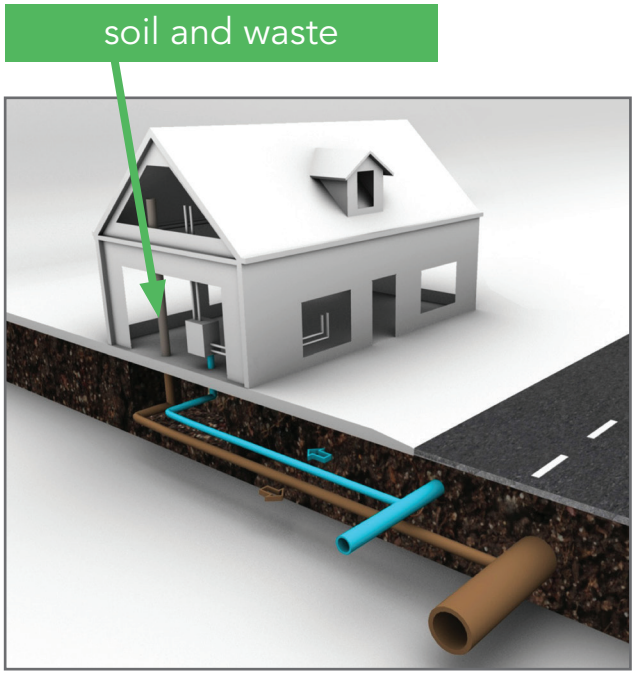
Polypropylene plastic pipe systems vs ductile iron environmental impact comparison

An independent study following EN 15804 methodology by the respected Flemish Institute for Technological Research (VITO), and validated by the Denkstatt sustainable development institute in Austria, is conclusive in its findings that plastic soil and waste pipe systems made from polypropylene have a lower environmental impact than those made from ductile iron.



RELATIVE SIZE OF ENVIRONMENTAL FOOTPRINT

DUCTILE IRON

POLYPROPYLENE

To make a fair comparison between these two different materials and determine the environmental impacts of both, each stage of their lifecycle was analysed.
"Environmental footprints" can be either adverse or beneficial. Adverse effects such as emitting greenhouse gases may arise in either the product's production or disposal process; beneficial effects help to reduce greenhouse gas emissions by saving energy whilst the product is in use.

DETERMINING A PRODUCT'S ENVIRONMENTAL FOOTPRINT

A scientifically-based full Life Cycle Assessment (LCA) is the standardised method for fairly comparing the environmental impacts of different products or services. This type of assessment involves systematically collecting and evaluating quantitative data on the inputs and outputs of material, energy and waste flows associated with a product over its entire life cycle. Therefore a whole range of processes need to be assessed to calculate overall impacts, beginning with the manufacturing of raw materials, to transforming them into products; continuing through the product's transportation and installation, the product's lifetime of use, and ultimately, the product's disposal or re-processing at the end of life.

The findings of LCA assessments are typically published in the form of Environmental Product Declarations (EPDs) to help communicate a product's overall environmental impact.
The VITO study involved collecting data on plastic pipe systems from companies covering more than 50% of the European market. Data for ductile iron was based on publicly available information.

ENVIRONMENTAL IMPACT CRITERIA

The environmental impact of each pipe material was assessed against seven different criteria across its full life cycle.

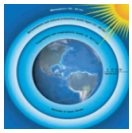
'Abiotic-depletion' non-fossil: the over-extraction of minerals, fossil fuels and other non-living, non-renewable materials which can lead to exhaustion of natural resources.

'Abiotic-depletion' fossil: The over-extraction of fossil fuels including all fossil resources.

'Acidification' potential: emissions, such as sulphur dioxide and nitrogen oxides, from manufacturing processes, result in acid rain which harms soil, water supplies, human and animal organisms, and the ecosystem.

'Eutrophication' potential: which arises from of the over-fertilisation of water and soil by nutrients (such as nitrogen and phosphorous). This speeds up plant growth and kills off animal life in lakes and waterways.

'Global warming' potential (its carbon footprint): the insulating effect of greenhouse gases - CO_2 and methane - in the atmosphere is a major contributor to global warming, affecting both human health and that of the ecosystem in which we live.



'Ozone-depletion' potential: depletion of the ozone layer in the atmosphere caused by the emission of chemical foaming and cleaning agents allows the passage of greater levels of UV from the sun, causing skin cancer and reducing crop yields.

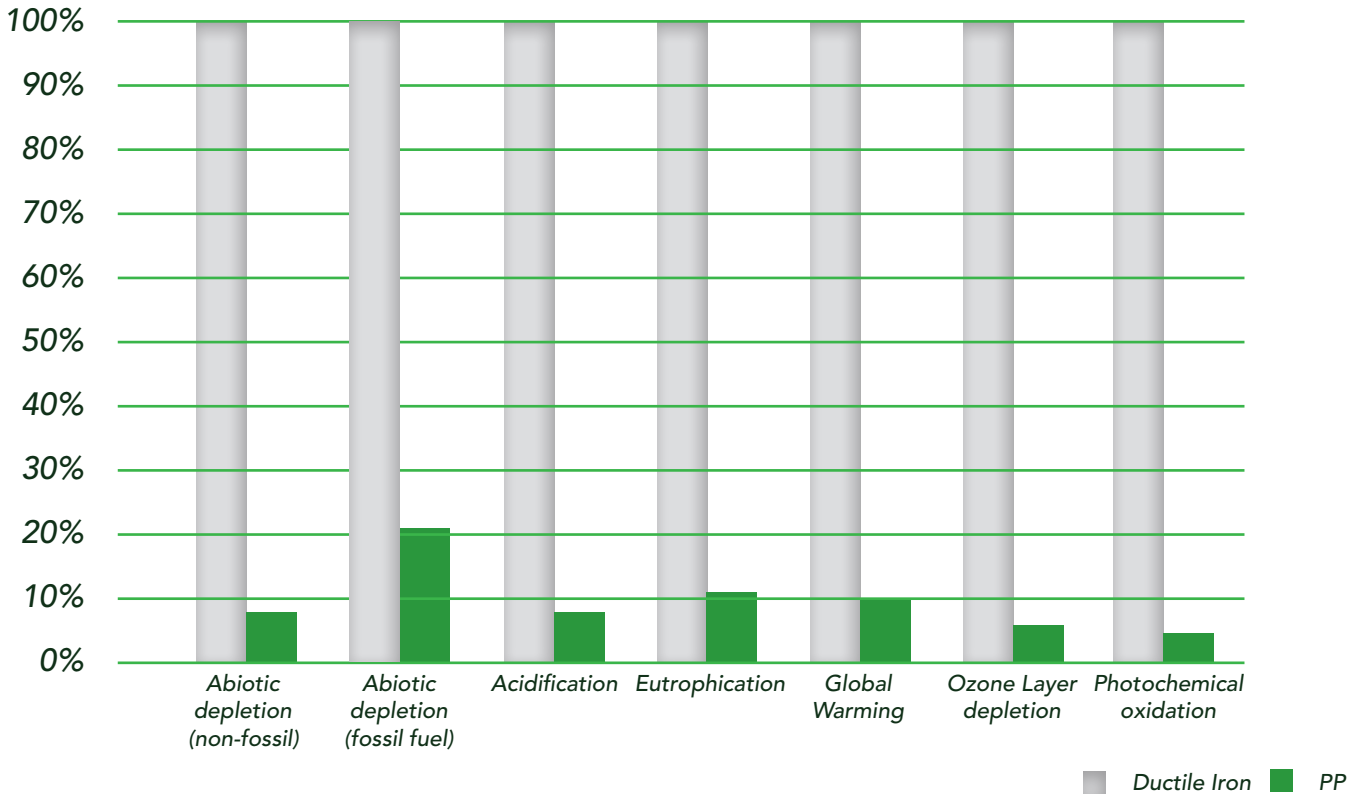
'Photochemical-oxidation' potential: where the photochemical reaction of sunlight with primary air pollutants such as volatile organic compounds and nitrogen oxides leads to chemical smogs that affect human health, food crops and the ecosystem in general.

COMPARISON BASED ON IDENTICAL FUNCTIONAL UNITS

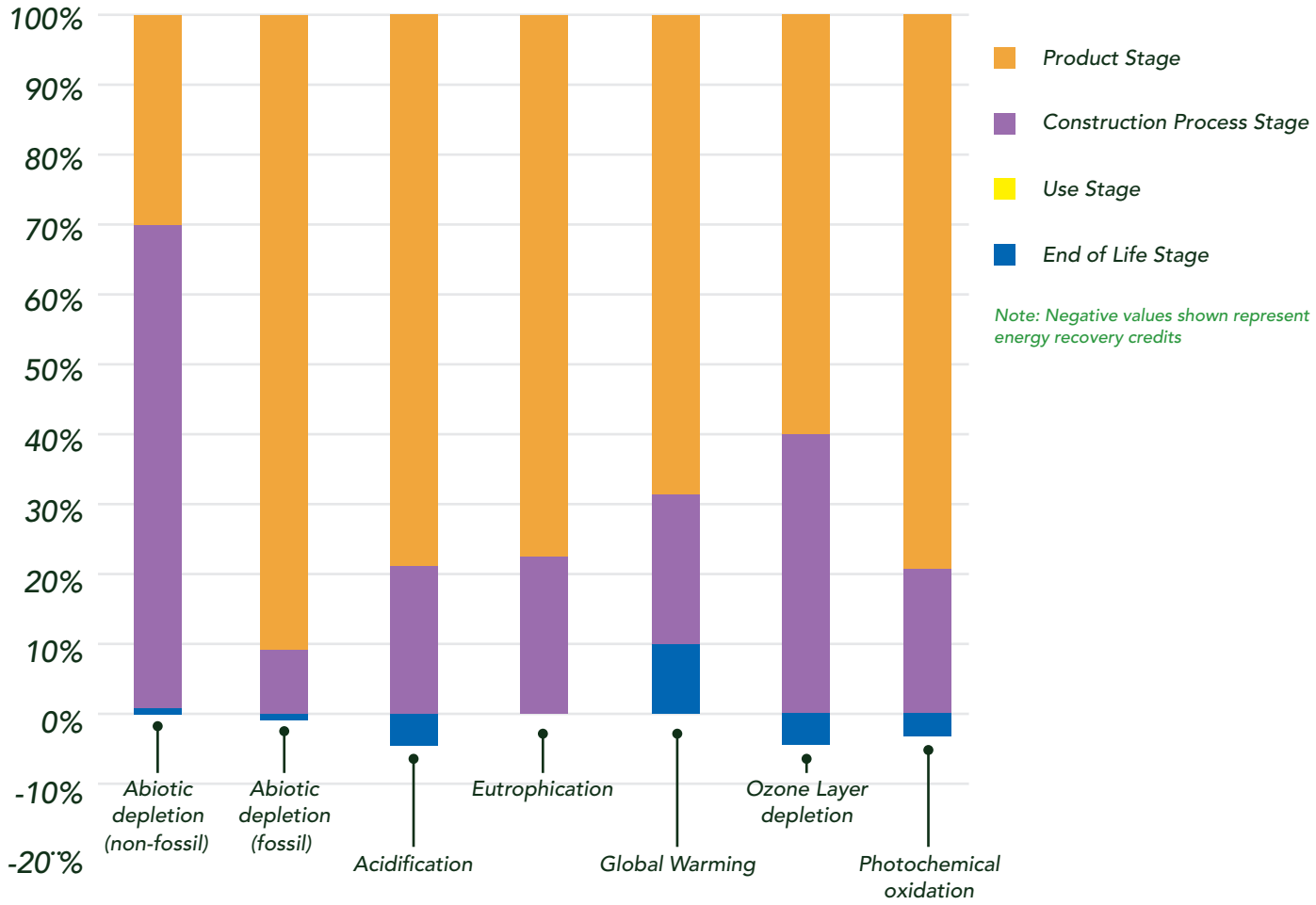
For the purposes of a direct fair comparison between alternative materials the following identical functional unit was used in the LCA study for soil and waste pipe systems:

- a pipe system for the gravity discharge and transport of soil and waste from an apartment of 100 m^2 to the entrance of a public sewer system
- a 50 year lifetime has been assumed which aligns with the normal lifetime expectancy of a building

COMPARISON OF PP TO DI FOR THE 7 ENVIRONMENTAL IMPACT CRITERIA



ENVIRONMENTAL PROFILE OF THE PP PIPE SYSTEM FOR SOIL AND WASTE REMOVAL (BUILDING) FROM CRADLE-TO-GRAVE PER FUNCTIONAL UNIT



ENVIRONMENTAL PROFILE OF THE PP PIPE SYSTEM FOR SOIL AND WASTE (CRADLE-TO-GRAVE) IN ABSOLUTE FIGURES PER FUNCTIONAL UNIT

IMPACT CATEGORY	Abiotic depletion Non-Fossil	Abiotic depletion Fossil Fuels	Acidification	Eutrophication	Global warming	Ozone layer depletion	Photochemical oxidation
Life cycle phases	kg Sb eq	MJ	kg SO2 eq	kg PO4--- eq	kg CO2 eq	kg CFC-11 eq	kg C2H4 eq
Product Stage	2.96E-07	2.23E+01	2.00E-03	4.15 E-04	6.18E-01	2.99E-08	1.47E-04
Construction Process Stage	6.81E-07	2.31E+00	6.49E-04	1.21E-04	1.82E-01	2.25E-08	4.61E-05
Use Stage	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Stage	9.24E-09	-3.12E-01	-1.13E-04	-1.99E-06	9.21E-02	-2.28E-09	-6.85E-06
Total	**9.86E-07**	**2.43E+01**	**2.54E-03**	**5.34E-04**	**8.93E-01**	**5.02E-08**	**1.86E-04**

More detailed information about this material comparison can be obtained via www.teppfa.eu or by contacting TEPPFA at: info@teppfa.eu

The EPD TEPPFA project

The European Plastic Pipes and Fittings Association (TEPPFA) is keen to raise awareness of the value that plastic pipe systems offer for a sustainable future. We commissioned an independent study by the Flemish Institute for Technological Research (VITO) to measure the environmental footprint of various plastic pipe systems based on life-cycle assessment. The work was validated by the Denkstatt sustainability consultancy in Austria.

An important objective was to provide transparency about the impact of plastic pipe systems on our environment. It was also an important step in the development of the Environmental Product Declarations for plastic pipes.

Many companies and institutes contributed to the work of this study, including Plastics Europe, TNO and PVC4pipes Association. Data was collected from 60% of companies within the European pipe industry.

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The European Plastic Pipes and Fittings Association (TEPPFA) is the trade association representing manufacturers and national associations of plastic pipe systems in Europe. We are actively involved in the promotion of plastic pipe systems for all applications. We want to raise awareness of the value that plastic pipe systems offer for a sustainable future.

www. teppfa.eu

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