



EPS The Environmental Truth

Results of the Life Cycle Assessment



Recent years have shown growing concern for the environment, and in particular an increased demand for sustainable building and development. For the construction industry this has meant a need for accurate information about the environmental impact of the building materials and products that they use. The most reliable way to present this information has proved to be the Life Cycle Assessment (LCA) approach. This approach investigates the processes involved in the manufacture, use and disposal of a product or system – from cradle to grave.

What is EPS?

Expanded polystyrene (EPS) is a material widely used in the building sector, mostly for insulation purposes, and also in the packaging industry. A cost-effective, easy-to-use material, it performs as an acoustic and thermal insulator, is moisture resistant, recyclable and environmentally sound.

It is produced when pentane is dissolved in a polystyrene base material, which is then steam-heated to form EPS beads. The beads can then be moulded to exact specifications, to form insulation boards, blocks or customised shapes for the building and packaging industry.

Environmental effect/aspect	Abbreviation	Unit	Characteristic scores	Normalisation scores
Environmental impact				
Abiotic depletion	ADP	-	0,83	1,04E-11
Global warming	GWP	kg	5,98	1,42E-12
Ozone depletion	ODP	kg	2,11E-06	3,75E-14
Human toxicity	HCT	kg	0,0357	9,06E-13
Aquatic ecotoxicity	ECA	m ³	101	2,29E-13
Smog	POCP	kg	0,0207	3,28E-12
Acidification	AP	kg	0,0278	8,19E-13
Nutrication	NP	kg	0,00241	2,81E-13
Land use	LU*t	m ² .yr	0,00274	
Environmental indicator				
Cumulative energy demand (excluding feedstock energy)	CED-	MJ (lhv)*	48,9	8,45E-13
Cumulative energy demand (including feedstock energy)	CED+	MJ (lhv)	93,1	1,61E-12
Not toxic final waste	W-NT	kg	0,0453	8,43E-14
Toxic final waste	W-T	kg	0,0124	3,09E-13
* lhv = lower heating value				

The figures above show the weighted averages of the characterisation and normalisation scores for the life cycle of 1kg of EPS material. Proper comparison with other insulating materials is only possible when the same 'functional unit' is used in calculations, e.g. one square meter of insulated area with the same thermal properties.

With this LCA we now have a complete picture of EPS, and it can support its inherent benefits with detailed, accurate information. The following environmental impacts and indicators were disregarded in the study: biological depletion potential, terristic ecotoxicity, noise, casualties, radiation and heat to water.

INTRON B.V., the Quality Assessment Institute for the Building Industry carried out the external critical expert review 2) according to ISO 14040 and concluded "that the EUMEPS LCA was carried out in a very scrutinised way, transparent and very well documented. It reflects the best available LCA data on EPS that can be made available in 1998."

THE ENVIRONMENTAL PROOF

The European Manufacturers of Expanded Polystyrene (EUMEPS) want the truth about their products to be known. They want accurate information to be available, and most importantly, they want to clarify the issues surrounding EPS. With this in mind, they commissioned a report into the manufacture, use and recycling or disposal of EPS. This brochure presents the available and reliable information that has been gathered from the EUMEPS member associations and producers, and is a comprehensive Life Cycle Assessment of EPS. The study was carried out by PRC-Bouwcentrum in the Netherlands 1). The authority of the Life Cycle Approach is supported by the ISO 14040 series of standards, and follows in detail the life cycle stages of EPS manufacture, use recycling and disposal.

Frequently asked questions

? How many steps are there in the Life Cycle Approach?

Four.

? What are they?

Goal Definition and Scoping, Inventory, Impact Assessment, Evaluation, and Improvement Analysis.

? Goal Definition and Scoping?

The unit (in this case 1 kg of EPS material) is defined, data gathering and validation procedures are determined, and the level of data-detail is established.

? What do we mean by Inventory?

First, an inventory of relevant inputs and outputs to and from the environment are compiled. From this information, known as the Life Cycle Inventory (LCI), any potential environmental impacts are evaluated and interpreted. The study is a dynamic one, and can be updated as soon as new information relevant to EPS becomes available.

Considering the number of participating countries and producers, and the amount of data involved,

the investigation had to be highly structured, detailed and standardised. This resulted in a clearly defined and reproducible working model. The parameters for the study are set at this stage. System boundaries and allocation procedures are determined, process flow charts are drawn up, and data sources are selected (in this LCA, the EUMEPS members and producers formed the data sources).

? What's Impact Assessment?

Before we can determine any environmental effects, we must outline the categories under consideration: the Impact Categories. An example of an Impact Category used in the EPS study is its recyclability. Then, for each category, a number of characterisation factors are created (categories of recyclability) and a selection of normalisation factors included.

? What's involved in the Evaluation process?

In this final stage of the study all the information gathered throughout the study is analysed. There are several considerations: sensitivity analysis, reliability analysis, qualitative and quantitative analysis, and finally, appraisal.



Who is EUMEPS?

EUMEPS stands for the European Manufacturers of Expanded Polystyrene (EPS). It reflects the interests of all of Europe's leading EPS manufacturers through national associations.

There are two interest groups within the organisation: EUMEPS Packaging and EUMEPS Construction.

EPS comprises 35 percent of the total building and construction insulation market with 10,000 people directly employed in the EPS industry.

Founded in 1989, EUMEPS now has the support of 95 percent of the European EPS industry.

EUMEPS acts as an intra-industry task force, monitoring and co-ordinating a continuous process of improvement in European EPS manufacture with 'cradle to grave' responsibility for the products. This is achieved via working groups focused on:

- Health, Safety and the Environment
- Standardisation
- Fire safety
- Communications.

EUMEPS is a partner on a European level for economic, political and technical issues to relevant parties including the building and construction industry, legislative authorities, architects, engineers, developers and consumers.

Further information on EPS for the construction industry is available from

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