ENVIRONMENTAL PRODUCT DECLARATION

EPD Program	The International EPD® System
CPC Code	37129 - 37990
Based on	PCR 2012:01 v2.3 - Construction products and services Sub-PCR-C - Acoustical systems solutions
Registration number	S-P-01764
Pubhised	2019-12-11
Valid until	2024-12-11
Market coverage	Worldwide
Representativeness	Switzerland - Germany

EPD in accordance with ISO 14025 and EN15804+A1 for:

Seamless acoustic systems for reduction and control of the reverberation time

Summary

BASWA acoustic AG

BASWA acoustic is the world leader in high performance seamless acoustic ceilings. Our mission is simple: to increase well-being by combining effective sound absorption with complete architectural freedom. BASWA has always been known as the original innovator in sound absorbing plaster. All our products are developed and engineered in Switzerland, and installed on site using only highly skilled, certified installers. Careful selection of our raw materials is of utmost importance to us, and therefore we also aim for sustainability in manufacturing. Our acoustical solutions allow architects and owners to design spaces where acoustics and aesthetics combine to exceed everyday expectations.

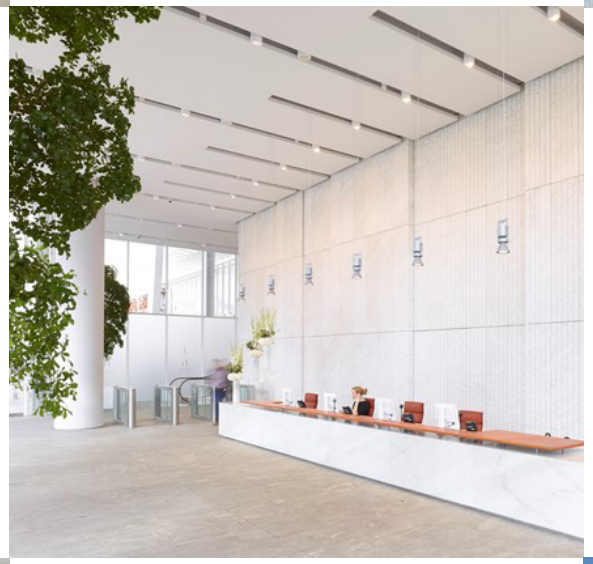
BASWA acoustic AG is a young and dynamic company with an international profile. Hans “Jeannot” Sulzer, who was sixty at the time, established it in 1991. From the start, the company pursued the goal of manufacturing and distributing innovative acoustics products. As a tireless and ambitious entrepreneur and pioneer with a high affinity for technology, Hans Sulzer invented and developed the BASWA acoustics system. He knew from the beginning that as an enterprise, BASWA would take an unconventional path to success and would find innovative new solutions for familiar problems.

VAULT HOUSE

VILLA BRAS

HELVETIA WEST EXTENSION

RESTAURANT GALLUSPLATZ



THE SHARD

NATIONAL MUSEUM OF QATAR

BASWA Phon systems

HEALTHY ACOUSTICS

Because noise is so ubiquitous in everyday life, it is time to think about sound absorption and the acoustic design of rooms. Especially because people in the northern hemisphere spend an average of 80% of their lives indoors. We have made this the purpose of our company and developed a series of excellent acoustic solutions. In class-rooms, BASWA solutions make a significant contribution to a healthy acoustic room climate and thus to learning success. Even long meetings in conference rooms become more bearable and dinner with the family more relaxed, if the room acoustics are right.

REAL VALUES

At BASWA we believe that only carefully selected raw materials can provide high quality solutions. This means using white marble sand from selected quarries and regions of the world, as well as recycled mineral materials. In order to guarantee the best possible quality of materials, we have been constantly developing and finding ways to combine traditional craftsmanship and innovative technologies for the last 30 years. This is how we achieve the unique acoustic and visual properties of our systems. And this is how we ensure that our acoustic surfaces are leaders in sustainability, aesthetic compatibility, energy efficiency, health and wellbeing, and acoustic performance.

CLEVER SOLUTIONS

BASWA's seamless solutions integrate into the architecture without compromise. The variety of solutions and adaptability enable optimal coordination of the acoustic surfaces with the architectural concept, reinforcing their validity. For us, the customer should determine the properties of the system, and never have to do without the functional basic properties of the surfaces. We have formulated the technology so that it can be incorporated into the planning process and thus become an integral part of the project.

BASWA solutions are modular - you decide according to your desire. The BASWA acoustic systems reduce and control the reverberation time in a space to create an ideal acoustic environment, positively affecting health and wellbeing. The BASWA acoustic systems consist of two elements; the BASWA Phon acoustic panels and the microporous coating compounds. The panels are adhered to a solid, closed substrate and then coated with the microporous coating compounds. This results in a jointless, smooth surface with high absorption values and gives the visual appearance of a smooth, painted plaster ceiling. The BASWA Phon technology provides architects and acousticians with unique design options.

Each system is available in the following four **system thicknesses: 30/40/50/70 mm**. All systems can be applied directly to concrete or conventional drywall systems (mineral substrates). The glued and grouted BASWA Phon acoustic panels can be coated with either one or two layers of a microporous acoustic plaster.

DESCRIPTION OF BASWA SYSTEMS

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m^2 of acoustical systems solutions for ceiling to aim at the reduction and control of the reverberation times and sound pressure level in public and private spaces and the creation of a pleasant sound environment.

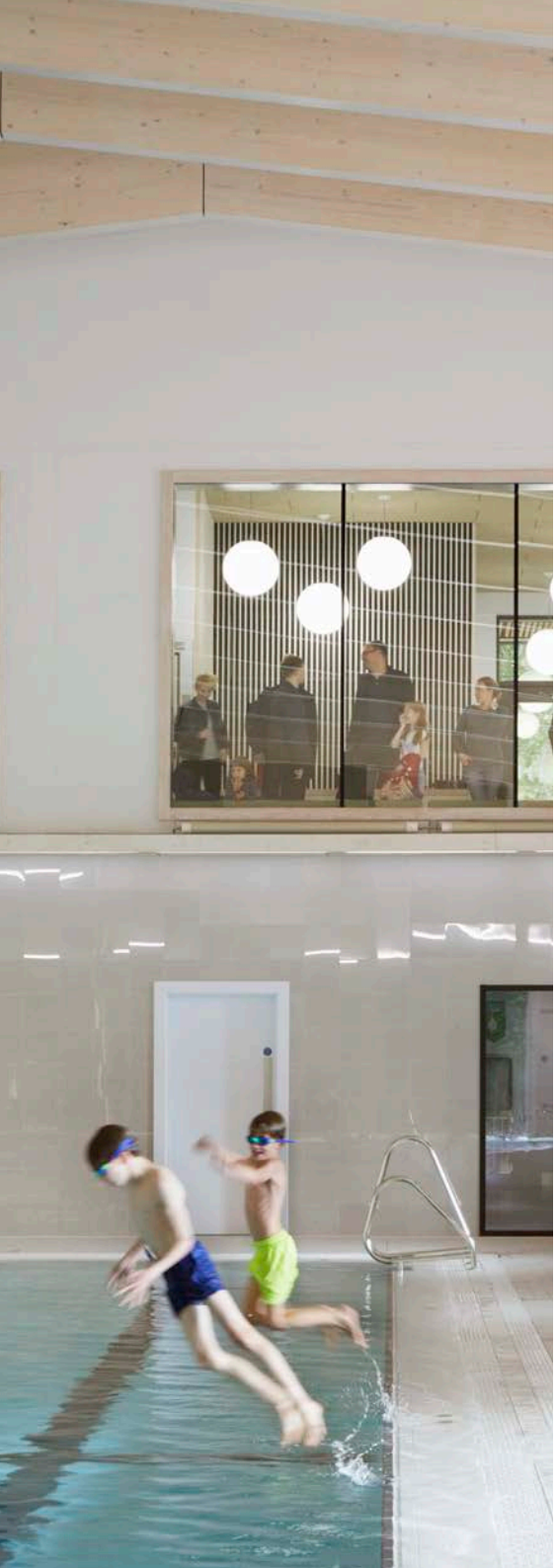
The BASWA systems included in this declaration are as follows:

- Single layer systems:
  - BASWA Phon Base
  - BASWA Phon Fine
- Double layer systems:
  - BASWA Phon Classic Base
  - BASWA Phon Classic Fine
  - BASWA Phon Classic Top

BASWA System Installation

BASWA Phon Classic Top

Elbphilharmonie Hamburg



All BASWA systems are presented in thicknesses of 30 mm, 40 mm 50 mm and 70 mm.

BASWA systems consist of glass wool panels with original thicknesses of 20 mm, 30 mm, 40 mm and 60 mm. On these panels, a covering is deposited that presents in its formulation expanded glass and other additives mixed with water. The expanded glass is produced with post-consumer recycled glass. Then, the panels are dried in a oven and subsequently a grinding is performed until the thickness of the covering is 6 mm. This makes BASWA Phon panels present final values of 26 mm, 36 mm, 46 mm and 66 mm respectively. Finally, panels are cut to a size of 80 cm x 60 cm, in this way are light and easy to handle and cut.

BASWA Phon panels are installed on ceilings using an adhesive applied on the not covered face. For concrete ceilings is used BASWA Fix C adhesive while for gypsum ceilings or drywall is used BASWA Fix K adhesive. Both products are marketed by BASWA but not manufactured in their facilities. The joints left between BASWA Phon panels are covered with the BASWA Phon Fill.

On the covered face different plasters are applied: BASWA Phon Base, BASWA Phon Fine or BASWA Phon Top. Plasters are produced by BASWA and uniquely differs in the granulometry of marble aggregate (0.7 mm, 0.5 mm y 0.3 mm respectively). This aggregate is a secondary material obtained from the production of natural stone. The plasters themselves constitute the surface finish of the ceilings in which BASWA systems are installed.

This finish can be single layer or double layer. In the first case a single layer of plaster is applied (BASWA Phon Base or BASWA Phon Fine). In the second case, a first layer of BASWA Phon Base plaster is applied. When it is completely dried, it is applied a second layer of plaster (BASWA Phon Base, BASWA Phon Fine or BASWA Phon Top). In both cases, the application of plasters makes BASWA Phon systems present final thickness values of 30 mm, 40 mm, 50 mm and 70 mm.

These finishes can be delivered with an extensive color palette.

APPLICATIONS

BASWA Phon systems are commonly used in public facilities where there is a need for noise, reverberation time and sound pressure level reduction to improve the working environment.

ACOUSTIC PERFORMANCE OF BASWA SYSTEMS

	Thickness	ISO 11654		ASTM C423		EN ISO
	mm	WSAC	SAC	NRC	SAA	SAC (α_s)
BASWA Phon Base	30	0.70	C	0.75	0.75	0.91
	40	0.85	B	0.80	0.85	0.91
	50	0.85	B	0.80	0.85	0.93
	70	0.90	A	0.85	0.85	0.88
BASWA Phon Fine	30	0.75	C	0.70	0.70	0.85
	40	0.80	B	0.75	0.80	0.88
	50	0.85	B	0.80	0.85	0.91
	70	0.75	C	0.75	0.80	0.77
BASWA Phon Classis Base	30	0.75	C	0.70	0.70	0.88
	40	0.95	A	0.85	0.90	0.97
	50	0.80	B	0.70	0.75	0.73
	70	0.75	C	0.70	0.70	0.63
BASWA Phon Classis Fine	30	0.60 (L)	C	0.60	0.60	0.82
	40	0.90	A	0.80	0.85	0.85
	50	0.75	C	0.70	0.75	0.68
	70	0.75	C	0.80	0.85	0.83
BASWA Phon Classis Top	30	0.70	C	0.65	0.65	0.75
	40	0.65	C	0.65	0.65	0.68
	50	0.65	C	0.70	0.65	0.68
	70	0.70	C	0.75	0.70	0.72

WSAC - Weighted Sound Absorption Coefficient
SAC - Sound Absorption Class
NRC - Noise Reduction Coefficient
SAA - Sound Absorption Average
SAC - Sound absorption coefficient at 1000 Hz

TECHNICAL DATA AND COMPOSITION

Tables below show the mass composition and sound absorption performance of the BASWA systems included in this EPD. All raw materials that are part of the declared systems are shown. Once installed, BASWA Phon systems do not contain any substance included in the list of Substances of Very High Concern with concentrations higher than 0.1% in weight.

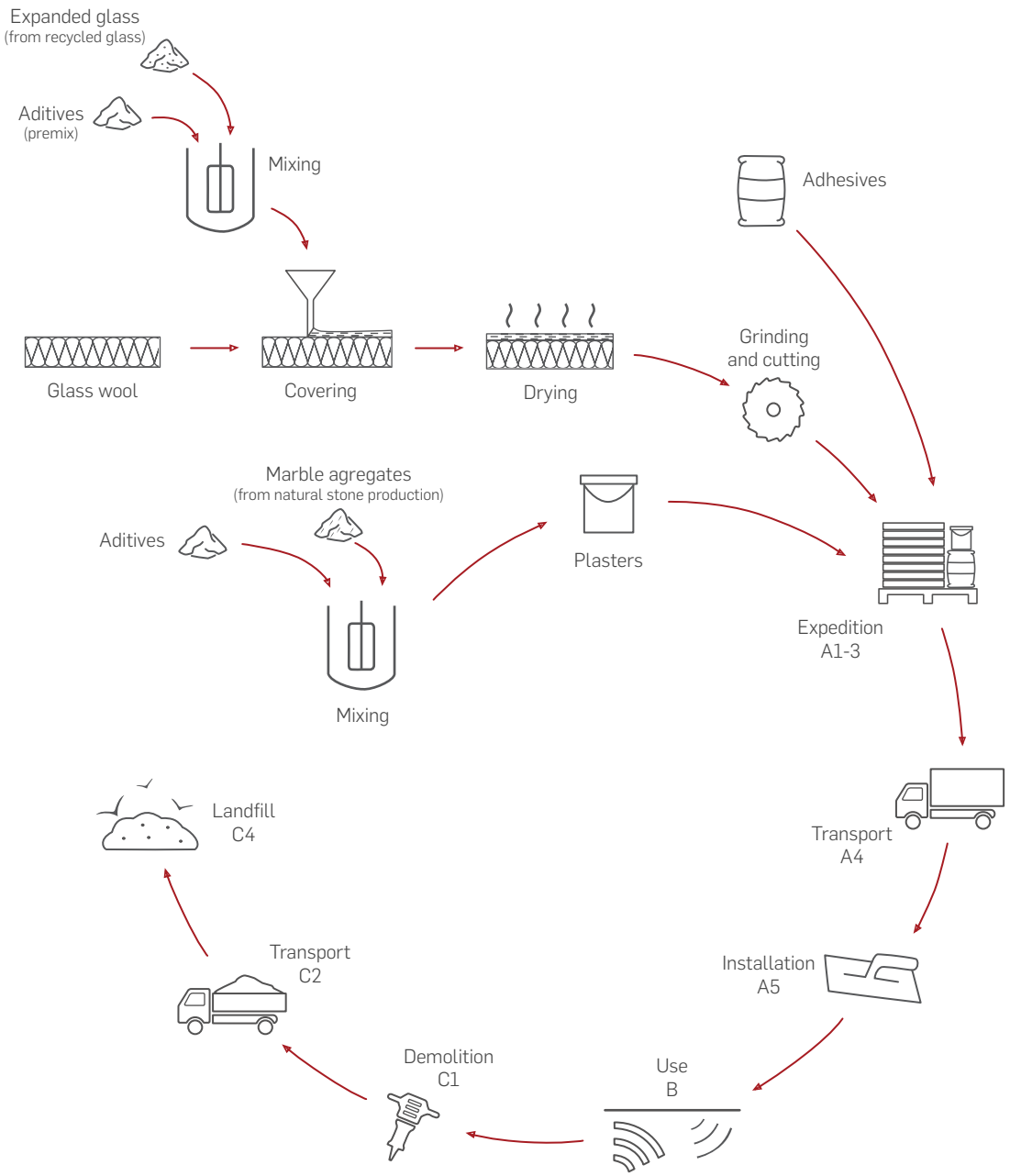
Reference service life of BASWA systems is 50 years according to the default value established in the Sub-PCR C for acoustic systems.

BASWA SYSTEMS LIFE CYCLE

The scope of the EPD is set to be “Cradle-to-grave”. Processes included in the assessment are presented on the following diagram process.

	Single layer systems				Double layer systems			
	30 mm	40 mm	50 mm	70 mm	30 mm	40 mm	50 mm	70 mm
Marble agregates	32.9%	30.4%	28.2%	24.7%	46.0%	43.2%	40.8%	36.6%
Expanded glass	16.3%	15.1%	14.0%	12.3%	12.7%	11.9%	11.2%	10.1%
Glass Wool	16.5%	22.9%	28.4%	37.3%	12.9%	18.1%	22.8%	30.7%
Adhesive	21.5%	19.9%	18.5%	16.2%	16.7%	15.7%	14.8%	13.3%
Aditives	12.7%	11.7%	10.9%	9.5%	11.7%	11.0%	10.4%	9.3%
Total (kg)	9.68	10.5	11.3	12.9	13.1	13.9	14.7	16.3


BASWA acoustic®
BASWAfix
Gipskleber
Liant colle de plâtre


Expanded glass
(from recycled glass)
Aditives
(premix)
Mixing
Glass wool
Covering
Drying
Grinding
and cutting
Adhesives
Marble agregates
(from natural stone production)
Aditives
Mixing
Plasters
Expedition
A1-3
Transport
A4
Installation
A5
Use
B
Demolition
C1
Transport
C2
Landfill
C4

LCA Information

FUNCTIONAL UNIT

The functional unit is 1m² of acoustical systems solutions for ceiling during 50 years with an acoustic performance declared in the table of the previous page.

GOAL AND SCOPE

The intended use of this EPD is the business to business communication for clients and relevant stakeholders within the building sector.

SYSTEM BOUNDARIES

This EPD presents the information in a modular way separated in the following stages.

A1 - Raw material supply

This module represents the extraction and processing of raw materials used in the manufacture of BASWA systems. Among them are the main raw materials such as glass wool, expanded glass obtained from recycled glass and marble aggregate from the production of natural stone as secondary material.

A2 - Transport to production sites

Raw materials are transported totally by road with a distance not higher than 1.720 km for all providers.

A3 - Manufacturing

This stage is organized according to the manufacture of each of the components that are part of the BASWA systems. On the one hand, the covering that will be deposited on the glass wool panels is mixed starting from expanded glass, aditives and water. Once this operation is completed, the panels are dried in an oven fed by natural gas or diesel in the two productions plants of BASWA Acoustic placed in Switzerland and Germany. Finally, the covering thickness and the panels edges are rectified.

By other hand, BASWA Phon plasters and BASWA Phon Fill, both used during BASWA systems installation are also manufactured by simple mixing of their components.

The environmental profile of all energy carriers used during manufacturing is modelled for local conditions. The combustion of the diesel and natural gas used in the drying oven is also included.

The production and transport of primary and secondary packaging of these components are also included in this module, i.e. plastic bags, plastic buckets, cardboard, plastic film and wooden pallets. Except for adhesives, the packaging of raw materials is outside of the scope of this EPD but not theirs EoL.

The aggregation of the modules A1, A2 and A3 is allowed by EN 15804. This rule is applied in this EPD and denoted by A1-3.

A4 - Transport

This module includes transport from BASWA acoustic facilities to the building site.

Transport is calculated on the basis of a scenario with the parameters described in the following table and the distances by road and by sea are weighted to different destinations of the BASWA acoustic custumers in the analyzed period.

Parameter	30 mm	40 mm	50 mm	70 mm
Transport by road (1)	Articulated lorry, 40 t total weight, 27 t max			
Transport by sea (1)	Container ship ocean, 27.500 dwt pay load			
Fuel consumption (road) - Diesel - kg/km	0.350			
Fuel consumption (sea) - Heavy fuel oil - kg/km	99.9			
Distance by road	1,500 km			
Distance by sea	3,350 km			
BASWA Phon panels (m^2/pallet)	63.4	46.1	36.5	24.3
Pallet of BASWA Phon panels (kg/pallet)	274.1	241.6	224.7	194.9
Pallet of plasters, adhesives and fill (kg/pallet)	715			
Volume capacity utilization (road) - Panels	63%			
Mass capacity utilisation (road) - Panels	30%			
Volume capacity utilization (road) - Plasters	32%			
Mass capacity utilisation (road) - Plasters	87%			

(1) Technology mix

A5 - Installation

This module includes water consumed during the installation of BASWA systems and generated wastes by the additional products (5%) in order to compensate losses during installation. It also included the energy consumed by handheld appliances for plasters projection on BASWA Phon panels.

Installation is calculated on the basis of a scenario with the parameters described in the following table.

Parameter	Single layer Systems	Double layer systems
Water	1.01E-03 m^3	
Energy	Global mix power (low tension)	
Energy consumption	2.38E-01 MJ	4.16E-01 MJ
BASWA Phon panels (1)	3.46E-01 kg	
Plasters, adhesives and fill (1)	3.10E-01 kg	4.70E-01 kg
Packaging (1)	9.31E-01 kg	
BASWA Phon panels (2)	Inert waste (100% landfill)	
Plasters, adhesives and fill (2)		
Packaging (2)	Plastic (29% recycling - 32% incineration - 39% landfill)	
	Carboard (75% recycling - 12% incineration - 13% landfill)	
	Wood - Pallet (30% recycling - 32% incineration - 38% landfill)	
	Metal (74% recycling - 12% incineration - 14% landfill)	

(1) Waste (average for 30 mm and 70 mm)
(2) Waste treatment

B1 to B7 - Use stage

Once installation of BASWA systems is completed, no actions or maintenance are required during the use phase until the end of life phase. Then, there are no contribution on impact categories of this stage.

C1 - De-construction

According to the databases consulted, the dismantling of mineral wool and plasters only implies the emission of particles that have no environmental consequences on the impact categories analyzed in this EPD. Then, there is no contribution on impact categories of this module.

C2 - Transport to waste processing

The scenario for transport to waste processing is the same as that used for transport to construction site (see A4). A distance of 60 km has been assumed for the transport to final disposal.

C3 - Waste processing for reuse, recovery and/or recycling

BASWA sytems are considered to be landfilled without reuse, recovery or recycling. Therefore, there is no contribution in the impact categories for this module or for module D.

C4 - Final disposal

The most likely disponal route for BASWA systems is a treatment as inert waste in landfill since a very high percentage of the materials involved are minerals. The amount of waste generated sent to final disposal is the same as that shown in the composition table of BASWA systems.

D - Reuse, recovery or recycling potentials

This module is not declared.

In order to make the results tables lighter, will be shown only declared modules with a non-zero contribution to the impact categories declared in this EPD.

Raw Materials Supply	A1	X
Transport	A2	X
Manufacturing	A3	X
Transport	A4	X
Installation	A5	X
Use	B1	X
Maintenance	B2	X
Repair	B3	X
Replacement	B4	X
Refurbishment	B5	X
Operational energy use	B6	X
Operational water use	B7	X
De-construction	C1	X
Transport	C2	X
Waste processing	C3	X
Disposal	C4	X
Reuse, recovery or recycling potentials	D	MND

X - Declared module

MND - Module not declared

CUT-OFF RULES

All environmental issues related to upstream and downstream processes of BASWA systems have been included in this EPD. In the same way, all environmental issues related to wastes and emissions have also been included in this study.

It was not possible to provide measurements of elemental flows of the water discharged into the sanitary network after the decantation process of the cleaning water from mixers. It is estimated that all mineral substances are left in the decantation sludge but not so in the case of those non-mineral substances present in the additives that can be dissolved. Therefore these elemental flows have not been included in the LCI. For impact categories evaluated in this EPD, none of these substances have direct environmental consequences in the LCIA stage but they could have it indirectly, as could provoque, for example, an increase in COD or BOD5.

TIME REPRESENTATIVENESS

All primary data used in this EPD are based on the 2016, 2017 and 2018 production data for the acoustic systems manufactured by BASWA in their facilities in Switzerland and Germany.

ALLOCATION

Premix, a component of covering, is manufactured only in the plant of Germany where BASWA Phon panels are also manufactured. It was not possible to distinguish the consumption of electricity between these two components. Based on the electricity per m^2 used in the plant of Switzerland, was obtained the total consumption for panels produced in Germany. After discounting this amount to the total electricity consumed in Germany, the electricity used in the manufacture of the premix could be calculated.

The environmental issues that could not be attributed to a specific process were assigned according to the m^2 of panels produced in each plant since there is a linear relationship between all developed processes in BASWA plants and this magnitude.

DATA QUALITY

In order to achieve precision, consistency and representativeness and to ensure reliable results, first-hand data were used. All foreground data were collected from BASWA for their facilities using customized data collection templates. The age of these data is less than three years.

Regionally specific datasets were used to model the energy consumption (electricity, natural gas or diesel). For the processes of transport, production of raw materials or end-of-life, datasets were chosen according to their technological and geographical representation of the actual process.

The technological and geographical representativeness of 80% of the processes included in the LCA is guaranteed, among which are the most contributing to final results. For the rest of processes, a geographical or technological approximation has been made to describe the flow.

DATABASES AND LCA SOFTWARE USED

All LCI datasets were sourced from the Ecoinvent v3.3. For transport processes the ELCD 3.2 database was consulted. In the case of glass wool, the manufacturer supplying to BASWA has provided a specific EPD (which complies with 15804 specifications) of it product.

The LCA study was performed using an excel-based model. The impact assessment results were calculated using characterization factors published by the University of Leiden's Centre of Environmental Sciences (CML 2001) obtained from Simapro.

ESTIMATES AND ASSUMPTIONS

BASWA Phon panels are manufactured in Switzerland and Germany. Both facilities have different power mixes and use different fuels for drying the panels (diesel and natural gas). All environmental issues involved are calculated separately in orden to obtain the impacts for the production of 1m^2 in each plant. Subsequently, a weighting factor, directly proportional to the m^2 produced in each facility, is applied.

It has been assumed, as baseline scenario for single layer systems, a plaster consumption of 4 kg/m^2 during the installation of systems (4.25 kg/m^2 for BASWA Phon Base system and 3.75 kg/m^2 for BASWA Phon Fine system). Baseline scenario for double layer systems consider a plaster consumption of 7.2 kg/m^2 (8.0 kg/m^2 for BASWA Phon Classic Base and 6.4 kg/m^2 for BASWA Phon Classic Top). Sensitivity analysis performed for the higher and lower plaster consumption show that the impact categories do not vary in any case by more than 3.2 % for the sum of A1, A2 and A3 modules. For this reason, the two single layer systems are reported jointly as “single layer systems” while the three double layer systems are reported jointly as “double layer systems”.

It also assumed, as baseline scenario for all BASWA systems declared in this EPD, the use of a mix of adhesives (50% BASWA Fix K and 50% BASWA Fix C). Sensitivity analysis with 100% of BASWA Fix K or 100% of BASWA Fix C were also performed. The variation of impact categories is not higher than 1.8 % for the sum of A1, A2 and A3 modules. For this reason, all BASWA system declared in this EPD are calculated with the same mix of adhesives (50:50).

Adhesives were modeled according to the components provided by the suppliers. While the percentages were obtained from the typical composition for these mortars.

All materials and their processing have been taken into account for the primary packaging of plaster, filler and adhesives.

Results

BASWA Phon 30 mm, single layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	11.6	1.57	0.757	3.82E-02	0.101
ODP	kg CFC-11 eq	2.62E-05	2.96E-09	7.92E-09	7.73E-11	2.63E-08
AP	kg SO_2 eq	4.85E-02	2.37E-02	8.01E-04	1.81E-04	6.99E-04
EP	kg PO_4^{-3} eq	1.58E-02	2.84E-03	8.16E-04	4.15E-05	2.10E-04
POCP	kg C_2H_4 eq	1.09	1.26E-03	1.33E-04	1.30E-05	3.25E-05
ADPE	kg Sb eq	2.30E-04	5.99E-08	9.97E-08	1.52E-09	1.37E-07
ADPF	MJ	181	21.1	1.76	0.536	2.55
PERE	MJ	44.6	2.78E-02	0.151	7.19E-04	7.45E-02
PERM	MJ	3.59	0	0	0	0
PERT	MJ	48.2	2.78E-02	0.151	7.19E-04	7.45E-02
PENRE	MJ	199	21.2	2.04	0.539	2.63
PENRM	MJ	12.2	0	0	0	0
PENRT	MJ	202	21.2	2.04	0.539	2.63
SM	kg	8.22	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	105	0	0.623	0	0.185
HWD	kg	5.66E-05	1.80E-06	1.63E-08	4.74E-08	0
NHWD	kg	1.83	8.41E-04	1.25	2.14E-05	9.68
RWD	kg	2.78E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.60	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

- ENVIRONMENTAL IMPACTS - **GWP** Global warming potential. **ODP** Ozone depletion potential. **AP** Acidification potential of land and water. **EP** Eutrophication potential. **POCP** Photochemical ozone creation potential. **ADPE** Abiotic depletion potential for non-fossil resources. **ADPF** Abiotic depletion potential for fossil resources.

- RESOURCE USE - **PERE** Renewable primary energy as energy carrier. **PERM** Renewable primary energy resource as material utilization. **PERT** Total use of renewable primary energy resources. **PENRE** Non-renewable primary energy as energy carrier. **PENRM** Non-renewable primary energy as material utilization. **PENRT** Total use of non-renewable primary energy resources.

BASWA Phon 30 mm, double layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	12.8	2.00	0.934	4.91E-02	0.130
ODP	kg CFC-11 eq	2.63E-05	3.77E-09	8.83E-09	9.94E-11	3.39E-08
AP	kg SO_2 eq	5.56E-02	3.02E-02	8.75E-04	2.32E-04	9.00E-04
EP	kg PO_4^{-3} eq	1.68E-02	3.61E-03	1.10E-03	5.34E-05	2.70E-04
POCP	kg C_2H_4 eq	1.09	1.60E-03	1.52E-04	1.67E-05	4.18E-05
ADPE	kg Sb eq	2.33E-04	7.63E-08	1.06E-07	1.96E-09	1.77E-07
ADPF	MJ	205	26.9	1.93	0.690	3.28
PERE	MJ	48.7	3.54E-02	0.155	9.25E-04	9.59E-02
PERM	MJ	3.59	0	0	0	0
PERT	MJ	52.3	3.54E-02	0.155	9.25E-04	9.59E-02
PENRE	MJ	226	27.0	2.21	0.693	3.38
PENRM	MJ	12.2	0	0	0	0
PENRT	MJ	228	27.0	2.21	0.693	3.38
SM	kg	11.0	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	107	0	0.632	0	0.238
HWD	kg	5.68E-05	2.30E-06	2.04E-08	6.10E-08	0
NHWD	kg	1.93	1.07E-03	1.57	2.75E-05	12.4
RWD	kg	2.78E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.60	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

SM Use of secondary materials. **RSF** Use of renewable secondary fuels. **NRSF** Use of non-renewable secondary fuels. **FW** Use of net fresh water.

- WASTE CATEGORIES - **HWD** Hazardous waste disposed. **NHWD.** Non-hazardous waste disposed. **RWD** Radioactive waste disposed.

- OUTPUT FLOWS - **CRU** Components for re-use. **MFR** Materials for recycling. **MER** Materials for energy recovery. **EE** Exported energy per energy carrier.

BASWA Phon 40 mm, single layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	12.2	1.67	0.758	4.13E-02	0.110
ODP	kg CFC-11 eq	2.62E-05	3.15E-09	8.03E-09	8.37E-11	2.85E-08
AP	kg SO_2 eq	5.07E-02	2.52E-02	8.06E-04	1.95E-04	7.57E-04
EP	kg PO_4^{-3} eq	1.65E-02	3.02E-03	8.17E-04	4.50E-05	2.28E-04
POCP	kg C_2H_4 eq	1.64	1.34E-03	1.33E-04	1.41E-05	3.52E-05
ADPE	kg Sb eq	3.28E-04	6.37E-08	1.00E-07	1.65E-09	1.49E-07
ADPF	MJ	191	22.4	1.78	0.580	2.76
PERE	MJ	51.0	2.96E-02	0.151	7.78E-04	8.07E-02
PERM	MJ	5.39	0	0	0	0
PERT	MJ	56.4	2.96E-02	0.151	7.78E-04	8.07E-02
PENRE	MJ	209	22.5	2.05	0.583	2.84
PENRM	MJ	13.6	0	0	0	0
PENRT	MJ	213	22.5	2.05	0.583	2.84
SM	kg	8.87	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	140	0	0.624	0	0.200
HWD	kg	6.95E-05	1.92E-06	1.67E-08	5.13E-08	0
NHWD	kg	2.02	8.94E-04	1.29	2.32E-05	10.5
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.62	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

- ENVIRONMENTAL IMPACTS - **GWP** Global warming potential. **ODP** Ozone depletion potential. **AP** Acidification potential of land and water. **EP** Eutrophication potential. **POCP** Photochemical ozone creation potential. **ADPE** Abiotic depletion potential for non-fossil resources. **ADPF** Abiotic depletion potential for fossil resources.

- RESOURCE USE - **PERE** Renewable primary energy as energy carrier. **PERM** Renewable primary energy resource as material utilization. **PERT** Total use of renewable primary energy resources. **PENRE** Non-renewable primary energy as energy carrier. **PENRM** Non-renewable primary energy as material utilization. **PENRT** Total use of non-renewable primary energy resources.

BASWA Phon 40 mm, double layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	13.4	2.10	0.935	5.23E-02	0.139
ODP	kg CFC-11 eq	2.63E-05	3.96E-09	8.94E-09	1.06E-10	3.61E-08
AP	kg SO_2 eq	5.78E-02	3.17E-02	8.79E-04	2.47E-04	9.57E-04
EP	kg PO_4^{-3} eq	1.74E-02	3.79E-03	1.10E-03	5.69E-05	2.88E-04
POCP	kg C_2H_4 eq	1.64	1.68E-03	1.52E-04	1.78E-05	4.45E-05
ADPE	kg Sb eq	3.32E-04	8.01E-08	1.07E-07	2.08E-09	1.88E-07
ADPF	MJ	215	28.2	1.95	0.734	3.49
PERE	MJ	55.1	3.72E-02	0.155	9.84E-04	0.102
PERM	MJ	5.39	0	0	0	0
PERT	MJ	60.5	3.72E-02	0.155	9.84E-04	0.102
PENRE	MJ	235	28.4	2.23	0.738	3.60
PENRM	MJ	13.6	0	0	0	0
PENRT	MJ	240	28.4	2.23	0.738	3.60
SM	kg	11.6	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	143	0	0.633	0	0.253
HWD	kg	6.97E-05	2.41E-06	2.08E-08	6.49E-08	0
NHWD	kg	2.11	1.13E-03	1.61	2.93E-05	13.2
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.62	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

SM Use of secondary materials. **RSF** Use of renewable secondary fuels. **NRSF** Use of non-renewable secondary fuels. **FW** Use of net fresh water.

- WASTE CATEGORIES - **HWD** Hazardous waste disposed. **NHWD.** Non-hazardous waste disposed. **RWD** Radioactive waste disposed.

- OUTPUT FLOWS - **CRU** Components for re-use. **MFR** Materials for recycling. **MER** Materials for energy recovery. **EE** Exported energy per energy carrier.

BASWA Phon 50 mm, single layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	12.8	1.77	0.759	4.45E-02	0.118
ODP	kg CFC-11 eq	2.63E-05	3.34E-09	8.14E-09	9.01E-11	3.07E-08
AP	kg SO_2 eq	5.29E-02	2.67E-02	8.10E-04	2.10E-04	8.15E-04
EP	kg PO_4^{-3} eq	1.71E-02	3.20E-03	8.18E-04	4.84E-05	2.45E-04
POCP	kg C_2H_4 eq	2.18	1.42E-03	1.34E-04	1.52E-05	3.79E-05
ADPE	kg Sb eq	4.26E-04	6.74E-08	1.01E-07	1.77E-09	1.60E-07
ADPF	MJ	201	23.8	1.79	0.625	2.97
PERE	MJ	57.5	3.13E-02	0.151	8.38E-04	8.68E-02
PERM	MJ	7.18	0	0	0	0
PERT	MJ	64.7	3.13E-02	0.151	8.38E-04	8.68E-02
PENRE	MJ	219	23.9	2.07	0.628	3.06
PENRM	MJ	15.1	0	0	0	0
PENRT	MJ	225	23.9	2.07	0.628	3.06
SM	kg	9.51	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	176	0	0.625	0	0.215
HWD	kg	8.24E-05	2.03E-06	1.71E-08	5.52E-08	0
NHWD	kg	2.20	9.48E-04	1.33	2.49E-05	11.3
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.64	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

- ENVIRONMENTAL IMPACTS - **GWP** Global warming potential. **ODP** Ozone depletion potential. **AP** Acidification potential of land and water. **EP** Eutrophication potential. **POCP** Photochemical ozone creation potential. **ADPE** Abiotic depletion potential for non-fossil resources. **ADPF** Abiotic depletion potential for fossil resources.

- RESOURCE USE - **PERE** Renewable primary energy as energy carrier. **PERM** Renewable primary energy resource as material utilization. **PERT** Total use of renewable primary energy resources. **PENRE** Non-renewable primary energy as energy carrier. **PENRM** Non-renewable primary energy as material utilization. **PENRT** Total use of non-renewable primary energy resources.

BASWA Phon 50 mm, double layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	14.1	2.20	0.936	5.54E-02	0.147
ODP	kg CFC-11 eq	2.63E-05	4.15E-09	9.05E-09	1.12E-10	3.82E-08
AP	kg SO_2 eq	6.00E-02	3.32E-02	8.83E-04	2.62E-04	1.02E-03
EP	kg PO_4^{-3} eq	1.81E-02	3.97E-03	1.10E-03	6.03E-05	3.05E-04
POCP	kg C_2H_4 eq	2.19	1.76E-03	1.52E-04	1.89E-05	4.72E-05
ADPE	kg Sb eq	4.30E-04	8.39E-08	1.08E-07	2.21E-09	1.99E-07
ADPF	MJ	225	29.6	1.96	0.778	3.70
PERE	MJ	61.6	3.90E-02	0.155	1.04E-03	1.08E-01
PERM	MJ	7.18	0	0	0	0
PERT	MJ	68.7	3.90E-02	0.155	1.04E-03	1.08E-01
PENRE	MJ	245	29.7	2.24	0.782	3.81
PENRM	MJ	15.1	0	0	0	0
PENRT	MJ	251	29.7	2.24	0.782	3.81
SM	kg	12.3	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	178	0	0.633	0	0.268
HWD	kg	8.27E-05	2.52E-06	2.12E-08	6.88E-08	0
NHWD	kg	2.30	1.18E-03	1.65	3.11E-05	14.0
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.64	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

SM Use of secondary materials. **RSF** Use of renewable secondary fuels. **NRSF** Use of non-renewable secondary fuels. **FW** Use of net fresh water.

- WASTE CATEGORIES - **HWD** Hazardous waste disposed. **NHWD.** Non-hazardous waste disposed. **RWD** Radioactive waste disposed.

- OUTPUT FLOWS - **CRU** Components for re-use. **MFR** Materials for recycling. **MER** Materials for energy recovery. **EE** Exported energy per energy carrier.

BASWA Phon 70 mm, single layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	14.1	1.97	0.760	5.08E-02	0.135
ODP	kg CFC-11 eq	2.64E-05	3.71E-09	8.36E-09	1.03E-10	3.51E-08
AP	kg SO_2 eq	5.74E-02	2.97E-02	8.19E-04	2.40E-04	9.30E-04
EP	kg PO_4^{-3} eq	1.84E-02	3.55E-03	8.20E-04	5.53E-05	2.80E-04
POCP	kg C_2H_4 eq	3.28	1.58E-03	1.34E-04	1.73E-05	4.32E-05
ADPE	kg Sb eq	6.23E-04	7.50E-08	1.02E-07	2.02E-09	1.83E-07
ADPF	MJ	222	26.5	1.82	0.713	3.39
PERE	MJ	70.4	3.49E-02	0.152	9.57E-04	9.92E-02
PERM	MJ	10.77	0	0	0	0
PERT	MJ	81.1	3.49E-02	0.152	9.57E-04	9.92E-02
PENRE	MJ	239	26.6	2.10	0.717	3.50
PENRM	MJ	18.0	0	0	0	0
PENRT	MJ	247	26.6	2.10	0.717	3.50
SM	kg	10.8	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	247	0	0.626	0	0.246
HWD	kg	1.08E-04	2.26E-06	1.79E-08	6.30E-08	0
NHWD	kg	2.58	1.05E-03	1.41E	2.85E-05	12.9
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.68	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

- ENVIRONMENTAL IMPACTS - **GWP** Global warming potential. **ODP** Ozone depletion potential. **AP** Acidification potential of land and water. **EP** Eutrophication potential. **POCP** Photochemical ozone creation potential. **ADPE** Abiotic depletion potential for non-fossil resources. **ADPF** Abiotic depletion potential for fossil resources.

- RESOURCE USE - **PERE** Renewable primary energy as energy carrier. **PERM** Renewable primary energy resource as material utilization. **PERT** Total use of renewable primary energy resources. **PENRE** Non-renewable primary energy as energy carrier. **PENRM** Non-renewable primary energy as material utilization. **PENRT** Total use of non-renewable primary energy resources.

BASWA Phon 70 mm, double layer systems

		A1-3	A4	A5	C2	C4
GWP	kg CO_2 eq	15.3	2.40	0.937	6.17E-02	0.164
ODP	kg CFC-11 eq	2.64E-05	4.52E-09	9.27E-09	1.25E-10	4.26E-08
AP	kg SO_2 eq	6.44E-02	3.62E-02	8.92E-04	2.92E-04	1.13E-03
EP	kg PO_4^{-3} eq	1.94E-02	4.33E-03	1.10E-03	6.72E-05	3.40E-04
POCP	kg C_2H_4 eq	3.28	1.92E-03	1.53E-04	2.10E-05	5.25E-05
ADPE	kg Sb eq	6.27E-04	9.15E-08	1.09E-07	2.46E-09	2.22E-07
ADPF	MJ	246	32.3	1.99	0.867	4.12
PERE	MJ	74.4	4.25E-02	0.156	1.16E-03	1.21E-01
PERM	MJ	10.77	0	0	0	0
PERT	MJ	85.2	4.25E-02	0.156	1.16E-03	1.21E-01
PENRE	MJ	265	32.4	2.27	0.871	4.25
PENRM	MJ	18.0	0	0	0	0
PENRT	MJ	274	32.4	2.27	0.871	4.25
SM	kg	13.6	0	0	0	0
RSF	MJ	4.41E-02	0	0	0	0
NRSF	MJ	0.224	0	0	0	0
FW	m3	249	0	0.635	0	0.299
HWD	kg	1.09E-04	2.75E-06	2.20E-08	7.66E-08	0
NHWD	kg	2.67	1.29E-03	1.73	3.46E-05	15.6
RWD	kg	2.79E-02	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	1.68	0	0	0	0
MER	kg	9.82	0	0	0	0
EE	MJ	0	0	0	0	0

Are shown only declared modules with a non-zero contribution to the impact categories evaluated in this EPD.

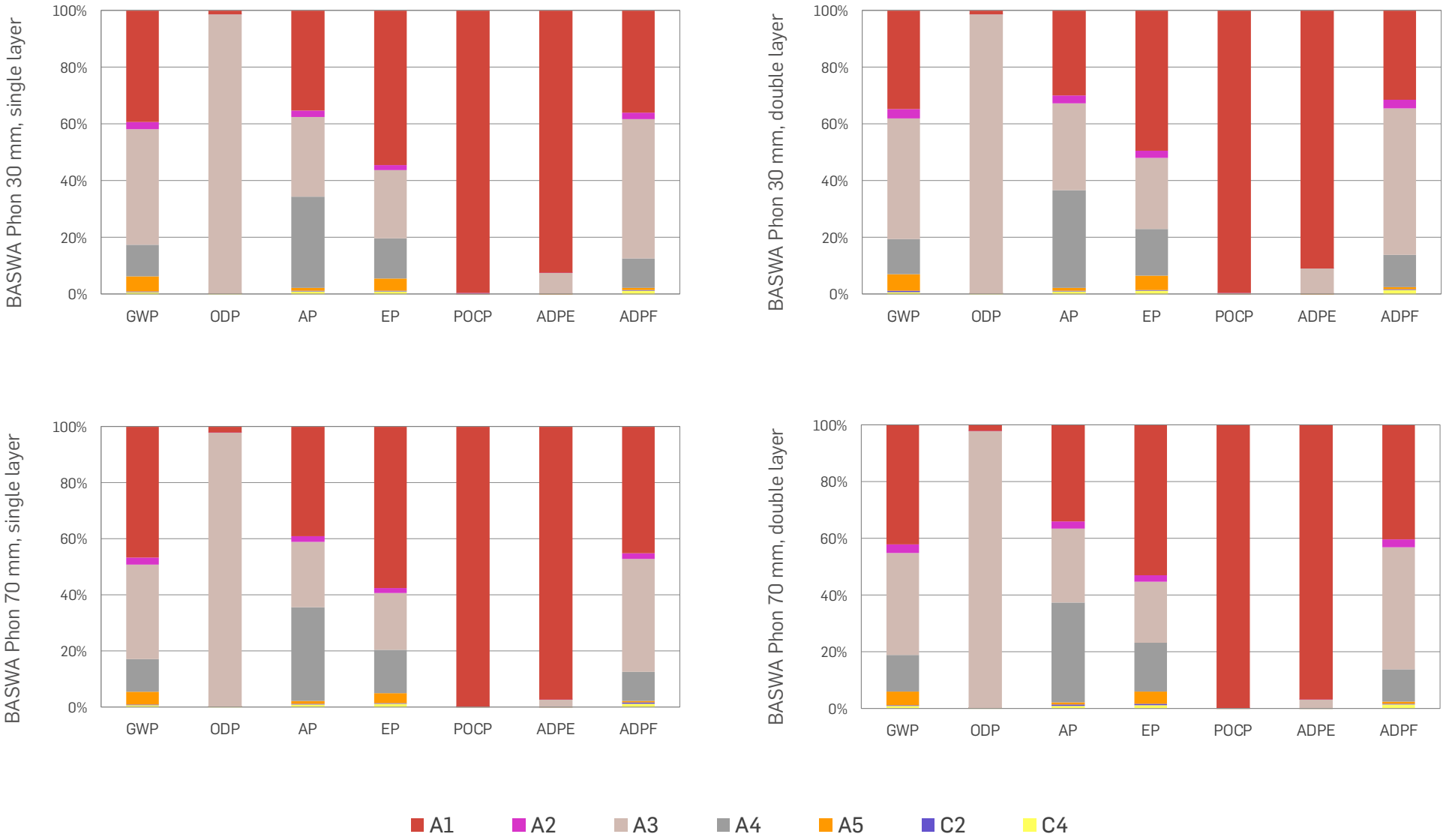
SM Use of secondary materials. **RSF** Use of renewable secondary fuels. **NRSF** Use of non-renewable secondary fuels. **FW** Use of net fresh water.

- WASTE CATEGORIES - **HWD** Hazardous waste disposed. **NHWD.** Non-hazardous waste disposed. **RWD** Radioactive waste disposed.

- OUTPUT FLOWS - **CRU** Components for re-use. **MFR** Materials for recycling. **MER** Materials for energy recovery. **EE** Exported energy per energy carrier.

Supplement Information

The following figures show the contribution to impact categories of each module for 30 mm and 70 mm BASWA Systems. The module with the higher contribution is A1, due to the production of expanded glass followed by the production of glass wool. A3 is the module with the second most important contribution in all impact categories due to the use of electricity and fossil fuels.



Verification

This document is an environmental product declaration in accordance with ISO 14025 and the requirements given in the product category rules document for Construction Products and Construction Services (EN 15804), PCR 2012:01-Sub-PCR-C for Acoustical System Solutions and the General Program Guidelines of The International EPD® System. The results shown in this EPD are based on the LCA for BASWA products according to standard 14044.

This EPD is not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages or are based on different Product Category Rules. EPDs of construction products may not be comparable if they do not comply with EN 15804. The EPD owner is responsible for its content, as well as to preserve supporting documentation during the period of validity that justifies the data and statements that are included.

EPD Program	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
EPD registration number	S-P-01764
EPD owner	BASWA acoustic AG
Functional unit	1 m^2 of acoustical systems solutions for ceiling during 50 years with an acoustic performance shown in table of page 8
System boundaries	Cradle to grave
Published	2019 - 12 - 11
Valid until	2024 - 12- 11
Reference year for data	2016-2017-2018
Geographical scope	Worldwide
Product group classification	UN CPC Code: 37129 - 37990
Product Category Rules	PCR 2012:01 v2.3 - Construction products and services Sub-PCR-C - Acoustical systems solutions
PCR review was conducted by	Technical Committee of The International EPD® System www.environdec.com info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006	☒ External ☐ Internal ☐ EPD Process
Third-party verifier	Centro Tecnológico de Miranda de Ebro www. ctme.es evamtz@ctme.es
EPD prepared by	IDNÓVAM Innovación y desarrollo para el ambiente info@idnovam.com

References

- General Programme Instructions of The International EPD® System. Version 3.0.
- PCR 2012:01. Construction products and construction services - Version 2.3.
- EN 15804:2012+A1:2013, Sustainability of construction works - Environmental Product Declarations – Core rules for the product category of construction products
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental product declarations
- ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment-Principles
- European Life Cycle Database. ELCD 3.2. http://eplca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default
- R. Hischier Weidema, B., Implementation of Life Cycle Impact Assessment Methods. Swiss Centre for Life Cycle Inventories, Ecoinvent Centre. Ecoinvent report No 3
- European Life Cycle Database. ELCD 3.2, n.d. http://eplca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default (accessed May 21, 2019)
- G. Doka, Life Cycle Inventories of Waste Treatment Services. Final report ecoinvent v2.1 No. 13, Swiss Cent. Life Cycle Invent. Dübendorf, CH
- ISO 354:2003 - Acoustics - Measurement of sound absorption in a reverberation room
- ISO 11654:1997 - Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
- ASTM C423 - Standard test method for sound absorption and sound absorption coefficients by the reverberation room method
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental product declarations
- Product environmental footprint category rules (PEFCRs) for thermal insulation, versión 5.0, 2019.

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