

Evaluating the environmental impacts of hot and cold water supply systems in a building to aid product choice: Asking the right questions - making choices



Keywords

- PE-X, PB, PP-R
Multilayer pipes
- Hot and cold water systems
- Robust data
- Building project
- Best environmental solution
- Carbon reduction

Article Highlights

Reduction in emissions during the manufacture of products and construction of buildings provides immediate environmental benefits. This series of bulletins describes the impacts on our environment, the drivers for change and the tools available to select the best sustainable options for plastic piping systems in hot and cold water systems.

What does the bulletin cover?

This final bulletin is a summary for those specifying and choosing products. It covers what questions to ask and what to consider when making a decision on piping systems. It explains the terms embodied and operational carbon reduction.

Introduction

Through this series of [bulletins](#), the BPF Pipes Group is raising awareness of environmental considerations when selecting piping systems in buildings. In the first bulletin (see [Bulletin 1](#)), the UK Government's commitments to reducing carbon and greenhouse gas emissions (GHG) by 2050 were noted. Up to 35% (2017) of carbon emissions result from the residential and business sectors, primarily operational activities such as heating, cooling, cooking etc. As these activities become more energy efficient and progress continues towards the use of sustainable energy sources, the impact of building construction on the environment will become more prominent.

From ambition to the reality of a building project

The Chartered Institution of Building Services Engineers (CIBSE) advises that “Nearly every new building constructed in the UK from now on will be part of the existing stock in 2050”. The UK's leading property developers and construction companies are actively seeking to go beyond the minimum required and make ethical choices which mitigate climate change and move towards net-zero carbon buildings.

Architects, consultant engineers, quantity surveyors, and contractors involved in the process of specifying and choosing products need to have access to robust and reliable evidence to allow informed decisions to be made which support these environmental ambitions.

The greatest opportunity to reduce the environmental burden from building construction comes at the design stage. Nearly 8% of the UK's GHG emissions are produced as a result of manufacturing, transporting, installing and disposing of construction products and materials used in the UK, so all savings made during these stages provide immediate and quantifiable benefits to our environment.

Studies (Source: UK Green Building Council) show that the greatest impacts come from the structure of a home — walls, floors, ceiling etc— and addressing product choice in these areas is key to bringing about change.

However, essential services such as hot and cold water supply systems should still be optimised to minimise the impact on the environment throughout their lifecycle.

Carbon reduction

The term “carbon reduction” is often used instead of greenhouse gas emission (GHG) reduction. It means the same and whilst GHG or carbon is only one of seven environmental impacts assessed (see [Bulletin 3](#)), it is a good indicator of the overall effect of a product on the environment.

- “Embodied carbon” describes the emissions from the construction materials, the building process, the fixtures and fittings as well as from deconstructing and disposing of the building at the end of its lifetime.
- “Operational carbon” describes the emissions associated with operation of the building (heating, cooling, powering, providing water etc).

The Life Cycle Assessment (LCA) of a product, presented for consistency as an Environmental Product Declaration (EPD), addresses the first of these: manufacturing the materials; transforming them into products; product transportation and installation; and disposal at the end of life (see [Bulletin 2](#) and [Bulletin 4](#)).

Using EPDs to make choices

Life Cycle Assessments and Environmental Product Declarations are essential tools for objectively assessing the impacts of products in procurement and sourcing, alongside performance and cost considerations. The BREEAM sustainability performance schemes, including the Home Quality Mark, use Environmental Product Declarations prepared to BS EN 15804 in the materials section of the assessment.

What information do you need to select a product?

- **Request** an independently verified EPD to BS EN 15804 for each option.
- **Check** the EPD.
 - Is it current? (see date of declaration and validity)
 - Is it for the product / system proposed? (see product description and standard)
 - Does it cover the complete system? (see functional unit)
 - Does it cover all stages of life (cradle to grave)?
- **Ask again!** EPDs for a single product (e.g. pipe or fitting) or a limited part of the life cycle (e.g. cradle to gate) will not support like-for-like comparison of the options available for hot and cold systems inside buildings. For more details on the essential features of an EPD, see **Bulletin 4**.

What might you consider when making the decision?

When comparing EPDs, greenhouse gas emissions (given by impact category GWP, Global Warming Potential) and use of fossil fuels (given by impact category ADP, Depletion of Abiotic Resources) are good indicators of all seven environmental impact categories.

For hot and cold water supply inside buildings, the contributions to all seven categories from any of the four plastics manufactured to European Standards (polybutylene, crosslinked polyethylene, polypropylene or multi-layer) are significantly lower than copper systems for the same application. **Bulletin 5** illustrates this graphically.

TEPPFA, The European Plastic Pipes and Fittings Association, provides [an EPD calculator](#) which displays values from their independently verified EPDs for any combination of impact category and pipe material selected by the user. The complete EPDs for plastic pipes for this application and many others are available from the [TEPPFA website](http://www.teppfa.eu/sustainability) (www.teppfa.eu/sustainability).

BPF Pipes Group

“The use of plastic piping systems for hot and cold water supply and heating systems has steadily grown over the past 40 years. Environmental credentials are increasingly being considered alongside performance and cost in procurement and sourcing. As a key part of the supply chain to the construction industry, members of the BPF Pipes Group are able to provide robust environmental performance data through independently verified EPDs to demonstrate that the move away from copper pipework for these applications has also been the right choice for the environment.” Caroline Ayres, Director.

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Bulletin 1: Introduction

Bulletin 2: Life Cycle Assessment (LCA)

Bulletin 3: Balancing the environmental impacts

Bulletin 4: Interpreting Environmental Performance Declarations (EPDs)

Bulletin 5: Applying your knowledge

Bulletin 6: Asking the right questions - making choices

About the BPF Pipes Group

Part of the British Plastics Federation, the BPF Pipes Group is a trade association representing manufacturers and material suppliers of plastic piping systems across the UK.

Committed to sustainable construction, its aims are to provide a forum for the exchange of technical expertise between member companies and to promote the importance of plastic as a pipework material, for the full spectrum of above and below ground, pressure and non-pressure applications. It also plays a key role in initiating and disseminating research and informing and influencing the standards bodies pertaining to plastic pipe systems. It works closely with TEPPFA, The European Plastic Pipes and Fittings Association.

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