,0045 kg/ m²
- Stretch film protection: 0,0073 kg/ m²
- Protection-film panels: 0,0160 kg/ m²
- Strip: 0,0019 kg/ m²

Note: More than 99% of materials have been included in the LCA. Substances of Very High Concern (SVHC), as described on the REACH regulation¹ have not been used in the manufacture of ProdEX panels.

¹ Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European

The Prodex panels rejected during the product quality control are re-used on the packaging process substituting the particleboard. As a consequence of this substitution there is a reduction of environmental impacts associated to the extraction, transport and manufacturing of the particleboard.

2. HYPOTHESIS AND METHOD

PE International Gabi 4.4 and ELCD databases have been selected as reference databases to define basic materials and processes. Software Gabi 4.4 has been used to develop the LCA model.

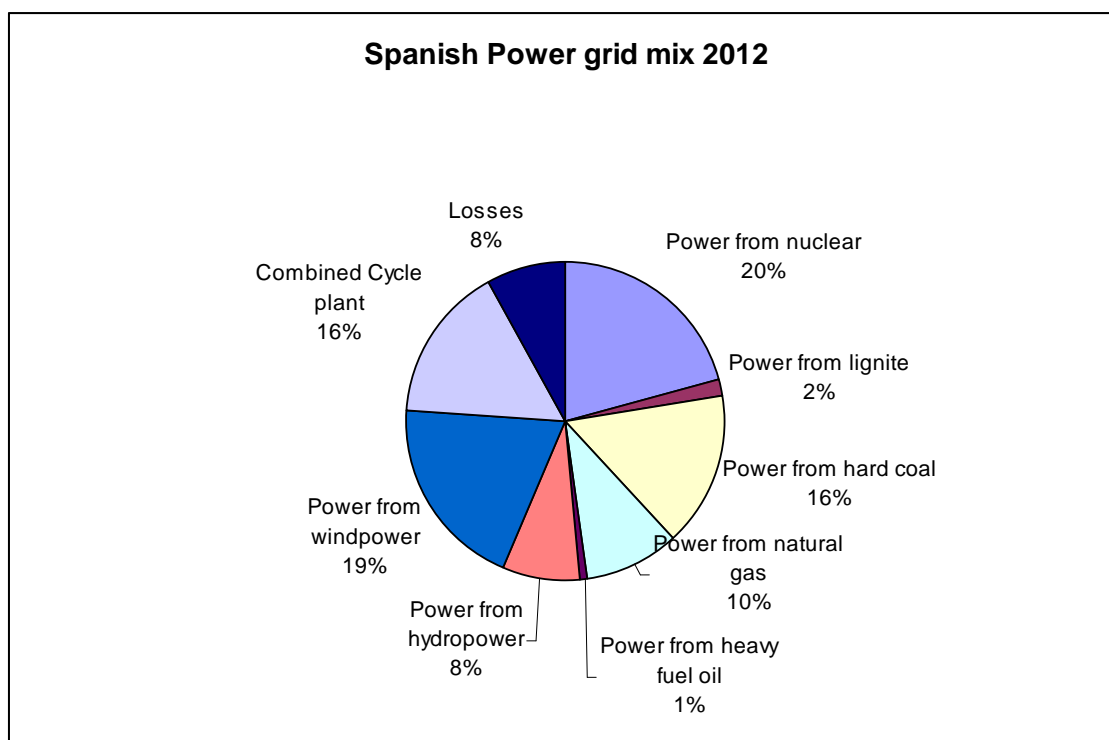
All data used in modelling the processes was obtained during one year of production (2010).

This data represents the current activities carried out by the company in the production of Prodex panel. (as prodex panel is the 51% of the total production at the facilities...). The data specified in this report are valid for the EPD, as at present there are no substantial modifications in the manufacturing process.

Data on the processes used as input for the model, like Kg of raw materials or transport distances of raw materials to manufacturing plant, were specifically collected at the site.

The following assumptions have been taken on the LCA:

- 1- As production of ProdEX is based in Spain, Spanish power grid mix has been chosen (2012). This power grid mix has been modelled from generic data of Spanish network of electricity. The Spanish grid mix, based on the last year data (May 2011-May 2012) presents the following distribution:



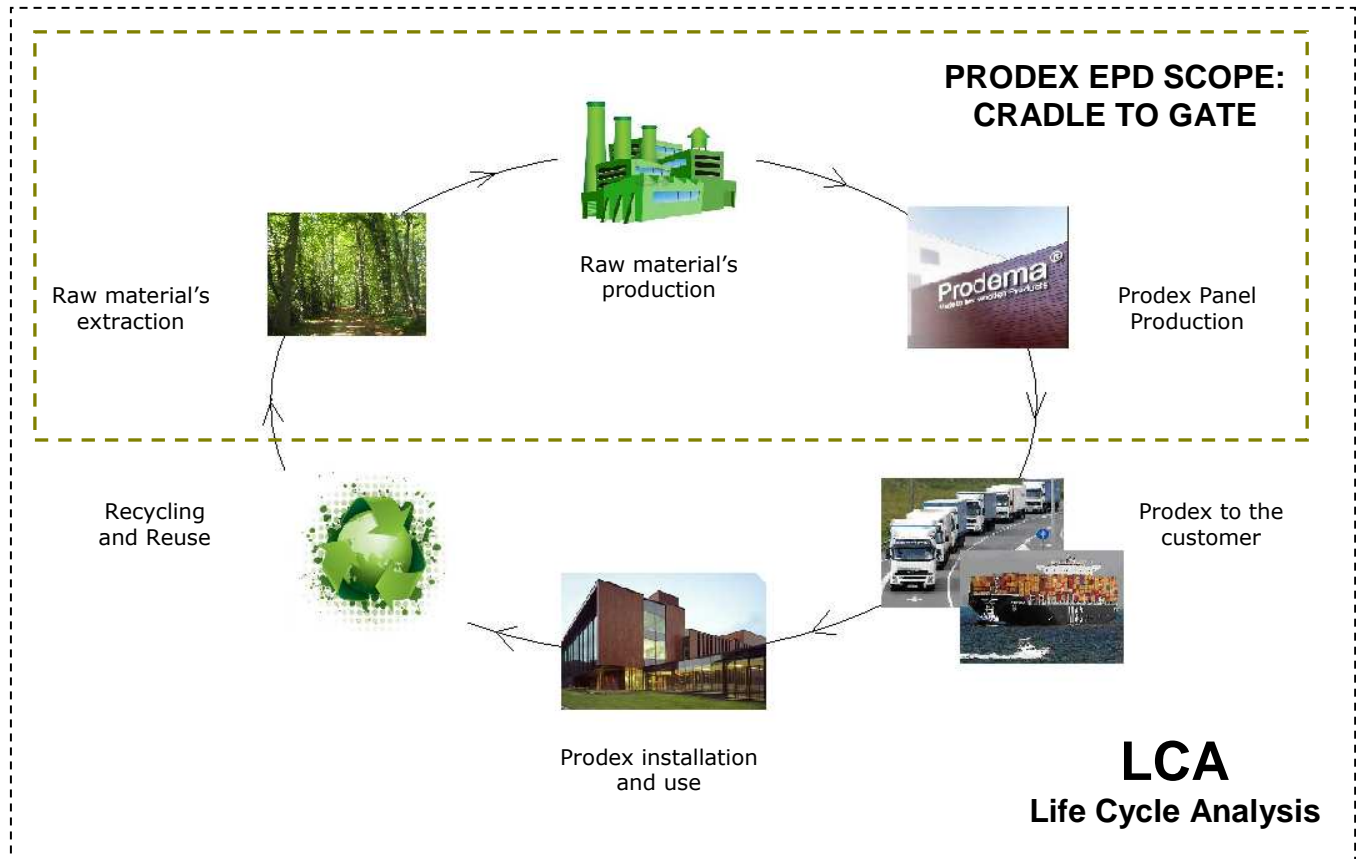
Source: Red Eléctrica Española, www.ree.es

- 2- Emissions to air considered in the model are those measured on site
- 3- The analysis includes transport of raw materials to the manufacturing site and of waste to the treatment plant or landfill. For those cases where transport destination of the waste is not known, a distance of 50 km has been assumed.
- 4- Acrylic film used on the back side of the panel is made of 100% recycled material. Its associated impact and use of film recycled resources have been quantified like recycled material.
- 5- 7% in weight of the kraft paper used as raw material comes from a recycled origin, 90% of which derives from post-consumption and a 10% from pre-consumption.
- 6- Environmental data for input materials has been sourced from PE International Gabi 4.4 database.
- 7- Environmental impacts are those prescribed in the CML 2001 methodology for calculating environmental impact. This methodology is fully developed and used at an European level due to the reliability of its data and its scientific bases which are supported in the methodology and procedures established by Guinée et al.(2001).

This study was carried out in order to understand the environmental impact of ProdEX product from "cradle to gate", including raw material supply, transport, and manufacturing phases.

The "ProdEX" production process consists of various stages divided into upstream and core.

The upstream process includes extraction/production of materials, and core includes transportation at plant, and manufacturing.
The use stage and end of life stage have not been considered in this environmental product declaration, following recommendations of the PCR for the product (Product category rules construction products 09/01/2012).



In the absence of product-specific category rules, the study and declaration have been developed in conformity with the relevant PCR Construction products and CPC division 54 construction products and services; Environdec 09/01/2012 . These Product Category Rules provide guidance on the limits of the system, assumptions, and presentation of results.

3. PRODUCTION PROCESS

The ProdEX production process consists of various stages divided into upstream and core.

3.1 Manufacturing phase

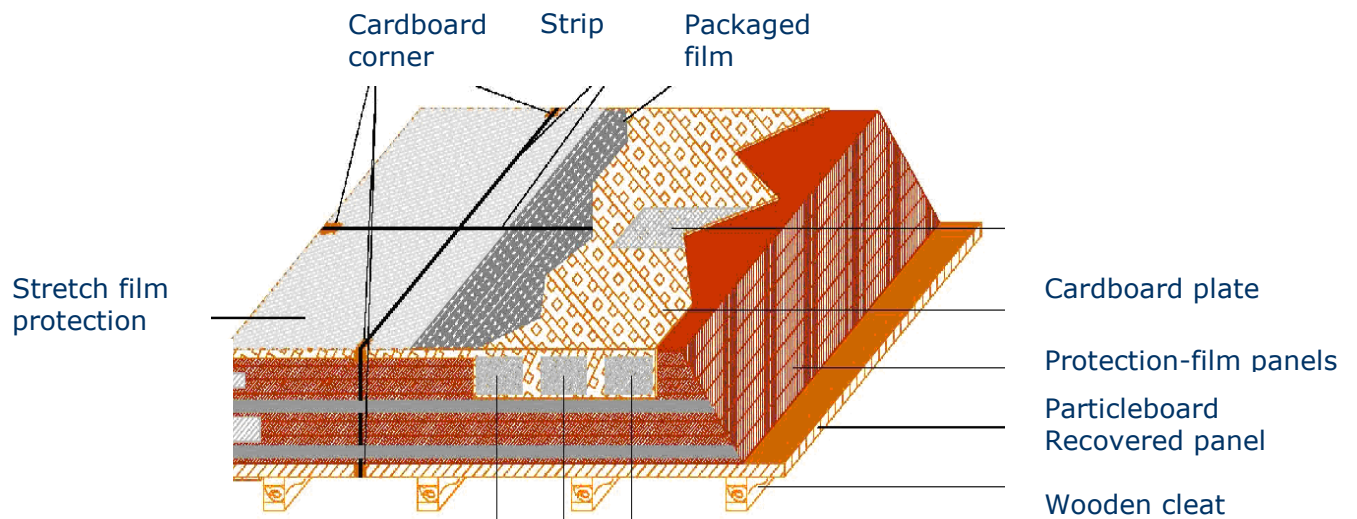
Upstream process:

The first stage starts with the extraction/ production of following raw materials:

PRODEX PANEL RAW MATERIALS

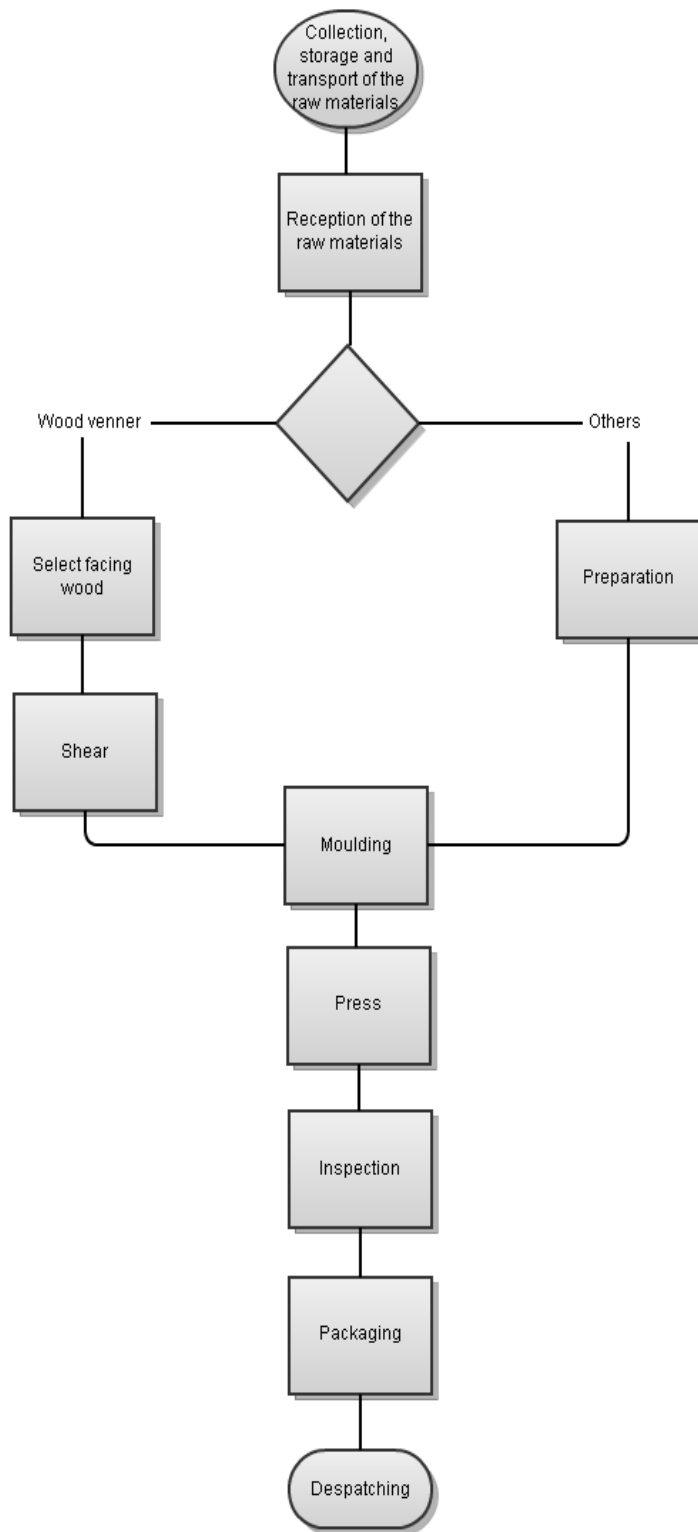


PACKAGING RAW MATERIALS



Core Process:

Production Flowchart



Process description

The first stage starts with the collection, storage and transport of raw materials at plant.

Reception of the raw materials: Initial examinations are performed.

Moulding: The material is placed on the moulding platform after which it is sent to the hydraulic press.

Press: The pressing process consists of the simultaneous application of high pressure and heat (cold / hot / cold) which facilitates the fluid thermo-stable resins to become a homogeneous material with a non-porous surface finish.

Once the pressed material is on the un-loader, each board is removed one by one

Inspection: The finished product is checked to ensure there are no defects such as cracks, wrinkles, or tears on the surface of the top layer.

There are also quality checks performed during production to monitor the quality of the material. The materials are subjected to standard tests to check the density, resistance to humidity, dimensional stability, flexural strength and elastic modulus.

Packaging: The production process is considered complete at the time the order is completely packaged and sent for dispatch.

Health protection during manufacturing

Over the entire manufacturing process, no further health protection measures are required in addition to the legally specified safety measures for manufacturing firms.

Environmental protection during manufacturing

Air: Emissions that are released into the air from the site are mainly volatile organic compounds (VOCs) and dust. The company conducts regular monitoring of its VOCs emissions, which are consistent with the strictest European regulations on our industry. Dust emissions, which are related to the cutting of the panels during the manufacturing process, are limited by capture systems. This protects employees' health and reduces direct emissions of dust into the atmosphere.

Water: The water consumption is as a consequence of the need for the production of the steam needed for the hot part of the cycle and the cooling water for the cold part of the cycle. As the hot/cold system function independently, the production process requires a minimum amount of water. Any water loss is through evaporation in the cooling tower.

Ground: No component panels seep into the ground.

Noise: As a result of in-house noise control measures, the noise emissions are well under the limit values.

Residual material: During the manufacturing process, the container residue left is minimal. The wooden pallets are re-used and the metal residue is collected for recycling. Cardboard and plastics are also collected for recycling.

3.2 Processing phase

Cutting recommendations

Due to their composition, ProdEX's panels are extremely hard and therefore we recommend the use of tungsten carbide (Widia) and polycrystalline diamond (PCD) saws because of the toughness and longer-life qualities of these saws. More ordinary saws used for cutting softer wood-based materials would not be suitable. The saws must be perfectly sharpened or they could cause splintering on the surface of the panel.

Health protection during processing phase

When processing the façade elements, work safety measures must be complied with:

- The use of gloves which provide protection against cuts, is recommended
- Safety glasses must be worn for protections against solid projections when cutting.
- A face mask must be worn when doing work that produces dust.

Environmental protection during processing phase

Residual material: In this phase there is minimal packaging produced. The polythene film and cardboard are both recyclable. The pallets used for the transportation of the manufactured product are re-usable. The residue which might be produced during the installation process can also be disposed off by industrial incineration.

3.3 Use phase (additional information, outside boundary limits)

ProdEX is a high pressure compact laminate that can be fixed to a timber or metal sub-frame to provide a decorative/protective façade over the external walls of buildings.

Effect relationships - Environmental health

Emissions into the atmosphere during product use: The VOC emission of the finish product corresponds to the lowest level, less than 50% of the E1 class, which is evaluated by comparing the results that have been obtained by measurements carried out according to the European regulation 717-2:1994

The surface of the panel does not provide a favourable environment for the proliferation of micro-organisms, mould or bacteria. It does not favour the proliferation of mites.

Cleaning: ProdEX's panels do not require any particular maintenance and the non-porous nature of the panel surface acts as a dirt repellent. However if needed due to possible atmospheric dirt present, can be cleaned with a damp cloth and a mild detergent. The environmental impact is very low. Since the need for maintenance of the panels is low, the water pollution by detergents is limited.

If there is any adhesive, paint ink or other type of residue these can be cleaned with organic solvents such as denatured alcohol. In addition and due to the non-adherent nature of the panel, it acts as graffiti repellent, since the aerosol paint cannot adhere to the surface permanently.

Maintenance: ProdEX does not change throughout its life in terms of its structure. It can be easily removed and separated from the substructure that is attached to, thus facilitating the separation of all the parts and allowing for the re-using of the panels if necessary. It also makes it easier to classify its different components for recycling.

Energy Management: Ventilated façade systems that use ProdEX's panels can incorporate a thick insulating thermal underlay to keep the thermal values high. Since the façade system is quite a light system, work carried out to improve the energy efficiency of the building can be achieved without having to consolidate the foundations. The heat from the sun can disperse through the air flow behind the ventilated façade, therefore reducing the need for air conditioning during the summer months. Ventilated façades improve the quality of the air inside a building. The resistance to the thermal conductivity of the panels is 0.263W / m K according to the EN 12664 regulation.

3.4 End of life phase (additional information, outside boundary limits)

Re-use: Due to its composition, the life span of the panels (50 years) is longer than its aesthetic period. Depending on the volume, the panels can be reused in accordance with their original purpose if the buildings are dismantled.

Façade elements resultant from dismantling can be used for components with lower visual requirements.

Recycling: The cellulose fibre core and the thermosetting wood veneer can be easily recycled. Different recycling uses for these materials could include using it as filler material in wood-based panels to be used in the construction industry.

Disposal: When the recycling options mentioned above are not viable, residual elements produced on the construction site, production fractures and elements

from the demolition and deconstruction of the façade can easily be disposed off and do not represent a remarkable environmental contamination.

Sub-construction: Depending on the volume, the timber or aluminium profiles from the sub-structure can correspondingly be reused directly in accordance with their original purpose or recycled if the buildings are deconstructed carefully.

3.5. Exceptional impacts (additional information)

Fire: All fire extinguishing substances are appropriate (water, foam, powder, CO₂, halon).

A fire may generate a dense black smoke as when burning under free air conditions. Nitrogen oxide, carbon monoxide, carbon dioxide and water arise. There are no additives based on heavy metals like cadmium (cd), lead (Pb) or mercury (Hg). A face shield should be worn and observing the general regulations regarding the measures for fire precaution is recommended.

4. ENVIRONMENTAL PERFORMANCE RESULTS

In the following section the environmental performance and the use of raw materials is reported according to the PCR Construction products and CPC division 54 construction services; Environdec 09/01/2012, including the upstream process, and the manufacturing process or core stage.

4.1 ENVIRONMENTAL IMPACTS

Characterization factors are those prescribed in the CML 2001 methodology for calculating environmental impact. This methodology is fully developed and used at an European level due to the reliability of its data and its scientific bases which are supported in the methodology and procedures established by Guinée et al.(2001).

The following table presents environmental impact per declared unit for the following categories:

Indicator	Units	Total	Upstream	Core
Global Warming Potential (GWP, 100 years)	Kg CO ₂ equiv	2,57E+01	2,45E+01	1,20+00
Acidification Potential (AP)	Kg SO ₂ equiv	1,03E-01	9,52E-02	8,02E-03
Eutrophication Potential (EP)	Kg PO ₄ ⁻³ equiv	2,72E-02	2,59E-02	1,30E-03
Photochemical Ozone Creation (POCP)	Kg C ₂ H ₄ equiv	2,61E-02	2,48E-02	1,32E-03
Depletion Potential of the stratospheric Ozone layer (ODP,Steady state)	Kg CFC 11 equiv	2,20E-06	2,20E-06	1,99E-09
Abiotic Depletion Potential (ADP)	Kg Sb equiv	2,83E-01	2,75E-01	8,01E-03

4.2 Use of natural resources

The following table presents the use of resources per declared unit for the following categories:

	Units	Total	Upstream	Core
Use of natural resources				
Non renewable resources				
Material resources	Kg	7,49E+00	7,40E+00	8,89E-02
Inert rock	Kg	4,75E+00	4,67E+00	8,41E-02
Limestone	Kg	4,02E-01	4,00E-01	1,21E-03
Natural aggregate	Kg	1,52E+00	1,52E+00	5,58E-04
Energy resources, net calorific value	MJ	6,36E+02	6,20E+02	1,67E+01
Renewable resources				
Material resources	Kg	3,58E+01	3,57E+01	9,65E-02
Air	Kg	3,44E+01	3,43E+01	9,62E-02
Energy resources, net calorific value	MJ	1,31+02	1,30+02	1,86E-02
Water use (l)	l	1,01E+03	1,00E+03	5,57E+00
Electricity consumption	MJ	1,42E+01	1,42E+01	0,00E+00

4.3 Other indicators

The following indicators are also reported in the EPD per declared unit:

Indicator	Units	Total	Upstream	Core
Non hazardous waste	Kg	4,74E+00	-	4,74E+00
Hazardous waste	Kg	4,61E-02	-	4,61E-02
Radioactive waste disposal	Kg	5,11E-03	-	5,11E-03

Parameters	Units	Total	Upstream	Core
Components for re use	Kg	-	-	-
Materials for recycling	Kg	-	-	-
Materials for energy recovery	Kg	5,44E-01	-	5,44E-01

Parameters	Units	M ² of ProdEX®	Upstream	Core
Use or renewable secondary material	Kg	-	-	-
Use of non renewable secondary material	Kg	6,53E-02	-	6,53E-02

5. Programme related information and mandatory statements

This EPD® refers to the International System EPD® developed by the International EPD® Consortium (IEC) and is available, on the website, www.environdec.com

5.1 Comparisons of EPDs within this product category

This EPD has been developed according to the PCR Construction products and CPC division 54 construction services; and EN 15804:2011.

“EPDs and PCRs from different programmes may not be comparable”

5.2 Verification and registration

The EPD shall give the following information about the verification process:

EPD Programme:	The International EPD® System. For more information — www.environdec.com
Registration no:	date
Date of publication:	date
EPD validity:	date
EPD valid within the following geographical area:	Specify relevant area, regions etc
Generic PCR review conducted by (if relevant):	If a framework or so called generic PCR is based for the PCR work it shall be referred to here. Name and organization of the chair, and information on how to contact the chair through the programme operator
PCR review conducted by:	
Independent verification of the declaration and data, according to ISO 14025:	Internal, external or EPD process certificate, and if external name of the third party verifier.
Accredited or approved by (if relevant):	Name of the organisation

5.3 CONTACT

For more information about Prodema S.A. and its products check the company web site (www.prodema.com) or contact Fernando Encio (fencio@prodema.com)
 Technical support for the development of this EPD was given to Prodema S.A. by **TECNALIA RESEARCH & INNOVATION** (www.tecnalia.com). Contact details at TECNALIA regarding LCA models and EPD development:
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 -Lara Mabe (lara.mabe@tecnalia.com)
 -Beatriz Sánchez (beatriz.sanchez@tecnalia.com)

5.4 REFERENCES

**PCR Construction products and CPC division 54 construction services;
Environdec 09/01/2012 .**

**EN ISO 14025:2010 Environmental labels and declarations — Type III
environmental declarations — Principles and procedures.**

**EN 15804:2012 Sustainability of construction works — Environmental
product declarations — Core rules for the product category of construction
products.**