ENVIRONMENTAL PRODUCT DECLARATION

In accordance with International Standard ISO 14025

ABS PASSIVE HOUSING

Approval Date: 2018/01/10
Validity: 3 years
Valid until: 2021/01/09
Based on PCR 2013:01 Prefabricated buildings, v 1.1
EPD® Scope: Spain
Registration number: S-P-01242

ISOVER SAINT-GOBAIN

ABS AMERICAN BUILDING SYSTEM

General Information

Manufacturer: Saint Gobain Isover Ibérica SL (Avenida del Vidrio S/N. 19200 Azuqueca de Henares, España). American Building System, ABS (Avenida Conde Romanones 22. 19200 Azuqueca de Henares, España).
Programme used: The International EPD® System. More information www.environdec.com
EPD® registration number: S-P-01242
PCR identification: PCR 2013:01 Prefabricated buildings v. 1.1
Product name: ABS PASSIVE;
UN CPC Code: 531 Buildings
Manufacturer represented: Saint Gobain Isover Ibérica SL/American Building System SL
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Declaration issued: 2018/01/10, **valid until**: 2021/01/09

EPD programme operator	The International EPD® System. Operated by EPD® International AB. www.environdec.com.
PCR review conducted by	The International EPD® System technical committee
ACV y EPD® prepared by Saint Gobain Isover Ibérica SL	
Independent verification of the declaration and data, according to EN ISO 14025:2010 Internal ☐ External ☒	
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www.isover.es/www.abs.es	

Product description

Product description and description of use:

This Environmental Product Declaration (EPD®) describes the environmental impacts of the life cycle of the ABS PASSIVE model housing, with a constructed surface of 96 m^2 (on a single floor) and an Atemp[1] of 81,2 m^2, with a lifespan of 50 years (use during 10 years).

The ABS PASSIVE housing can be installed in virtually any place in the world, using for the study a 200km transport distance and is located in Azuqueca de Henares. It has been manufactured by American Building System in a clear commitment to sustainable architecture and energy efficiency through the combination of different strategies both passive and the installation of high efficiency equipment. All this has allowed the housing ABS PASSIVE to obtain the world wide Passivhouse label.
This house synthetizes the commitment and know-how of ABS and Isover Saint-Gobain in the development of sustainable construction, more specifically, in the development of industrialized

[1] Temperature controlled area, i.e. spaces that are intended to be heated or cooled by an energy system, limited by the inside of the building envelope.

construction, answering the consumers' demand of low energy and resources consuming dwellings through its life cycle.

ABS PASSIVE housing consists of three bedrooms, two bathrooms (double room with bathroom and dressing room), living-dining room kitchen and facility/laundry room and 11,75 m² porch. It has an aerothermal and heat recovery system, together with high insulation enclosure, triple glass joinery and shading elements that minimizes to the maximum power consumption in addition to improve indoor air quality.

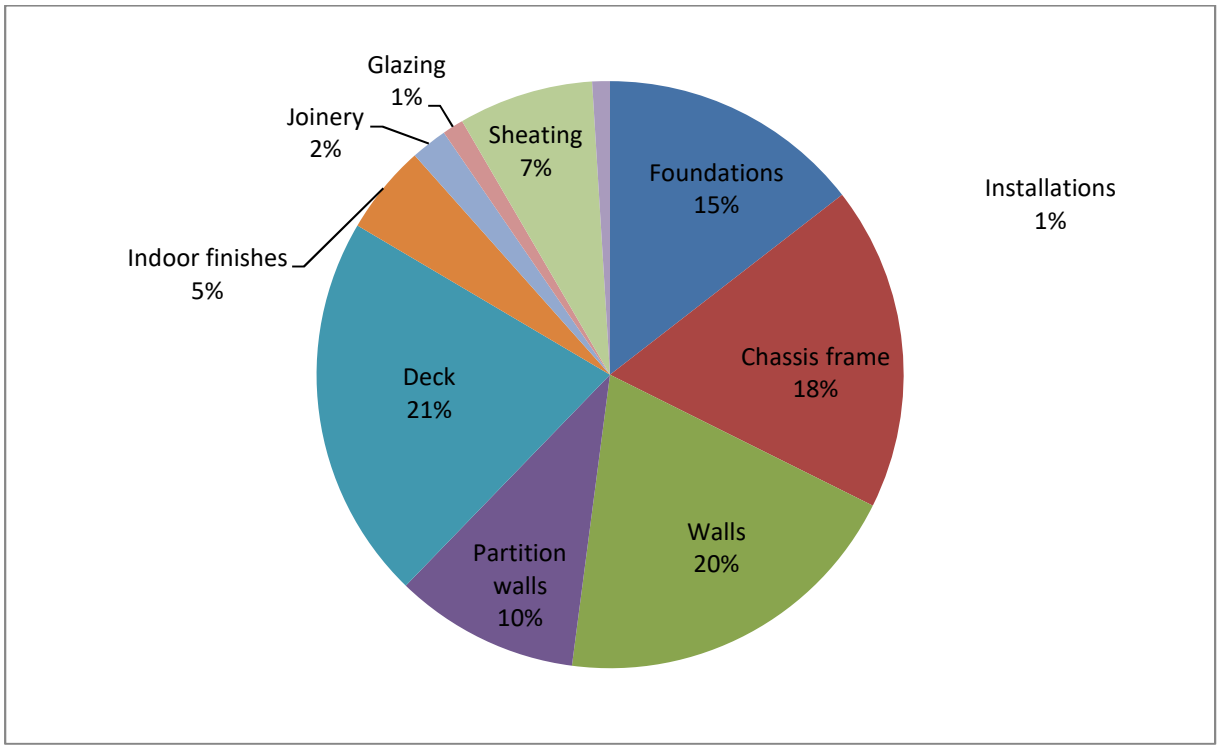

Figure 1 Description of materials use in ABS Passive housing in weight (%) by product groups.

MATERIALS/COMPONENTS	SUBSTANCES	QUANTITY OR WEIGHT (Kg)
Indoor finishes	Paint Stoneware flooring Grip paste Wooden platform	Total weight:1.001 Kg
Glazing	Triple glass	Total weight: 238 Kg
Joinery	Indoor doors Wardrobe Joinery Entrance door	Total weight: 305 Kg
Chassis frame	Galvanised steel beam Geotextile sheet Wooden beam Mineral wool IBR Isover Saint Gobain Waterproof board Screws Glue	Total weight: 3.624 Kg Wool thickness: 16 cm
Foundations	Concrete deck	Total weight: 2.944 Kg
Deck	Truss+beam+wood insert Gypsum board Placo Saint Gobain Wooden board Waterproofing sheet Mineral wool insulator IBR Isover Saint Gobain	Total weight: 4.311 Kg Thickness: 36 cm
Installations	Joining elements Light points Cables Ventilators Flow controller Heat recovery system Remote control Ventilation grid and silencer Pipes Heat pump	Total weight: 199 Kg
Walls	Wood stud Screws Glue Mineral wool insulation Eco 035 Isover Saint Gobain Mineral wool insulation Isofex Isover Saint Gobain Wood panel board Gypsum board Placo Saint Gobain 4Pro PPM13 Block-one tape	Total weight: 4.003 Kg Wool thickness: 9 cm Wool thickness: 14 cm
Sheating	Weber Saint Gobain mortar Cement panel Clamps and screws	Total weight: 1.509 Kg
Partition walls	Channel+plate stud Gypsum board Placo Saint Gobain 4Pro PPM13 Screws	Total weight: 2.066 Kg

The product does not contain any hazardous substance present in the “Candidate List of Substances of Very High Concern (SVHC) for authorization[2]” in a percentage higher than 0,1% of the product weight.

[2] http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

LCA calculation information

FUNCTIONAL UNIT	-Life cycle of ABS Passivhaus housing, occupied by five people with a 96 m^2 built area and Atemp of 81 m^2, with a use stage of 10 years and use during 335 days per year. -One day of use of the housing.
SYSTEM BOUNDARIES	Cradle to grave: Mandatory stages = A1-3, A4-5, B1-7, C1-4. Optional stage = D has been taken into account.
REFERENCE SERVICE LIFE (RSL)	10 years[3].
CUT-OFF RULES	No more than 1% of the total energy consumption and 1% of the total mass input has been omitted from each unit process. For each information module (A1-3, A4-5, B1-B7 and C1-C4), not more than 5% of material and energy input flows have been excluded. Employee-related activities such as transport to and from work are not included. Furthermore, flows related to the construction of production plants, production equipment and transport systems are exempt. Mentioned flows are considered negligible in comparison with manufacture of construction products (if we compare considering systems useful life time). The manufacture of the communications facilities and lamps has not been included.
ALLOCATIONS	Allocation criteria are based on physic units.
GEOGRAPHYCAL COVERAGE TERM	International 2016

- EPDs® within the same product category but from different programmes may not be comparable.
- The verifier and the programme operator do not make any claim nor have any responsibility of the legality of the product.

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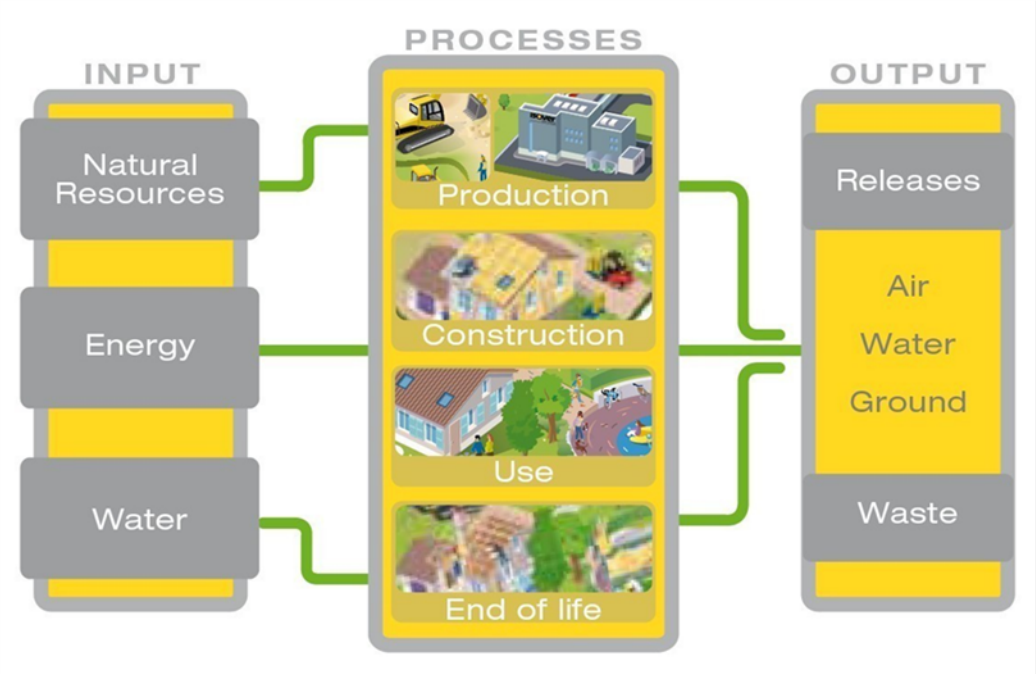
[3] Real Reference Service Life of the building: 50 years

Life cycle stages

Flow diagram of the Life Cycle.



Product stage, A1-A3

Description of the stage: The product stages of mineral wool are subdivided into 3 modules A1, A2 and A3 respectively, Raw material supply, Transport and Manufacturing.

According to the ISO EN 15804, the results for upstream processes shall be declared as a single aggregated information module, A1-3.

Description of the scenarios and other additional technical information:

A1, Raw material supply
This module includes the extraction and processing of raw materials and energy from the primary sources for the manufacturing of all construction products used in ABS Passivhaus housing.

A2, Transport
This module includes the transportation to the factory where raw materials are processed.

A3, Manufacture
This module includes the manufacture of products and packaging materials, as well as waste management and factory power consumption.

Flow diagram of production process

Construction product stage, A4-A5

Description of the stage: the construction process stage is subdivided into 2 modules: A4, Transport and A5, Installation.

A4, Transport to building site: this module includes the transportation of the building from the factory to the building site (Azuqueca de Henares, Guadalajara, Spain).

The transport is calculated according to scenarios, described in the table below.

PARAMETER	VALUE/DESCRIPTION
Fuel type and consumption of vehicle and vehicle type used for transport e.g. long distance truck, boat etc	Average truck trailer with > 32t payload, diesel consumption of 32 litres for 100 km
Distance	200 km
Capacity utilization (including empty returns)	100 % of the capacity in volume % of empty returns assumed in Ecoinvent 3.3
Bulk density of transported products *	181 Kg/m2
Volume capacity utilisation factor	Not applicable

A5, Installation in the building: this module includes

- Any waste produced during the installation process (any waste produced).
- Since there are not any losses during the installation process any additional manufacturing process in order to compensate losses is required.

PARAMETER	VALUE/DESCRIPTION
Ancillary materials for installation (specified by material)	Any ancillary material is used during installation because it is an industrialized housing
Water use	Any water is not consumed during installation
Other resource use	Any other resource is used
Quantitative description of energy type (regional mix) and consumption during the installation process	Diesel consumption to unload the housing: 9.160 MJ Electricity consumption (mix Spain 2016): 30 KWh
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Waste materials are not produced in the building site because it is an industrialized housing
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Any waste produced
Direct emissions to ambient air soil and water	-

Use stage (excluding potential savings), B1-B7

Description of the stage: The use stage is divided into the following modules:

- B1: Use (negligible impact)
- B2: Maintenance
- B3: Repair (any reparation performed)
- B4: Replacement (any replacement performed)
- B5: Refurbishment (any refurbishment performed)
- B6: Operational energy use
- B7: Operational water use

Description of the scenarios and additional technical information:
Once the installation is complete, the following actions or technical operations are required during the use stages until the end of life stage.

B2. MAINTENANCE	
PARAMETER	**VALUE/DESCRIPTION**
Maintenance process	Cleaning
Maintenance cycle	Cleaning: weekly
Ancillary materials for maintenance (cleaning products)	Soap: 5ml/l of floor cleaning water
Waste material resulting from maintenance	Not significant
Net fresh water consumption during maintenance	Floor cleaning: 10 l/ per week
Energy input during maintenance, energy carrier type and amount if applicable and relevant	Vacuum cleaner: half hour per week

B6-B7. OPERATIONAL WATER AND ENERGY USE	
PARAMETER	**VALUE/DESCRIPTION**
Ancillary materials specified by material	-
Net fresh water consumption	0,200 m^3/day
Type of energy carrier	Electricity: 7,22 kWh/day
Power output of equipment	-
Characteristics performance	Heating: 4,34 KWh/day Cooling: 1,94 kWh/day Domestic hot water: 0,94 kWh/day
Further assumptions for scenario development	Use: 335 days/year (during 10 years) Occupants: 5

End of Life Stage, C1-C4

Description of the stage: this stage includes the next modules

C1, Deconstruction, dismantling, demolition

At the end of housing lifespan, the entire structure is deconstructed.

C2, Transport to waste processing

The demolition waste is transported to the waste manager.

C3, Waste processing for reuse, recovery and/or recycling
All materials are reused except the concrete deck.

C4, Disposal (removal), physic pre-treatment and management
Wastes from concrete deck are deposited in landfill.

Description of the scenarios and additional technical information: (see table below)

End of Life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	20,30 Tn collected separately
Recovery system specified by type	17,36 Tn reused/recycling
Disposal specified by type	2,94 Tn of reinforced concrete to controlled landfill
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 16-32t payload, diesel consumption of 21 litres per 100 km 50 km of average distance to landfill

Reuse/recovery/recycling potential, D

Description of the stage: module D has been included, including the environmental savings achieved as a result of the reuse of the materials at the manufacturing plant and at the end of life of the building. At the end of life, it can be used on the same location, moved to other location or its elements can be reused/recycled per pieces because the housing can be disassembled easily.

LCA results

LCA model, aggregation of data and environmental impact have been calculated with Simapro 8 software. CML-IA baseline v 4.1 impact method, Ecoinvent 3.3 LCA database and EPDs® from Saint Gobain products has been used to obtain the inventory data of generic processes. EDIP 2003 impact model has been used to calculate waste indicators. The quantity of raw materials used have been gathered directly by American Building Systems from a real house, and energy consumption in climatization has been modelled with HULC software.
Results are shown for the entire housing, and per day of use.

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction stage		Use stage							End of Life Stage				D Reuse, Recovery, Recycling
	Production A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP) – ***kg CO2 equiv/FU***	2,26E+04	3,18E+02	8,56E+02	0,00E+00	5,55E+02	0,00E+00	0,00E+00	0,00E+00	7,81E+03	5,57+01	0,00E+00	1,71E+02	0,00E+00	1,56E+01	-1,71E+04
kg CO2 equiv/day	6,77E+00	9,52E-02	2,56E-01	0,00E+00	1,66E-01	0,00E+00	0,00E+00	0,00E+00	2,33E+00	1,66E-02	0,00E+00	5,11E-02	0,00E+00	4,68E-03	-5,11E+00
The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.															
Ozone Depletion (ODP) ***kg CFC 11 equiv/FU***	8,11-03	6,01E-05	1,56E-04	0,00E+00	3,64E-05	0,00E+00	0,00E+00	0,00E+00	9,32E-04	4,93E-05	0,00E+00	3,11E-05	0,00E+00	5,26E-06	-7,53E-03
kg CFC 11 equiv/day	2,42E-06	1,79E-08	4,66E-08	0,00E+00	1,09E-08	0,00E+00	0,00E+00	0,00E+00	2,78E-07	1,47E-08	0,00E+00	9,31E-09	0,00E+00	1,57E-09	-2,25E-06
Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.															
Acidification potential (AP) ***kg SO2 equiv/FU***	1,11E+02	1,08E+00	6,51E+00	0,00E+00	1,91E+00	0,00E+00	0,00E+00	0,00E+00	5,26E+01	3,64E-01	0,00E+00	5,67E-01	0,00E+00	1,18E-01	-8,38E+01
kg SO2 equiv/day	3,33E-02	3,24E-04	1,94E-03	0,00E+00	5,70E-04	0,00E+00	0,00E+00	0,00E+00	1,57E-02	1,09E-04	0,00E+00	1,70E-04	0,00E+00	3,52E-05	-2,51E-02
Acid depositions have negative impacts on natural ecosystems and the man-made environment including buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.															
Eutrophication potential (EP) ***kg (PO4)3- equiv/FU***	3,56E+01	2,40E-01	1,49E+00	0,00E+00	9,05E-01	0,00E+00	0,00E+00	0,00E+00	8,90+00	9,42E-01	0,00E+00	1,26E-01	0,00E+00	2,51E-02	-2,57E+01
kg (PO4)3- equiv/day	1,06E-02	7,18E-05	4,45E-04	0,00E+00	2,70E-04	0,00E+00	0,00E+00	0,00E+00	2,66E-03	2,81E-04	0,00E+00	3,77E-05	0,00E+00	7,50E-06	-7,70E-03
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.															
Photochemical ozone creation (POPC) ***Ethene equiv/FU***	7,76E+00	5,36E-02	1,74E-01	0,00E+00	2,26E-01	0,00E+00	0,00E+00	0,00E+00	2,14E+00	1,68E-01	0,00E+00	2,89E-02	0,00E+00	5,77E-03	-6,28E+00
Ethene equiv/day	2,32E-03	1,60E-05	5,19E-05	0,00E+00	6,75E-05	0,00E+00	0,00E+00	0,00E+00	6,39E-04	5,01E-05	0,00E+00	8,64E-06	0,00E+00	1,72E-06	-1,88-03
Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.															

Abiotic depletion potential for non-fossil resources (ADPelements) - *kg Sb equiv/FU*	1,06E-01	5,86E-04	2,90E-04	0,00E+00	1,25E-03	0,00E+00	0,00E+00	0,00E+00	1,69E-02	2,22E-03	0,00E+00	4,99E-04	0,00E+00	1,75E-05	-9,60E-02
kg Sb equiv/day	3,17E-05	1,75E-07	8,68E-08	0,00E+00	3,73E-07	0,00E+00	0,00E+00	0,00E+00	5,04E-06	6,63E-07	0,00E+00	1,49E-07	0,00E+00	5,22E-09	-2,87E-05
Abiotic depletion potential for fossil resources (ADP-fossil fuels)*MJ/FU*	2,96E+05	5,22E+03	1,32E+04	0,00E+00	3,10E+03	0,00E+00	0,00E+00	0,00E+00	9,02E+04	5,58E+03	0,00E+00	2,71E+03	0,00E+00	4,71E+02	-2,40E+05
MJ/ day	8,84E+01	1,56E+00	3,94E+00	0,00E+00	9,25E-01	0,00E+00	0,00E+00	0,00E+00	2,69E+01	1,67E+00	0,00E+00	8,11E-01	0,00E+00	1,41E-01	-7,16+01
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE

Parameters	Product stage	Construction stage		Use stage							End of Life Stage				D Reuse, Recovery, Recycling
	Production A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy excluding primary energy resources used as raw material- *MJ/FU*	2,25E+05	7,20E+01	1,18E+02	0,00E+00	5,28E+03	0,00E+00	0,00E+00	0,00E+00	4,16E+04	7,93E+02	0,00E+00	3,28E+01	0,00E+00	1,12E+01	-2,35E+05
MJ/ day	6,72E+01	2,15E-02	3,52E-02	0,00E+00	1,58E+00	0,00E+00	0,00E+00	0,00E+00	1,24E+01	2,37E-01	0,00E+00	9,79E-03	0,00E+00	3,34E-03	-7,01+01
Use of renewable primary energy resources used as raw material- *MJ/FU* MJ/*day*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)-*MJ/FU*	2,25E+05	7,20E+01	1,18E+02	0,00E+00	5,28E+03	0,00E+00	0,00E+00	0,00E+00	4,16E+04	7,93E+02	0,00E+00	3,28E+01	0,00E+00	1,12E+01	-2,64E+05
MJ/ *day*	6,72E+01	2,15E-02	3,52E-02	0,00E+00	1,58E+00	0,00E+00	0,00E+00	0,00E+00	1,24E+01	2,37E-01	0,00E+00	9,79E-03	0,00E+00	3,34E-03	-7,88+01

Use of non-renewable primary energy excluding primary energy resources used as raw material - MJ/FU	2,96E+05	5,22E+03	1,32E+04	0,00E+00	3,10E+03	0,00E+00	0,00E+00	0,00E+00	9,02E+04	5,58E+03	0,00E+00	2,71E+03	0,00E+00	4,71E+02	-2,40E+05
MJ/ day	8,84E+01	1,56E+00	3,94E+00	0,00E+00	9,25E-01	0,00E+00	0,00E+00	0,00E+00	2,69E+01	1,67E+00	0,00E+00	8,11E-01	0,00E+00	1,41E-01	-7,16+01
Use of non-renewable primary energy resources used as raw material - *MJ/ day*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)- *MJ/FU*	2,96E+05	5,22E+03	1,32E+04	0,00E+00	3,10E+03	0,00E+00	0,00E+00	0,00E+00	9,02E+04	5,58E+03	0,00E+00	2,71E+03	0,00E+00	4,71E+02	-2,40E+05
MJ/ *day*	8,84E+01	1,56E+00	3,94E+00	0,00E+00	9,25E-01	0,00E+00	0,00E+00	0,00E+00	2,69E+01	1,67E+00	0,00E+00	8,11E-01	0,00E+00	1,41E-01	-7,16+01
Use of secondary material-*kg/FU*	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
kg/ *day*	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels - *MJ/FU*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
MJ/ *day*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels - *MJ/FU*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
MJ/ *day*	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Use of net fresh water - *m3/ FU*[4]	1,34E+02	1,20E+00	1,38E+00	0,00E+00	5,59E+01	0,00E+00	0,00E+00	0,00E+00	4,49E+01	7,91E+02	0,00E+00	4,97E-01	0,00E+00	4,90E-01	-1,04E+02
m^3/ day	4,00E-02	3,58E-04	4,12E-04	0,00E+00	1,67E-02	0,00E+00	0,00E+00	0,00E+00	1,34E-02	2,36E-01	0,00E+00	1,48E-04	0,00E+00	1,46E-04	-3,13E-02

[4]. Neither the use of water for turbine use or cooling during the production of hydraulic and nuclear electricity have been taken into account.

WASTE CATEGORIES															
Parameters		Product stage	Construction stage		Use stage							End of Life Stage				D Reuse, Recovery, Recycling
		A1-A3 Production	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	Hazardous waste to disposal *kg/FU*	6,75E-01	2,84E-03	5,48E-03	0	6,03E-03	0	0	0	1,45E-01	1,05E-01	0	1,57E-03	0	3,09E-04	-5,86E-01
	kg/ *day*	2,02E-04	8,48E-07	1,64E-06	0	1,80E-06	0	0	0	4,33E-05	3,13E-05	0	4,71E-07	0	9,23E-08	-1,75E-04
	Non hazardous waste to disposal *kg/FU*	5,50E+03	4,22E+02	1,22E+01	0	3,92E+01	0	0	0	4,36E+02	6,47E+02	0	1,20E+02	0	2,94E+03	-2,39E+03
	kg/ *day*	1,64E+00	1,26E-01	3,64E-03	0	1,17E-02	0	0	0	1,30E-01	1,93E-01	0	3,60E-02	0	8,80E-01	-7,16E-01
	Radioactive waste disposed *kg/FU*	1,46E+00	3,42E-02	8,87E-02	0	2,59E-02	0	0	0	1,17E+00	4,25E-02	0	1,77E-02	0	2,99E-03	-8,43E-01
	kg/ *day*	4,38E-04	1,02E-05	2,65E-05	0	7,73E-06	0	0	0	3,49E-04	1,27E-05	0	5,28E-06	0	8,94E-07	-2,52-04

OTHER OUTPUT FLOWS														
Parameters	Product stage	Construction stage	Use stage							End of Life Stage				D Reuse, Recovery, Recycling
	A1-A3 Production	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	
Components for re-use *kg/FU*	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,74E+04
kg/ day	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,16E+00
Materials for recycling *kg/FU*	7,70E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
kg/ day	2,29E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for energy recovery *kg/FU*	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
kg/ day	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy *MJ/FU*	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
kg/ day	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

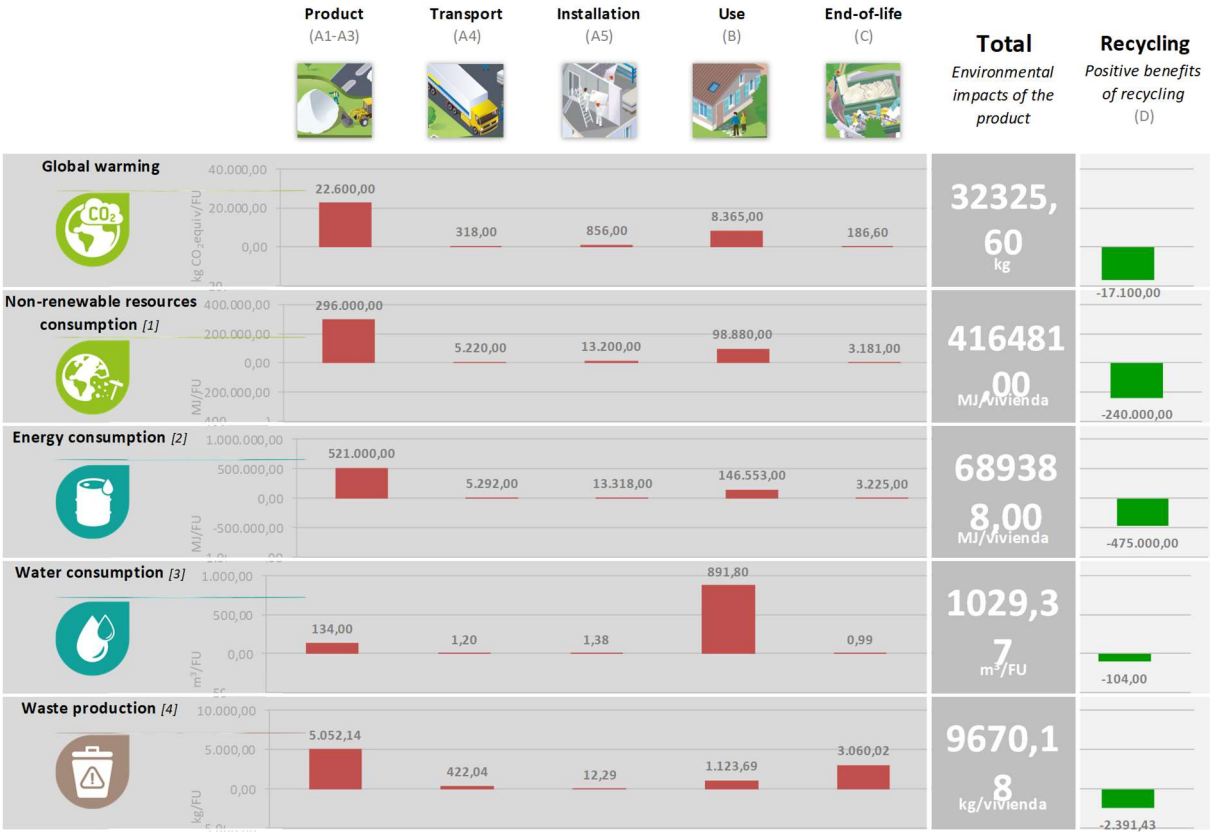
LCA interpretation

The Product stage (A1-A3) is the life cycle stage with the biggest impact, since it represents more than 70% of the whole life cycle housing impacts for the next impact categories: Global warming, Abiotic depletion and Energy consumption.

Water is mainly consumed during the use stage, since it represents 87% of the life cycle water consumption.

Waste production iss distributed between the End of life stage (32% of the whole waste production) and Product stage A1-A3 (52% of the whole waste production)

Due to potential of reuse of an industrialized housing, it generates significant savings on the life cycle housing impact (Module D). For example, Global Warming savings are equivalent to 53% of the whole life cycle impact and 69% of total energy consumption. Global warming saving are equivalent to run 144.915 Km by car[5] (3,62 tours to Earth) and to the impact of 1,28 european citizen in one year[6].



[5] CO2 emmissions of a Seat Ibiza 1.2 TSI FR Euro 5: 119 g/km

[6] Carbon footprint of one european citizen=13,3 Tn CO2-eq/year. Source: Carbon, Land, and Water Footprint Accounts for the European Union: Consumption, Production, and Displacements through International Trade. Kjartan Steen-Olsen, Jan Weinzettel, Gemma Cranston, A. Ertug Ercin§, and Edgar G. Hertwich. *Environ. Sci. Technol.*, **2012**, *46* (20), pp 10883–10891

Additional information

The electricity production mix considered for A1-A3 product stage and B6 operational energy use is the Spanish electricity production mix in 2016[7].

The composition of the electricity production mix used is detailed in the next figure.

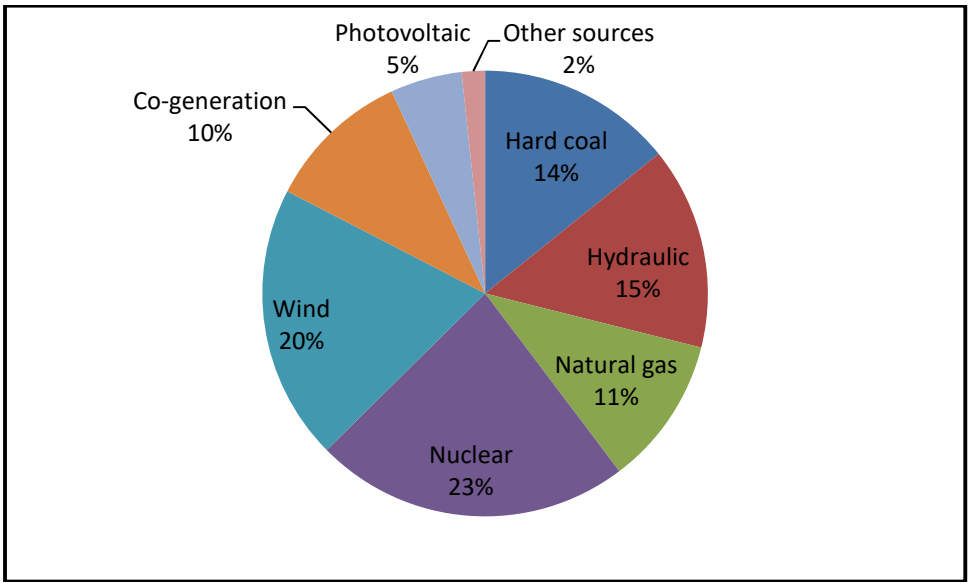


Figure 2 Electricity production mix in Spain (2016)

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