

Special:
Sustainability



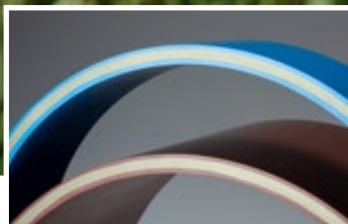
Funke INFO

The magazine of Funke Kunststoffe GmbH

Infrastructure needs pioneers Taking responsibility – acting sustainably



P.03
The future in sight
We take responsibility for generations



P.08
Funke Pipe2Pipe®
The new pipe with up to 100 % recycled material in the core layer



P.10
Funke Plant2Pipe®
uses 100 % bio-attributed PVC-U with the familiar high quality



Dear readers,

The German Climate Adaptation Act (KAnG) and the EU Ecodesign Regulation came into force in July 2024. Both have a significant impact on business operations. The KAnG regulates measures for adapting to climate change. Among other things, companies must conduct climate risk analyses to assess the potential impacts of climate change on their business activities and develop appropriate adaptation strategies. At the same time, businesses are encouraged to integrate climate adaptation measures into their long-term business planning and decision-making processes. The Ecodesign Regulation (Regulation (EU) 2024/1781) establishes minimum ecological requirements for products sold in the EU to reduce their environmental and climate impacts. This includes aspects such as durability, reparability and recyclability to conserve resources and minimise waste.

Looking at the increasing occurrence of heavy rainfall events also highlights the urgency of the situation. By reducing our corporate footprint, we are leading by example and aim to make a meaningful contribution to climate relief together with our customers. That's why Funke is taking various measures and is expanding its product range with reduced climate impact in a targeted manner.

We wish you an enjoyable and insightful read!

Timo Langer
Head of Sales

Rudolf Töws
Head of Engineering

Special: Sustainability

Contents

03 | We take responsibility

The company's CO₂ footprint is consistently being reduced.

04 | Funke – the innovation driver in civil engineering

Modern system solutions contribute to a liveable environment.

06 | Sustainability at Funke

Acting sustainably is in the company's DNA.

08 | Funke Pipe2Pipe®

The new pipe is a pioneer for closed material cycles.

10 | Funke Plant2Pipe®

This product uses 100% bio-attributed PVC-U.

12 | Figures, dates, facts

These are the keywords for promoting sustainability.

20 | Funke and PVC-U

The material serves the basis for top quality civil engineering solutions.

Legal Notice

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03/2025

The future is important to us

We take responsibility for today and tomorrow

With its modern and high-performance system solutions, Funke Kunststoffe contributes to maintaining a healthy and liveable environment in which people and infrastructure are protected. By developing and marketing innovative products, as well as using recycled materials and sustainably sourced raw materials, we are consciously fulfilling our Corporate Social Responsibility (CSR). In addition, we are continuously working to further reduce the company's carbon footprint.

Business activities inevitably have environmental impacts. To quantify these, a company's Corporate Carbon Footprint (CCF) is determined. Another unit of measurement used is the climate currency kg CO₂e (kilogrammes of CO₂ equivalent). The GHG Protocol (Greenhouse Gas Protocol) categorises emissions into three Scopes: Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy) and Scope 3 (indirect emissions from the upstream and downstream supply chain). Scope 1 and 2 emissions can be directly influenced by corporate decisions.

With the introduction of energy management according to ISO 50001 in 2015, Funke Kunststoffe GmbH opted to have its practiced climate strategy measured against strict criteria. And with success: since the continuous monitoring, management and targeted reduction of Scope 1 and 2 emissions, a reduction of 88% was achieved by 2023.

CO₂-footprint in Germany

10.3

tonnes of CO₂e per capita are emitted in Germany. A climate-compatible global per capita emission would be less than 1 tonne of CO₂e per year.

Source: Federal Environment Agency 2024

What is one tonne CO₂e equivalent to?

80

years is how long a beech tree needs to grow to absorb one tonne of CO₂. This means: per year, one beech tree binds 12.5 kg of greenhouse gases.

Source: Handelsblatt 2009

450,000

km train journey by one person or 4,900 km by car (8.5 l/100 km) create one tonne of CO₂.

Source: Swissclimate.ch, FACT. SHEET
How much is one tonne of CO₂?

400

litres of oil, 360 kg coal or 560 m³ of natural gas create around one tonne of CO₂ when burnt.

Source: Swissclimate.ch, FACT. SHEET
How much is one tonne of CO₂?

-88 %

In 2023, Funke can report a **CO₂e reduction** of 88% (Scope 1 and 2) compared to the base year of 2015.

Visionary, creative, solution-oriented Funke – the innovation driver in civil engineering

PVC pipes

1935-41

The first PVC pipes were used in Bitterfeld and during the construction of the Berlin Olympic Stadium



1941

Introduction of the first product standards for the use of plastic pipes in sewage systems

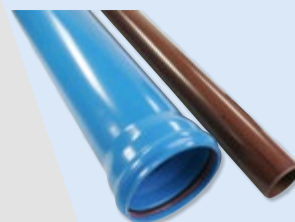
1980-85

Market launch of the KG Sewer Pipe System as a complete range for property drainage



1993

Introduction of the HS® Sewer Pipe System; initially, only pipes in nominal diameters DN/OD 160 and 200, as well as branches and double socket couplings, were produced



2000

New opening of the Hamm production site



1993

Production of the first foamed (core layer) plastic pipes



1962

Foundation of Kunststoffröhren Sendenhorst



1998

Development and launch of products for stormwater management



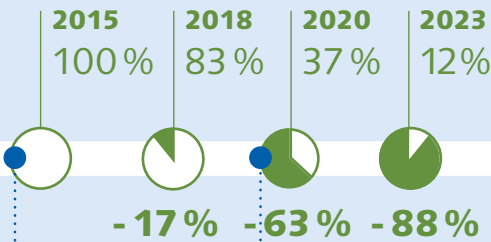
Funke company

from 2000

Expansion of the HS® Sewer Pipe System to complete system with outstanding structural properties in nominal diameters DN/OD 110 to DN/OD 800



CCF (Corporate Carbon Footprint) monitoring
The share of CO₂e emissions at the company level (Scope 1 und 2) based on 2015



2002

Introduction of ISO 9001 as the standard for quality management systems and the associated requirements



2015

Introduction of ISO 50001 as the international standard for energy management systems



2020

Definition and introduction of sustainable corporate goals (CSR)



2024

Introduction of the sewer pipe systems with reduced climate impact, Funke Pipe2Pipe® and Funke Plant2Pipe®



2025

Sewer Connections product group **transitioned** to bio-attributed PVC-U



2024

The number of employees grows to over 350



2030

Future vision: Funke as a system provider for sustainable blue-green infrastructure



violetkaipa, istockphoto

Sustainability at Funke

Acting sustainably for future generations



Funke Kunststoffe aligns itself with the goals of the Sustainable Development Goals (SDGs). Each one of them contributes to making the world fairer and more ecological.

Ambitious goals

Down to earth, but with entrepreneurial spirit! Conservative values, yet bold, forward-thinking and innovation-driven – character traits like these have played a decisive role in transforming a traditional family business into a successful company operating across Europe. With the change in management that took place in 2023, responsibility has been transferred to the third generation.

This created the foundation to continue expanding all areas of the company in a future-oriented and sustainable manner. Sustainable expansion means acting, producing and growing sustainably, as well as taking responsibility for both today and tomorrow. Funke defines its identity not only through products, innovative ideas and technical expertise. The focus is also on respectful and trustworthy interaction with each other and with business partners, as well as environmental protection.

We have set ambitious goals, including becoming a circular economy-oriented company with a positive climate balance and reducing our CO₂ footprint as much as possible.

Acting sustainably

With a focus on environmental protection and sustainability, it is important to use alternative materials to reduce environmental impact. One such option is the use of PVC-U recyclates, which help reduce resource consumption and minimise waste. By incorporating PVC-U recyclates into production, we not only reduce our ecological footprint but also help minimize the environmental impact of producing new materials and promote the plastic recycling loop. Our innovations and measures for CO₂ reduction support the goals of the Green Deal. We are taking concrete steps to improve energy efficiency and reduce emissions. Funke Kunststoffe's energy management is certified according to ISO 50001. Among other measures, we

exclusively purchase green electricity. At the Hamm site, Funke was able to reduce CO₂ emissions from electricity supply (Scope 2) by more than 90 % between 2015 and 2023 by switching to 100 % green electricity. As a result, more than 9,700 tonnes of CO₂ were saved by the end of 2023 compared to a standard German electricity mix.

Another energy source is the photovoltaic system on the production building. In addition, the vehicle fleet and forklifts are gradually being converted to electromobility, and additional charging stations for electric vehicles are being installed on the company premises. By utilising the waste heat from production systems for heating and hot water preparation, not only is energy saved, but operating costs are also significantly reduced. The modernisation of machines and equipment makes an additional active contribution to environmental protection.

Producing sustainably

As an innovation driver in civil engineering, it is our responsibility to also improve the climate balance. This starts with the sourcing of raw materials, continues through the production of our products, and extends to distribution and service. With a sustainability-driven approach in the use of raw materials and recyclates, as well as the continuous development of production processes, the company's CO₂ footprint has already been significantly reduced in recent years. In the field of sewer pipes, we are consistently taking the next logical steps. In addition to the established HS® Sewer Pipe System, we offer two climate-friendly product lines for environmentally-conscious customers. For the production of Funke Pipe2Pipe®, approximately 50% recycled PVC-U and around 50% PVC-U produced with green electricity are used. With Funke Plant2Pipe®, we go even further and use 100 % bio-attributed PVC-U. To live up to our pioneering role, we produce all of our sewer connections from 100 % bio-attributed PVC-U.

People in focus

350 people work at Funke Kunststoffe. Their goal is to invest their working time in a meaningful and sustainable way for a better future. For us, it goes

without saying that we support and protect our employees. This includes, in addition to numerous training and further education opportunities, a healthy workplace. Not only in the office, but also in production.



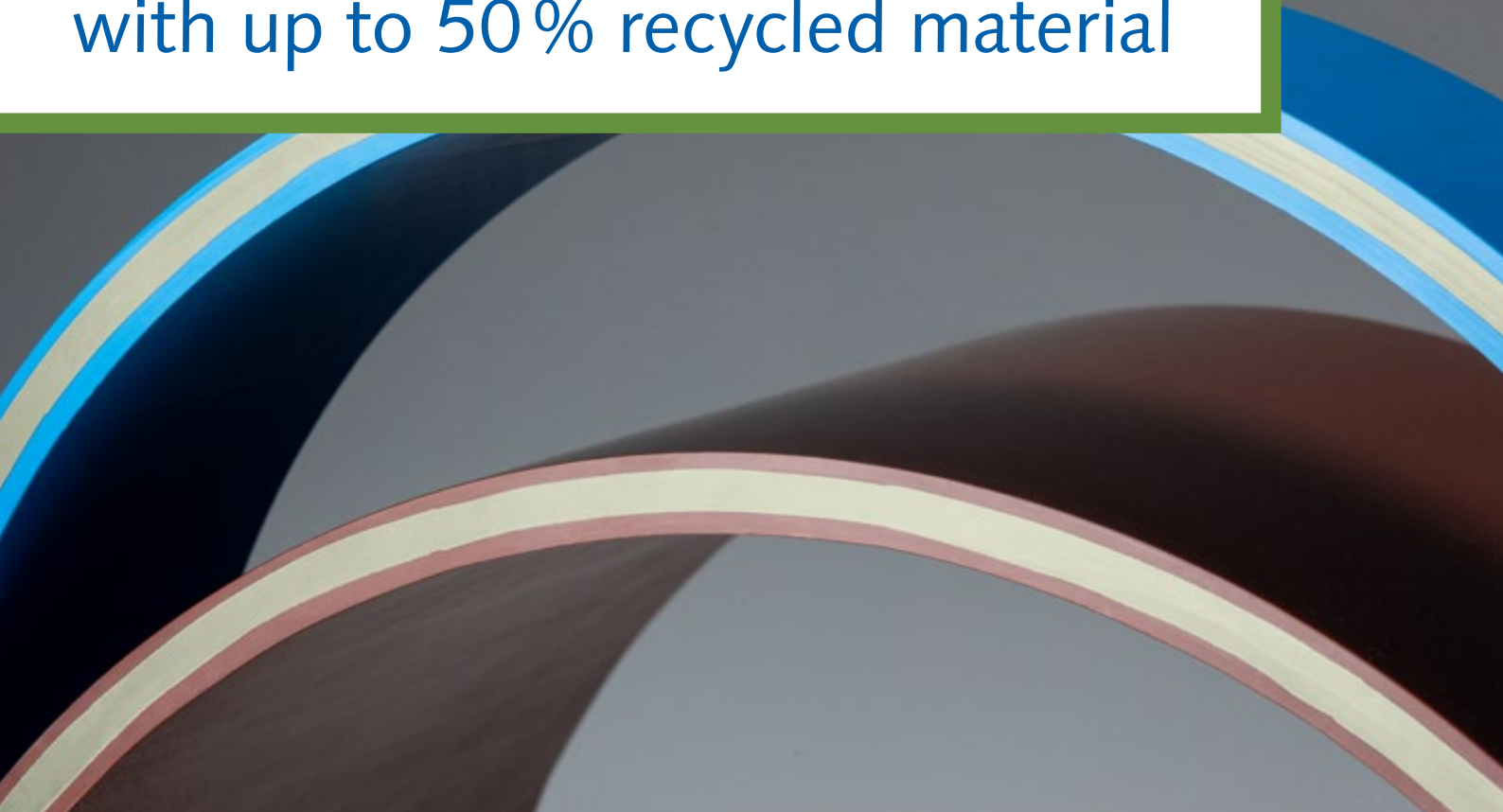
Funke sets an example

- **2015 to 2023: Reduction of CCF (Corporate Carbon Footprint) at the company level (Scope 1 and 2) by 88 %**
- **By using pure PVC-U (monomaterial), products can be easily recycled multiple times**
- **Modern production and processing methods help to avoid PVC-U waste**
- **The energy management is certified according to ISO 50001**
- **Innovative products for stormwater management help reduce microplastic intrusion**
- **Products made of Bio-attributed PVC-U are possible**
- **The complete range of sewer connections has been uncompromisingly switched to 100 % bio-attributed PVC-U**



Going sustainably into the future

Funke Pipe2Pipe® – the new pipe with up to 50 % recycled material



90%

CO₂ savings possible

By using recycled PVC-U, up to 90 % CO₂e can be saved per kilogramme of material compared to the use of new material.

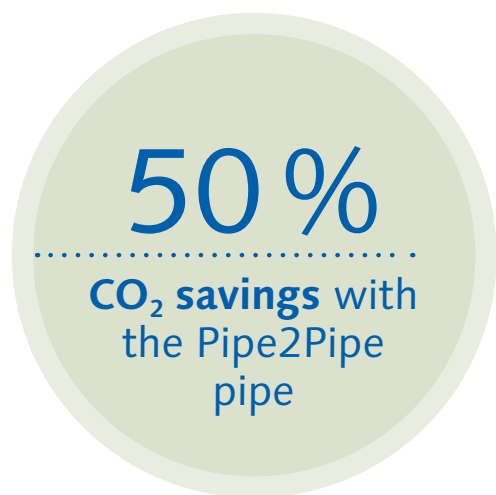
Funke Pipe2Pipe® is the sustainable pioneer for closing material cycles. This is achieved through the consistent use of 50 % PVC-U recyclate and 50 % PVC-U produced with green electricity, based on the entire pipe cross-section.

Funke acts

Funke goes beyond the market standard here as well. The DIN EN 1401 allows a recycled content with an agreed specification of 20%. To truly make a difference, we increase this content by more than double in the Funke Pipe2Pipe® pipe, up to 50%. For the remaining portion, polyvinyl chloride produced with green electricity is used.

Avoiding compensation

Only consistent avoidance of CO₂ emissions aligns with our philosophy – it is the right step towards a decarbonised industry. Therefore, we aim to avoid negative environmental impacts and emissions from the outset, rather than compensating for them elsewhere.

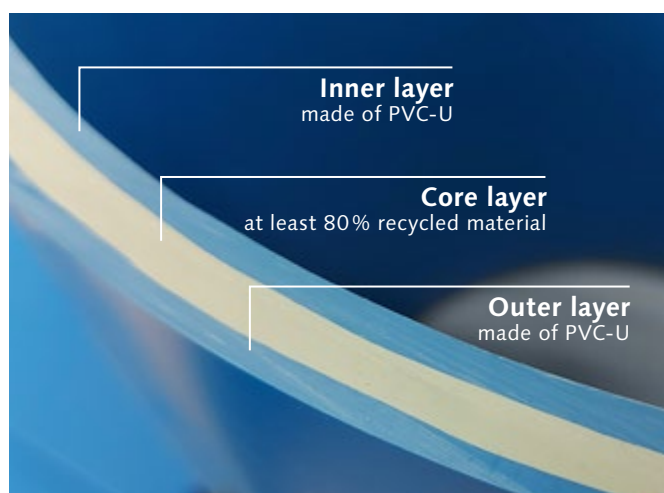


Why a change in mindset is necessary

The past ten years have also been the warmest since records began. Compared to pre-industrial temperature levels, the temperature increase in 2024 exceeded 1.5°C for the first time. A look at the NASA chart (see page 12) clearly illustrates this. Here, it becomes clear that greenhouse gas emissions must be dramatically reduced in all areas of human activity. For mass-intensive, durable and high-quality construction products such as the sewer pipe systems offered by Funke, there are three key factors that are directly influenced by the manufacturer, according to DIN EN 15804. They are:

- A1 | provision of raw materials
- A2 | transport
- A3 | manufacturing

In the case of plastic sewer pipes such as the HS® Sewer Pipe, more than 90 % of the PCF CO₂e emissions in a Cradle to Gate analysis are attributed to the provision of raw materials for conventionally produced PVC-U (A1).

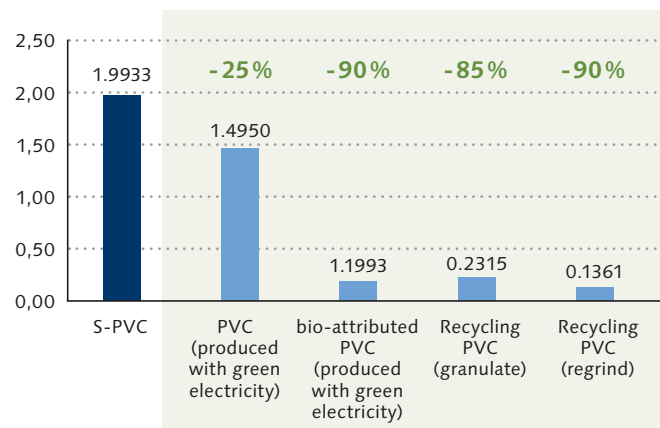


In the Funke Pipe2Pipe®, the core layer consists of up to 100 % PVC-U recycled material.

Material as the largest lever

Funke addresses the emissions caused by transport (A2) by using European PVC-U. During manufacturing (A3), a minimum amount of emissions is achieved through efficient plant technology, which is powered by 100 % renewable energy. The material used in A1 for manufacturing is the biggest lever for the PCF consideration. High-quality plastic pipes with high load-bearing capacities are produced using the co-extrusion process. This makes pipes particularly suitable for the use of large amounts of recycled materials. Continuous production monitoring ensures the highest product quality with a 50 % reduced environmental impact compared to 2015.

CO₂e/kg of different PVC-U Variants



With Funke Pipe2Pipe®, 50 % of CO₂ emissions can be saved compared to the HS® Sewer Pipe System from the base year 2015.

Definitions

- **Cradle-to-gate** refers to the assessment of the environmental impacts of a product from raw material extraction (cradle) to the factory gate (gate), taking into account all the phases of the product lifecycle in between.
- The **Product Carbon Footprint (PCF)** refers to the total greenhouse gas emissions that occur over the entire lifecycle of a product – from raw material extraction, through production, to use and disposal.
- **CO₂e** stands for carbon dioxide equivalents and is a unit of measurement used to compare the effects of different greenhouse gases on climate change.

Sustainability plus

Funke Plant2Pipe® uses 100 % bio-attributed PVC-U

100 %

bio-attributed
PVC-U is used in
the new pipe

Sustainability plus

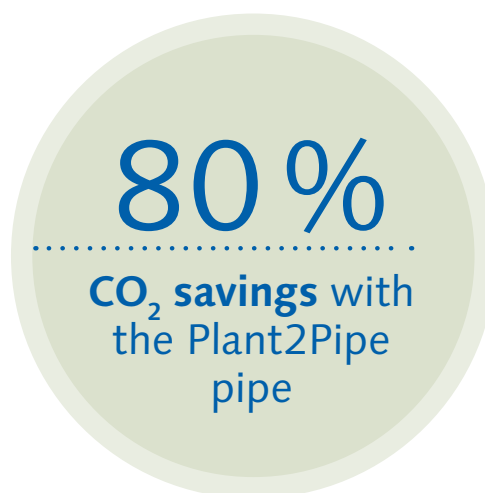
To live up to our pioneering role, we produce all of our sewer connections from 100 % bio-attributed PVC-U. The usual quality of our products remains unchanged, while the environmental impact is significantly reduced.

Funke Plant2Pipe® sewer pipe system HS® goes one step further and relies on 100 % bio-attributed PVC-U, which uses ethylene from renewable sources in the mass balance approach while maintaining the same quality.

The term 'drop-in plastics' is commonly used in the market for this. Their chemical structure is identical to that of conventional, petrochemically produced plastics. There are no technical losses in the quality or performance of the products. The use of bio-attributed PVC-U is a fast and effective way to transition supply chains to more sustainable practices. In addition to using recycled PVC-U, bio-attributed PVC-U is the uncompromising alternative with low environmental impact while still using new material. Accordingly, in the upstream value chain for producing PVC-U, petroleum is replaced by carbon from biomass. With its Funke Plant2Pipe® system, Funke relies on 100 % bio-attributed PVC-U, which uses ethylene from renewable sources under the mass balance approach while maintaining consistent quality.

CO₂ savings of up to 80 %

For the production of bio-attributed PVC-U, plant-based raw materials are used to replace petroleum. This means that fossil resources are substituted with a renewable alternative that does not compete with food production. Pipes labeled with Funke Plant2Pipe® are equal to high-quality HS® sewer pipes in terms of quality, workability and durability. Products made from bio-attributed PVC-U are also fully recyclable. This means that CO₂ savings of up to 80 % are possible in life cycle stages A1-A3 according to DIN EN 15804 compared to conventional HS® sewer pipes.



For environmentally-conscious users

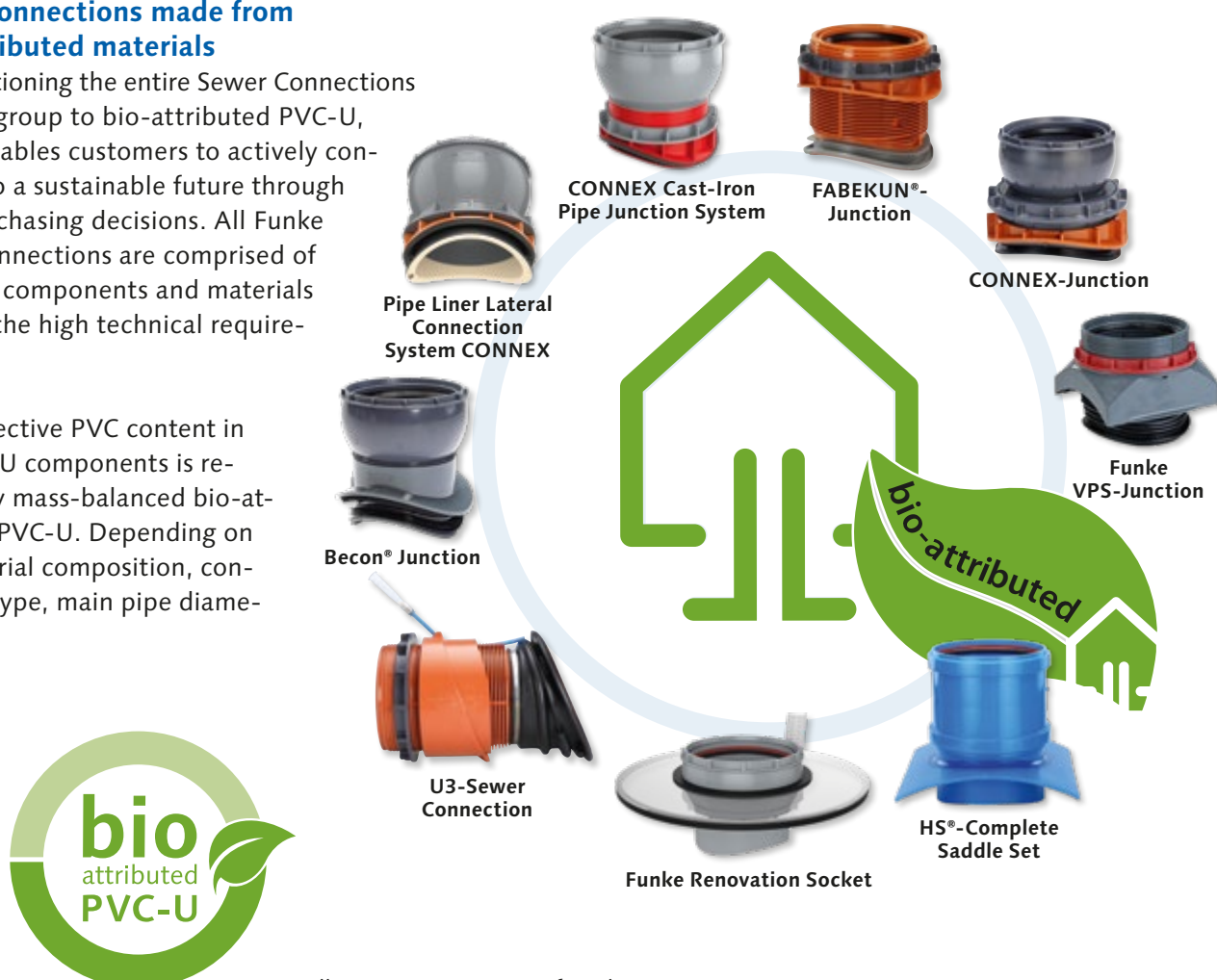
Against this backdrop, Funke now offers clients, planners and network operators the opportunity to use high-quality and durable civil engineering products with a reduced climate impact through its new product lines. After all, the new construction and renovation measures you implement should fulfil their function for many years and also offer future generations a safe and functioning underground infrastructure.

ter and sewer connection variant, the CO₂-equivalent savings vary compared to the fossil-based product version. These savings amount to up to 70 % when considering the Cradle to Gate phase (DIN EN 15804; A1-A3).

Sewer connections made from bio-attributed materials

By transitioning the entire Sewer Connections product group to bio-attributed PVC-U, Funke enables customers to actively contribute to a sustainable future through their purchasing decisions. All Funke sewer connections are comprised of different components and materials to meet the high technical requirements.

The respective PVC content in the PVC-U components is replaced by mass-balanced bio-attributed PVC-U. Depending on the material composition, connection type, main pipe diame-



All PVC-U components of Funke sewer connections are made from bio-attributed PVC-U.

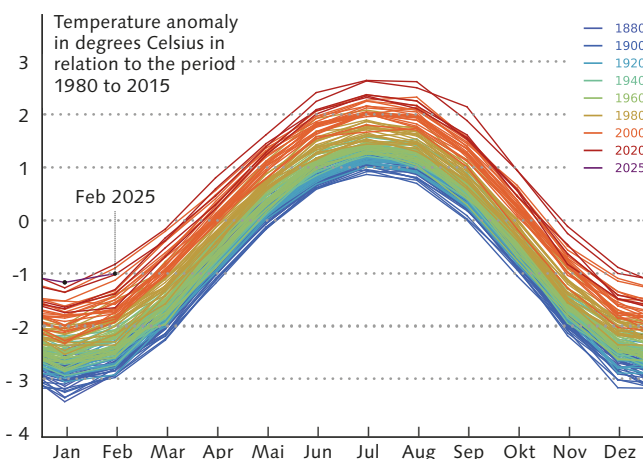
Figures, dates, facts

Bio-attributed PVC-U is the material of the future

The natural greenhouse effect is crucial for the Earth's climate—without it, life would not be possible. However, activities such as burning fossil fuels, deforestation and industrial processes increase the concentration of greenhouse gases in the atmosphere. This intensifies the greenhouse effect, leading to global warming, rising sea levels and more frequent extreme weather events. In 2024, the 1.5°C threshold above pre-industrial levels (1850–1900) was exceeded for the first time. Measures to reduce greenhouse gas emissions are therefore essential to minimise the impacts of climate change.

Funke Kunststoffe is committed to making a positive contribution toward climate neutrality through a sustainable product range in collaboration with its customers. In the past, we have primarily increased energy efficiency in our production processes and focused on using renewable energy. Additionally, we consider the entire product life cycle during development. We prioritise conserving resources, reducing waste and lowering emissions. We remain dedicated to using PVC-U when its mechanical and physical properties make it the most suitable material. The greatest potential for reducing CO₂ emissions lies precisely in the materials we use.

The Earth is warming up



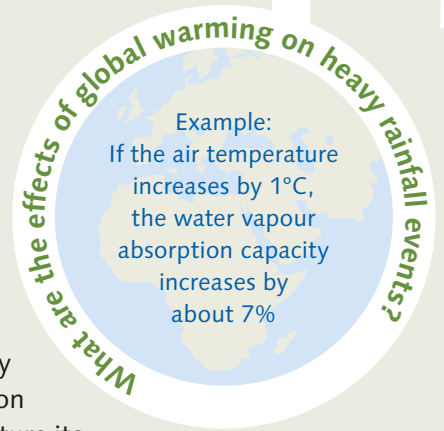
The monthly global temperature anomalies in °C in relation to the mean seasonal cycle from 1980 to 2015. Source: Nasa

Weather extremes

The occurrence of heavy rainfall events is a complex process, and focusing solely on the air's water absorption capacity does not fully capture its complexity. Nevertheless, the temperature-dependent water absorption capacity of air is an illustrative measure that highlights physical changes as a function of temperature. At standard atmospheric pressure and a temperature of 20°C, one cubic meter of saturated air contains approximately 17.3 g/m³ of water vapour. If the temperature rises to 25°C, the air can hold about 23 g/m³. In addition to the greenhouse effect of water molecules in the atmosphere ("positive feedback"), this increases the potential for more intense heavy rainfall events. Unfortunately, 2024 has already provided many negative examples of this across Europe. The chart on the left, sourced from NASA, illustrates the temperature anomaly in degrees Celsius compared to the average temperature during the reference period from 1980 to 2015, based on weather records since 1880. The two highlighted points (purple) relate to January and February 2025. Comparing the yearly data in the legend with the colour gradient of the measurement curves clearly shows the rise in temperature since 1880. The past ten years of weather records have also been the warmest ever – a trend we need to address.

Funke is working to reduce its carbon footprint

A company's greenhouse gas emissions are classified into Scope 1 to 3 according to the GHG Protocol*. The result of accounting for emissions associated with business activities at the company level is the CCF*. Scope 1 includes direct emissions from the combustion of fossil fuels and, for example, (chemical or physical) process emissions from the company under assessment. Scope 2 covers all indirect emissions from upstream energy provision. Scope 3 looks at emissions from both the upstream and downstream supply chain (see the graphic on page 13). Scope 1 and 2 emissions are within the direct control and decision-making authority of the reporting company. We have reduced our emissions in Scope 1 (green



pe2Pipe

arrow) and Scope 2 (gray arrow) by approximately 88% from 2015 to 2023. This is a great success, and we are proud of it. The implementation of an energy management system according to ISO 50.001, monitoring energy-related consumption values, efficiency improvements, and the switch to 100% green electricity made this success possible. The greatest potential for reducing CO₂ emissions lies in the upstream supply chain (Scope 3) for companies in the real economy, meaning in raw materials, semi-finished products and other components. The analysis of the profit and loss statement using a monetary approach to determine CO₂e emissions confirms this for Funke. Specifically, the analysis shows that the lion's share of emissions originates in the purchased and processed plastic. This brings us back to our customers, where the material used at the product level,

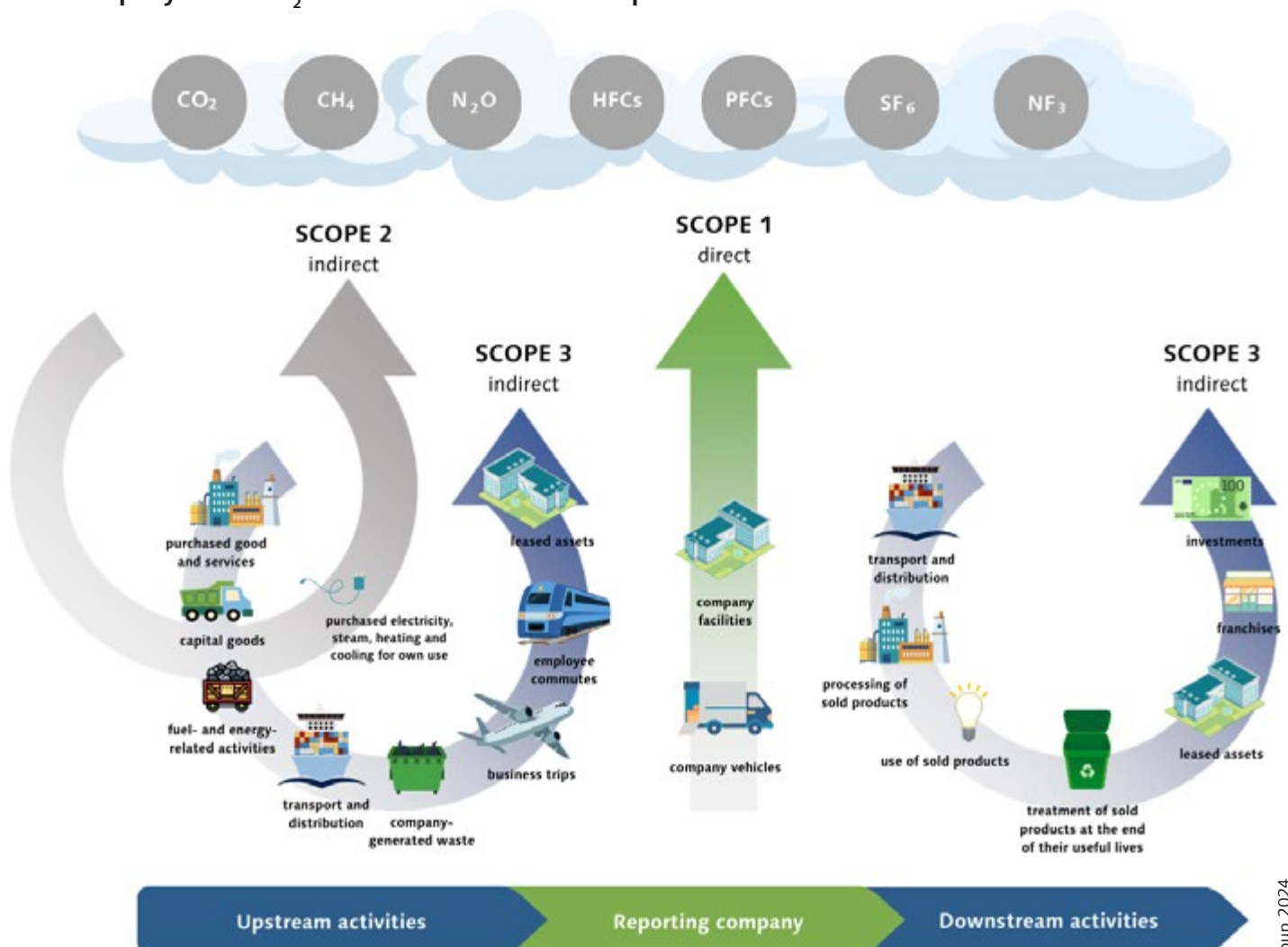
in terms of the Product Carbon Footprint (PCF), accounts for the largest share in the Cradle to Gate assessment during phases A1-A3, contributing up to 90 % of the product's carbon footprint.

The next logical step is to address the largest lever – the material used in our products. We invite you to take advantage of the synergy effect together:

- 1. Reduce the PCF reduces emissions in your construction project, and**
- 2. Funke reduces Scope 3 emissions for the company's carbon footprint.**

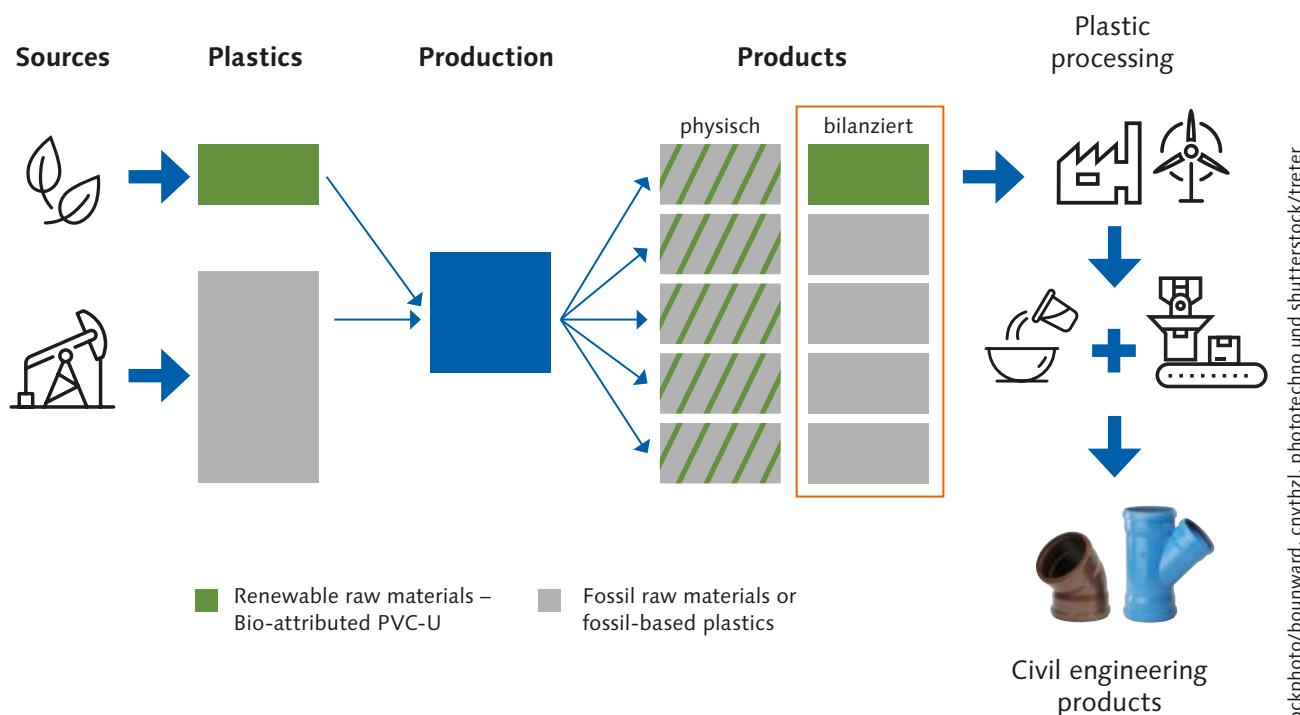
Together, we can contribute to counteracting the global challenge of global warming and the greenhouse effect.

Company-wide CO₂ balance of the Funke Group



Overview of greenhouse gas emissions along the value chain, broken down by Scope 1 to 3; according to the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions.

Mass Balance in bio-based Plastics



Bio-attributed PVC-U

As a pioneer for sustainable infrastructure, we rely on bio-attributed PVC-U. The long list of advantages of PVC-U as a material for use in open channel pipes is well-known (see page 16 ff.). With the use of bio-attributed PVC-U, the list of benefits is expanded to include terms like sustainable, future-proof and “good for the climate.” PVC-U is made up of 57 % rock salt and 43 % ethylene. Ethylene consists of carbon and hydrogen and can be derived from either fossil sources or renewable plant-based sources. In addition to the use of renewable raw materials in the upstream chemical industry, the principle of mass balancing helps facilitate the rapid transition of industrial production processes.

How is this possible?

Biomass binds CO₂ from the atmosphere during its growth phase. These renewable carbon sources are used to replace parts of the fossil raw materials in PVC-U production. For the amount of carbon in 1 kg of polyvinyl chloride, 1.41 kg of CO₂ must be bound in biomass. Every kilogramme of bio-attributed PVC-U reduces the CO₂ content in our atmosphere. The carbon is a by-product, for example, in the cellulose industry. The carbon footprint of 1 kg of bio-attributed polyvinyl chloride is reduced by 90% compared to the conventional oil-based version.

Principle representation of the mass balance in bio-attributed PVC-U from the raw materials to the plastic production and the processing and manufacturing of civil engineering products at Funke Kunststoffe GmbH.

How does the principle of mass balancing work?

The principle of mass balancing is familiar to consumers from eco-electricity or fair-trade products. With eco-electricity, the consumer always uses the German electricity mix because all electricity producers feed into the same grid. Consumption is tracked via the electricity meter, and the amount of electricity used is then billed as eco-electricity by the provider.

In large production plants, the required raw materials for manufacturing, e.g., PVC-U, are added in a known mass ratio of fossil and renewable sources. Since the chemical and physical process steps are known and follow natural laws, the amount produced in each category (fossil or renewable) can be assigned based on the input quantities. Physically, a mixture is produced because conventional PVC-U and bio-attributed PVC-U are chemically identical (see image of mass balancing, products physically). The amount of the product corresponding to the renewable source input quantity is then sold as bio-attributed PVC-U. The remaining amount is sold as fossil PVC-U.

Figures, dates, facts

Funke Kunststoffe – Sustainability in focus

A "business as usual" approach and the attitude of "let others start first" can no longer be acceptable. A simple example serves to illustrate why we cannot bring about noticeable change without changes in behaviour: The positive effects of city trees on temperature development on summer days in urban areas are well known. Trees not only beautify the concrete jungles created by humans, but they also provide shade and noticeably reduce temperatures through evaporation effects. When strategically planned, tree neighbourhoods can also act as water reservoirs that help relieve the sewer system during heavy rainfall events.

For the year 2024, the average per capita carbon footprint in Germany is estimated at 10.3 t CO₂e. This amount is roughly distributed as follows: 23 % for housing, 6 % for electricity generation, 21 % for mobility, 15 % for food, 24 % for other consumption and around 11 % for public infrastructure. In order to achieve a climate-compatible CO₂e output, we would all need to reduce our footprint by more than 90 % on average. The climate goal for the carbon footprint is 1 t CO₂e or below.

Average CO₂ footprint per person in Germany

Housing	2.3 t CO ₂ e	23%
Electricity	0.6 t CO ₂ e	6%
Mobility	2.1 t CO ₂ e	21%
Food	1.6 t CO ₂ e	15%
Other Consumption	2.5 t CO ₂ e	24%
Public infrastructure	1.2 t CO ₂ e	11%



Source: Federal Environment Agency CO₂ Calculator (2024)
© Kompetenzzentrum Nachhaltiger Konsum

Let's remind ourselves:

One beech tree must grow for about 80 years to bind 1 ton of CO₂ from the atmosphere (12.5 kg CO₂e per year).



Why compensation cannot be a real solution

A beech tree absorbs an average of 12.5 kg of CO₂ per year. After 80 years, this amounts to 1 tonne of CO₂ being stored in the tree. The following example illustrates the land area required for CO₂ compensation. The difference between the climate goal (1 ton CO₂e per person) and the average carbon footprint of Germans in 2024 (10.3 tons CO₂e per person) is 9.3 tons CO₂e per person. If this difference were to be compensated by planting beech trees (with a carbon storage capacity of 12.5 kg CO₂ per year), each person would need to plant, nurture, and care for 744 trees. With an estimated 83.45 million Germans on 1 January 2024, around 62 billion trees (6,2*10¹⁰) would be required. Assuming that the beech trees reach their maximum life expectancy of about 500 years (since the stored CO₂ must be kept out of circulation for as long as possible for an effect), the land area required for each beech tree must be considered. With an assumed land requirement of 66 m² per beech, around 4,000,000 km² of land would be necessary. Germany itself has around 350,000 km². To compensate for the CO₂e difference between the actual carbon footprint of Germans in 2024 and the climate goal, more than 11 times the area of Germany would be needed for compensation plantings. This example demonstrates why we must minimise greenhouse gas emissions in all areas where possible and why mere compensation, without changes in behaviour, is not enough.

Average carbon footprint per person in Germany (2024), broken down by six sectors and compared with the climate goal; Kompetenzzentrum Nachhaltiger Konsum, based on the CO₂ calculator supplied by the Federal Environment Agency.

Figures, dates, facts

Practical example highlights potential

Example of a new development area with approximately 110 building plots. For the construction project and the planned wastewater and stormwater drainage, 5 km of pipelines in nominal diameters DN/OD 110 to 630 and approximately 2,500 fittings are planned.



A construction project in various versions

Using the example of a new development area, the potential savings from the presented pipe systems Funke Plant2Pipe® and Funke Pipe2Pipe® will be compared to the proven HS® Sewer Pipe System. The potential new development area includes about 110 building plots. Approximately 5 km of pipeline length in nominal diameters DN/OD 110 to 630, as well as about 2,500 fittings, are planned to realize the stormwater and wastewater sewer system. The planned components correspond to an approximate mass of 4,000 kg for the fittings and 70,000 kg for the pipes.

Compared to a theoretical implementation using the HS® Sewer Pipe System from 2015 (shown in the graph as 100%), the identical HS® Sewer Pipe System under current conditions (2023) saves about 13 % of emissions (absolute 20 t CO₂e).

If the construction project were implemented with the Funke Pipe2Pipe® pipe system, the absolute savings could be increased to about 75 t CO₂e compared to the HS® Sewer Pipe System from 2015, representing a saving of 50%. This is achieved through the increased use of recycled PVC-U in the pipe core layer and the use of PVC-U produced with green electricity in the inner and outer layers. The same construction project can be reduced by about 80 % in the product footprint (Cradle to Gate; A1-A3) by using bio-attributed PVC-U in the Funke Plant2Pipe® sewer pipe system. The absolute savings would then amount to about 120 t CO₂e. This practical example highlights the significant savings potential from the more sustainable product alternatives offered by Funke Kunststoffe. With the expanded product portfolio, planners, engineering firms and municipalities are given the opportunity to plan in a way that is also fair to future generations.

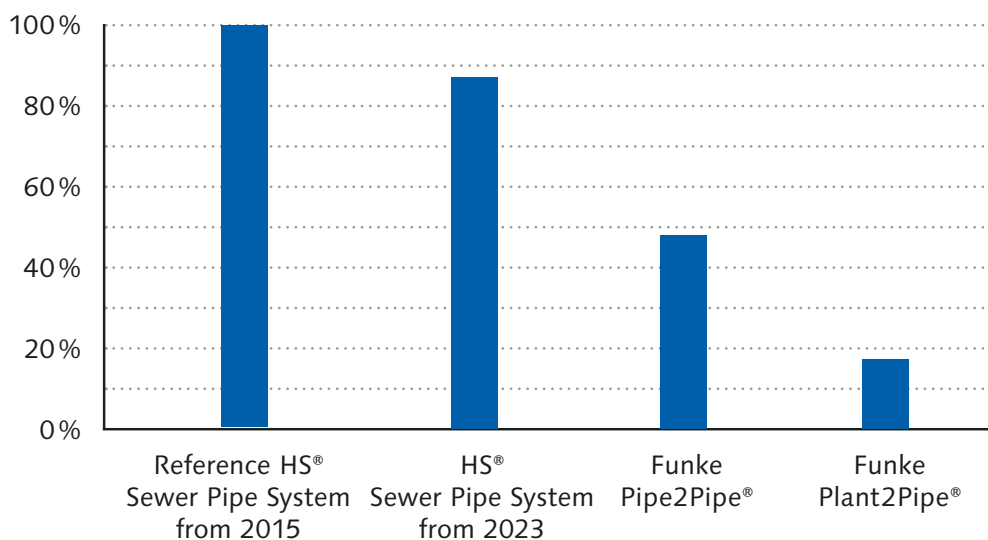
Plant2Pi

pe2Pipe

CO₂e emissions for phases A1-A3

based on the HS[®] Sewer Pipe System reference from 2015

Percentage share of emissions



Percentage share of emissions for the described example of a new development area with 110 building plots in the different system variations. The reference is the HS[®] Sewer Pipe System from 2015 as 100%. In comparison, there is the HS[®] Sewer Pipe System with current emission values and the new product variants Funke Pipe2Pipe[®] and Funke Plant2Pipe[®].

The greenhouse effect explained simply

Sun rays hit the Earth's surface and warm it up. Land areas and oceans absorb more solar energy than, for example, icy polar caps (Albedo effect). The heated Earth's surface then emits thermal radiation back through the atmosphere towards space. As the radiation travels through the atmosphere, it encounters greenhouse gases (including water molecules) that cause them to vibrate. The energy stays in the atmosphere, warming it up. As a result, a higher average equilibrium temperature is established. This manifests as a positive shift in the curve along the Y-axis with the increasing years (see page 12, NASA graphic). For the first time, the rise in average temperature in 2024 was above the 1.5°C target compared to the pre-industrial level.

Source: Federal Environment Agency



Reflected thermal radiation excites the greenhouse gases (Greenhouse effect)



Solar radiation warms the Earth's surface

Figures, dates, facts

Other products are possible, talk to us!

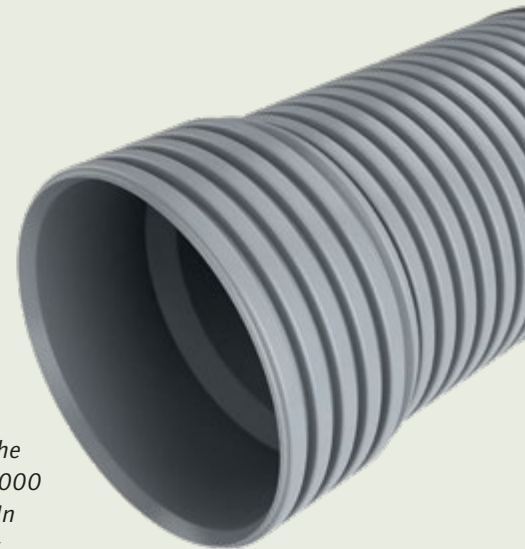
The use of bio-attributed PVC-U can be extended to other PVC-U products from Funke. The mass balance method with external monitoring allows for the additional products with a reduced climate impact to be offered quickly and easily.

Example: DWCor® 3000 Sewer Pipe DN/ID 300 – 1000 SN8

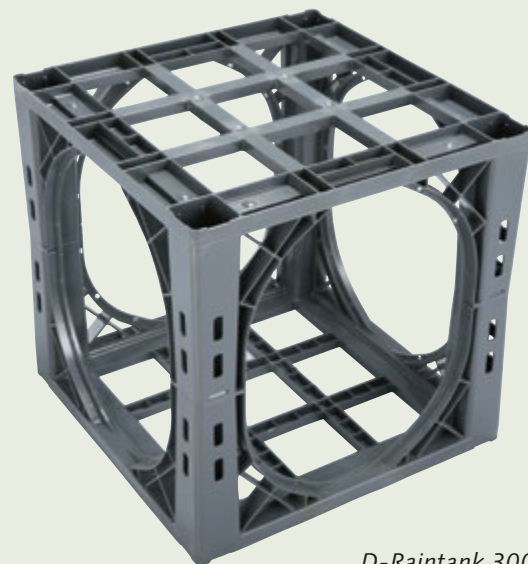
The DWCor 3000 pipe DN/ID 1000 impresses with its low weight and simultaneously high rigidity of SN8. In the nominal diameters 300 to 1000 mm, DWCor® Pipes are particularly suitable for use as a rainwater or combined sewer for traffic route drainage. The grey profile pipe is produced in effective lengths of 1.5 m, 3.0 m and 6.0 m plus a push-fit socket. The use of bio-attributed PVC-U reduces the CO₂e footprint per meter of pipe by approximately 75 % (A1-A3). Over a distance of 1,000 metres, the carbon footprint of the DWCor® 3000 pipe in the nominal diameters DN/ID 1000 is reduced by approximately 120 t of CO₂e.

Beispiel: D-Raintank 3000® as infiltration tank with 1,500 m³

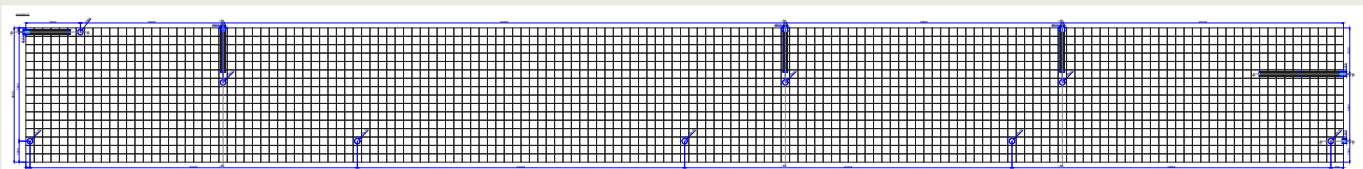
As an injection-moulded high-performance infiltration tank element with unparalleled long-term properties on the market, the D-Raintank 3000® is ideally suited for the use of bio-attributed PVC-U. In this example, an infiltration tank with a volume of 1,500 m³ consisting of more than 7,000 D-Raintank 3000®, 840 side plates, and around 3,500 connectors can save about 80% of CO₂e emissions compared to the conventional variant of the system. This corresponds to approximately 110 t CO₂e.



DWCor® 3000 Rohr with the nominal diameter DN/ID 1000 with a view of the socket. In this pipe system, the seal is applied in the second trough at the spigot end.



D-Raintank 3000® as single tank body



Planning of an infiltration tank with a storage volume of 1,500 m³ consisting of 7,000 D-Raintank 3000® units.

Example: Funke Plastic Chamber DN 1000

The Funke Plastic Chamber DN 1000 consists of a profile pipe that features a chamber base with various channel designs. This plastic chamber can be adapted to various functions in the form of special chambers. Whether as a control chamber, pressure relief chamber, pump chamber, tangential chamber or even as a throttle chamber for the targeted and controlled irrigation of urban trees. The use of bio-attributed PVC-U allows us to offer each of our chambers with a reduced climate impact, achieving savings of up to 60% of emissions compared to the conventional fossil variant.



Funke Plastic Chamber DN 1000 mit channel with the nominal diameter DN/OD 400 and lateral inlet DN/OD 200

Funke addresses the supply of tree sites



photo like @ shutterstock.com

Urban trees provide shade, beautify our urban landscape and simultaneously cool the environment on hot summer days. With our high-quality civil engineering products, we can make a sustainable contribution for future generations. You can help us achieve this.

Funke and PVC-U

Top-quality civil engineering solution

Versatile, durable, safe, hygienic, recyclable, resource-saving and economical – these are just some of the terms that describe the outstanding properties of PVC-U. A list that can easily be extended with words like chemically resistant, permanently tight and easy to install. Moreover, this list highlights why an increasing number of municipalities, planners, network operators and civil engineering companies are choosing this material when it comes to the construction or rehabilitation of pipeline infrastructure.



The market demands economical (sewer) construction solutions that can be implemented with technically advanced, cost-effective, and ecologically optimised products. Here, the material PVC-U simply plays to its strengths – even compared to pipes and fittings made from PP or PE! For example, when it comes to resource consumption. The material consists of 43 % fossil-derived petroleum. In contrast, the production of PP and PE is 100 % based on petroleum. Additionally, the production and processing of PVC-U require low energy. Emissions and waste are relatively low compared to

many other materials. And Funke takes it even further by offering environmentally conscious customers new, climate-friendly products alongside the proven HS® Sewer Pipe System. These include new sewer pipe systems and sewer connection solutions.

Pipes made of PVC-U are flexible and have a different static load-bearing behaviour compared to rigid pipes, such as those made of vitrified clay or concrete. While a rigid pipe concentrates the loads above the pipe, a flexible pipe transfers most of the earth and traffic loads to the surrounding soil. If the



Today, there are a variety of high-quality recycled products. Examples include recycled-PVC windows, flooring, pipes, roofing membranes and traffic barriers. Additionally, there are cable protection pipes, cable coverings, work gloves, car mats, stall accessories, pullovers made from fibres of recycled PVC water bottles and puzzle flooring made from reused PVC cables (source: www.agpu.de).

body under linear elastic behavior. It is an indicator of the material's strength. The creep factor describes the time-dependent increase in deformation under constant load. Therefore, the long-term deformation of a plastic pipe is calculated using the so-called long-term E-modulus (the quotient of the E-modulus and the creep factor). In conclusion, initial deformation is influenced by the E-modulus, while long-term deformation is also determined by the material's creep factor.

loads are higher than expected or the load situation changes over time, this only results in a slight increase in deformation for a flexible pipe. In contrast, in the case a rigid pipe, stability failure and thus material breakage cannot be ruled out.

The deformation of a plastic component under load depends on the design, the type of load and material properties, such as the modulus of elasticity (E-modulus), and creep factor. The E-modulus is a material property that describes the relationship between stress and strain during the deformation of a solid

The ring stiffness or bending strength of a smooth-walled pipe (SN classification) depends on the E-modulus (short-term) and the wall thickness of the material. This means that a lower E-modulus must be compensated for by increasing the wall thickness to achieve the same ring stiffness.

Due to the different E-moduli, PVC-U pipes have significantly thinner walls compared to pipes made of PE or PP. This results in a higher diameter-to-wall thickness ratio (SDR) while maintaining the same or better ring stiffness.

UV resistance

Since PVC-U pipes are typically laid underground, UV resistance is generally not required. However, pipes exposed to UV rays for extended periods may experience discoloration. This does not, however, affect the functionality or mechanical properties of the PVC-U pipes.

Microplastics

The improper handling and careless disposal of plastic products in nature pose a challenge that we must address. Important background information on the subject of microplastic is provided, among other sources, by a consortium study conducted by the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT in 2018, commissioned by partners from the plastics industry, water management, waste management, and research.

The authors estimate that approximately 330,000 tonnes of microplastic are generated annually in Germany, which originate from various sources. In addition to advantages such as better installation and handling or lower error susceptibility, plastics and improper handling of them are a potential source of microplastic entry into the environment. The theoretically calculated intrusion from plastic piping in public and private sewer networks is estimated at 620 tonnes per year, representing 0.19 % of the total annual intrusion. Taking into account retention in wastewater treatment plants (-62 %) and estimated entry at construction sites (10 tons per year), 245.6 tonnes per year remain from plastic pipes (including installation), which corresponds to 0.0744 % of the total load. Compared to other sources like tire wear (approximately 101,000 tonnes per year; 33.95 %), abrasion from sports and playgrounds (approximately 10,900 tonnes per year; 3.6 %), shoe sole wear (9,000 tonnes per year; 3.0 %), road marking abrasion (approximately 7,500 tonnes per year; 2.5 %), or fibre wear from textile washing (approximately 6,000 tonnes per year; 2 %), the abrasion from plastic piping plays a much smaller role. To reduce the total load at the right points, Funke Kunststoffe GmbH offers products aimed at reducing man-made intrusions of foreign substances (light liquids, heavy metals and microplastics), such as D-Rainclean® and the Innolet® Dry Trap Gully.

Consortium Study:
<https://www.umsicht.fraunhofer.de/content/dam/umsicht/de/dokumente/publikationen/2018/kunststoffe-id-umwelt-konsortialstudie-mikroplastik.pdf>

Microplastic abrasion from plastic sewer pipes:
<https://www.umsicht.fraunhofer.de/de/presse-medien/pressemitteilungen/2021/mikroplastikabrieb-kunststoffrohre.html>

Environmental compatibility

PVC-U (rigid PVC) is a durable material and contains no plasticisers. PVC is one of the most extensively studied materials in the world. Its production is resource-efficient. PVC is used in various applications, including medical technology, food packaging, windows and for drinking water and sewer pipes.

The manufacturing process in modern chemical plants is safe. Risks associated with the intermediate product vinyl chloride for workers are well-known and are effectively controlled. Rigid PVC does not pose a physiological danger to humans.

The plasticiser debate

The controversial plasticisers associated with PVC products are not used in the production of PVC-U parts. "U" stands for unplasticised, meaning "not softened." Another name for PVC-U is rigid PVC. Funke's pipes and fittings are made from PVC-U.

Material properties

PVC-U is a relatively rigid polymer, and the required ring stiffness is achieved even with low wall thicknesses. Despite this, it has high fracture resistance, and PVC-U pipes are resistant to acids, alkalis, and other chemical compounds with a pH range of 2-12. Due to the smooth inner surface, plastic pipes have excellent hydraulic properties. Furthermore, plastic pipes are among those with the lowest wear values (abrasion resistance > 100 years).





Due to its lower creep behaviour, PVC-U also exhibits less long-term deformation under prolonged stress than other plastics.

Fire behaviour

PVC-U pipes are fire-retardant and self-extinguishing once the ignition source is removed or in the absence of continuous exposure to fire. Therefore, they meet the fire behavior requirements of fire protection class B1/Euroclass C. For pipes laid underground, the fire hazard is not a concern.

Cost-effectiveness

Pipes and fittings made of PVC-U are very durable products, with a realistic service life of 100 years or more. The depreciation period for hydraulic structures, based on their average service life, is specified as 50-80 years according to the guidelines of the LAWA working group "Benefit-Cost Studies" in water management (LAWA = Federal/State Working Group on Water). Other studies suggest even longer service lives, such as the long-term internal pressure tests on PVC-U pipes laid over 60 years ago in Bitterfeld and Salzgitter.

Recycled material and recycle

Funke has been using material recycling in the production and processing of PVC-U for many years. The majority of pure waste is directly returned to production. Funke operates its own grinding facility where production waste is shredded. The sorted grinding material is then used along with external PVC-U recycle in various Funke products.

Life cycle assessment (LCA)

The life cycle assessment of PVC-U involves evaluating the environmental impacts of PVC-U products throughout their entire life cycle –from raw material extraction to production, use and disposal. A detailed study was conducted by the European Plastic Pipe and Fittings Association (TEPPFA) in collaboration with the Flemish Institute for Technological Research (VITO). This study examines factors such as energy consumption, emissions and resource use. The results show that PVC-U products offer positive environmental aspects due to their durability and low maintenance.

Durability

The first PVC-U plastic pipes were laid in Bitterfeld and Salzgitter in 1935. Decades later, pipe sections that had been used for nearly 60 years in fresh water supply systems under 4 to 5 bar internal pressure were examined. It was found that the pipes extruded around 1935-1940 had properties only slightly different from those of modern extruded PVC-U pipes. The results of the long-term internal pressure tests conducted on PVC U pipes installed in 1938 and dismantled for testing in 1991 showed that after 53 years of operation, the pipes could still have safely fulfilled their function for another 100 years without failure.



Shaping climate protection

With our climate strategy, we actively take measures to combat climate change, including the use of 100% green electricity.

Sustainable products

We develop and produce system solutions to improve the climate in urban areas. For this, we rely on research and development.

Sustainable innovations

We offer innovative solutions for the infrastructure of tomorrow, which we are constantly expanding.

Responsibility for society and employees

By recognising the UN Human Rights Charter and adhering to our Code of Conduct, we contribute to ensuring dignity in the workplace.

The future is important to us we take responsibility for generations!

Funke Kunststoffe aligns itself with the goals of the Sustainable Development Goals (SDGs). By doing so, we achieve significant impact with our activities and commitment, and exert lasting influence.