

The role plastic pipes will play in delivering Net Zero

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THE BPF PIPES GROUP



The **BPF Pipes Group** is the leading trade association representing manufacturers and material suppliers of plastic piping systems in the United Kingdom.

UTILITIES



RECYCLABILITY
All Plastic pipe waste is either recyclable into new products or a viable source of a calorifically rich fuel.

18
AT LEAST
18 DIFFERENT APPLICATIONS
for plastic pipes

1
FIRST PVC PIPES
introduced in 1930s

BPF PIPES GROUP MEMBERS
are committed to sell and promote products that are third party approved to the appropriate standards

ABOVE GROUND
198,000KM

BELOW GROUND
90,000KM

AMOUNT OF PIPE INSTALLED ANNUALLY
288,000KM

UK MEMBER EMPLOYEES
6200

DIRECT EMPLOYEES
5500

INDIRECT EMPLOYEES
700

THE BPF PIPES GROUP
is committed to raising industry standards through best practice and guidance documents

OVER 400 STANDARDS
(BS/BS EN/BS ISO)
for thermoplastic pipes

ANNUAL TURNOVER
of members
£8.9 billion

REPRESENTING MANUFACTURERS
since 1962

TODAYS UNDERGROUND PLASTIC PIPES HAVE A LIFE EPECTANCY OF OVER 100 YEARS

Learning objectives

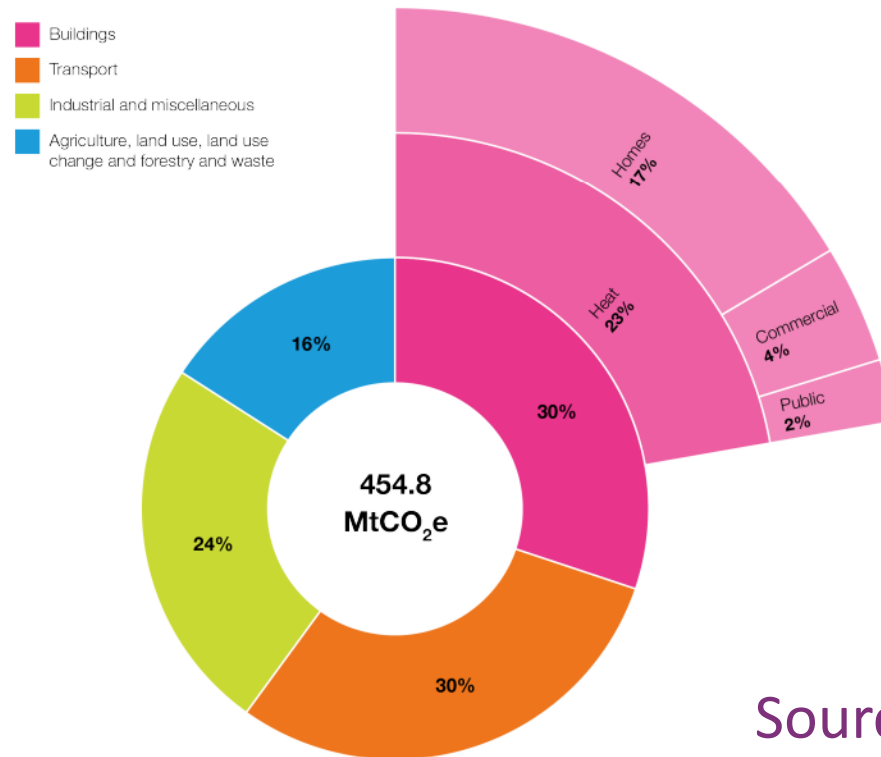
- Explain what Scope 1, 2 & 3 carbon emissions are
- Give examples of how a plastic pipe manufacturer can reduce carbon emissions
- Explain the applications of plastic pipes to help achieve Net Zero

What is Net Zero?

- Balance between carbon emitted into the atmosphere and carbon removed from it
- To offset the remaining carbon, you can either change how we use land (e.g. grow trees) or use carbon capture & storage (CCS)
- UK government legislated to meet it **by 2050** (80% reduction vs 1990 baseline)

UK carbon emissions

Figure 2: UK emissions in 2019



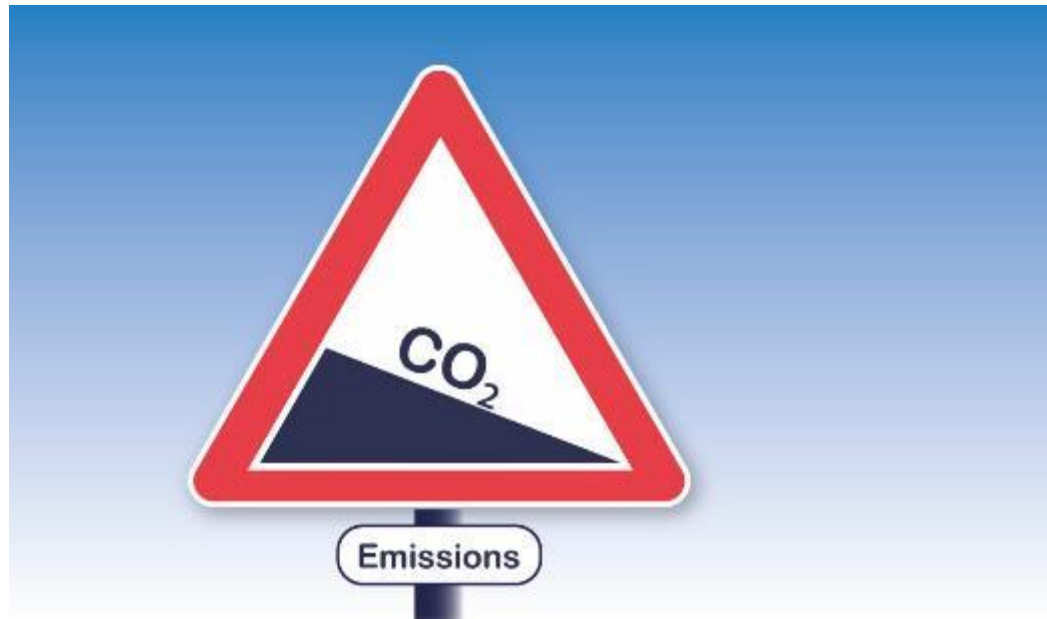
Source: Heat and Buildings Strategy 2021

Legal requirement for carbon emissions

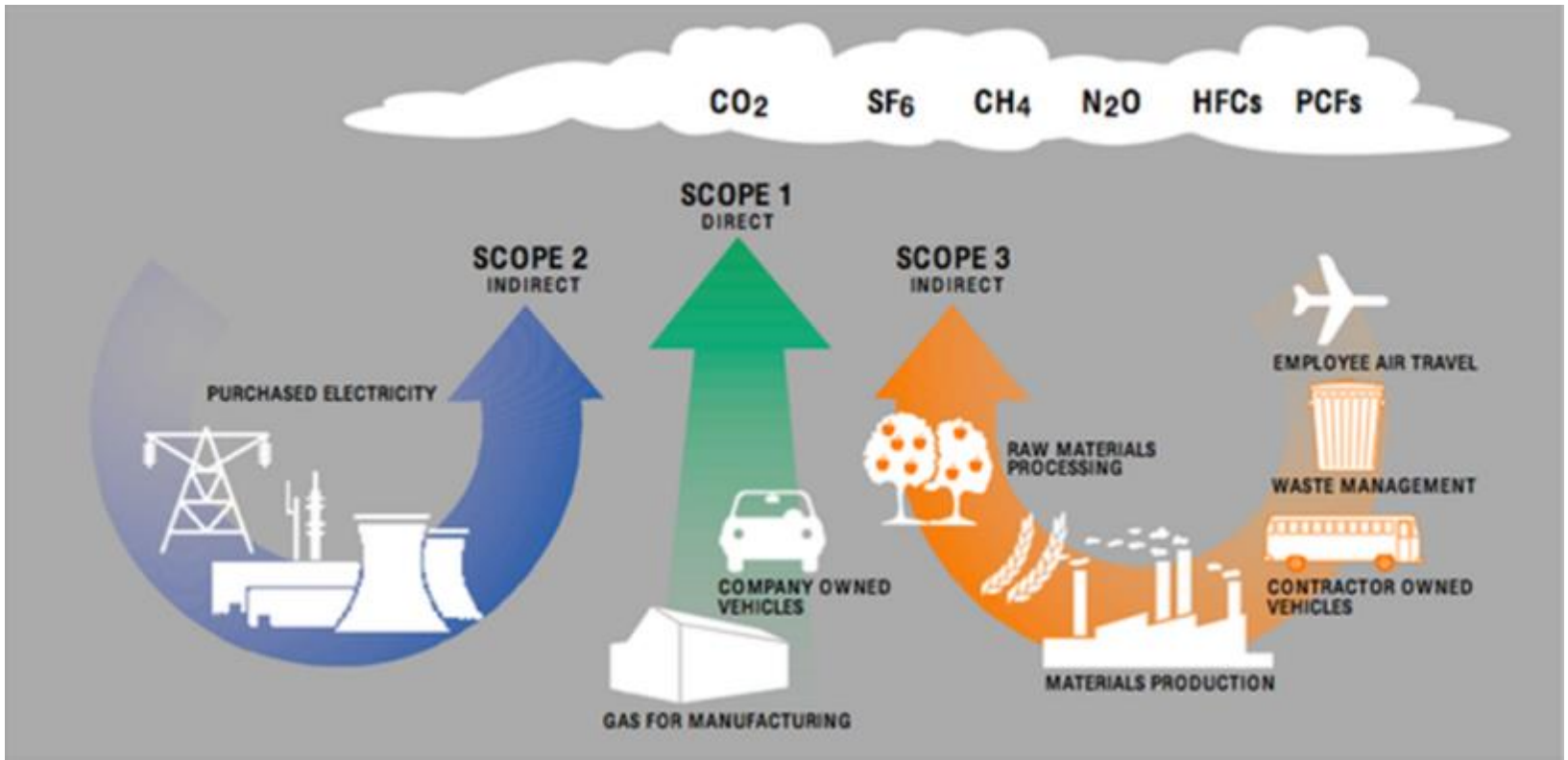
It is now a legal requirement to publish performance data from Scope one and two carbon emissions in company accounts



How can pipe manufacturers achieve Net Zero?



Three categories of carbon emissions



Examples of Scope 1-3 emissions

Scope 1 Examples

- FLT LPG/Diesel
- CO₂ released in heating plastic
- Heating with gas

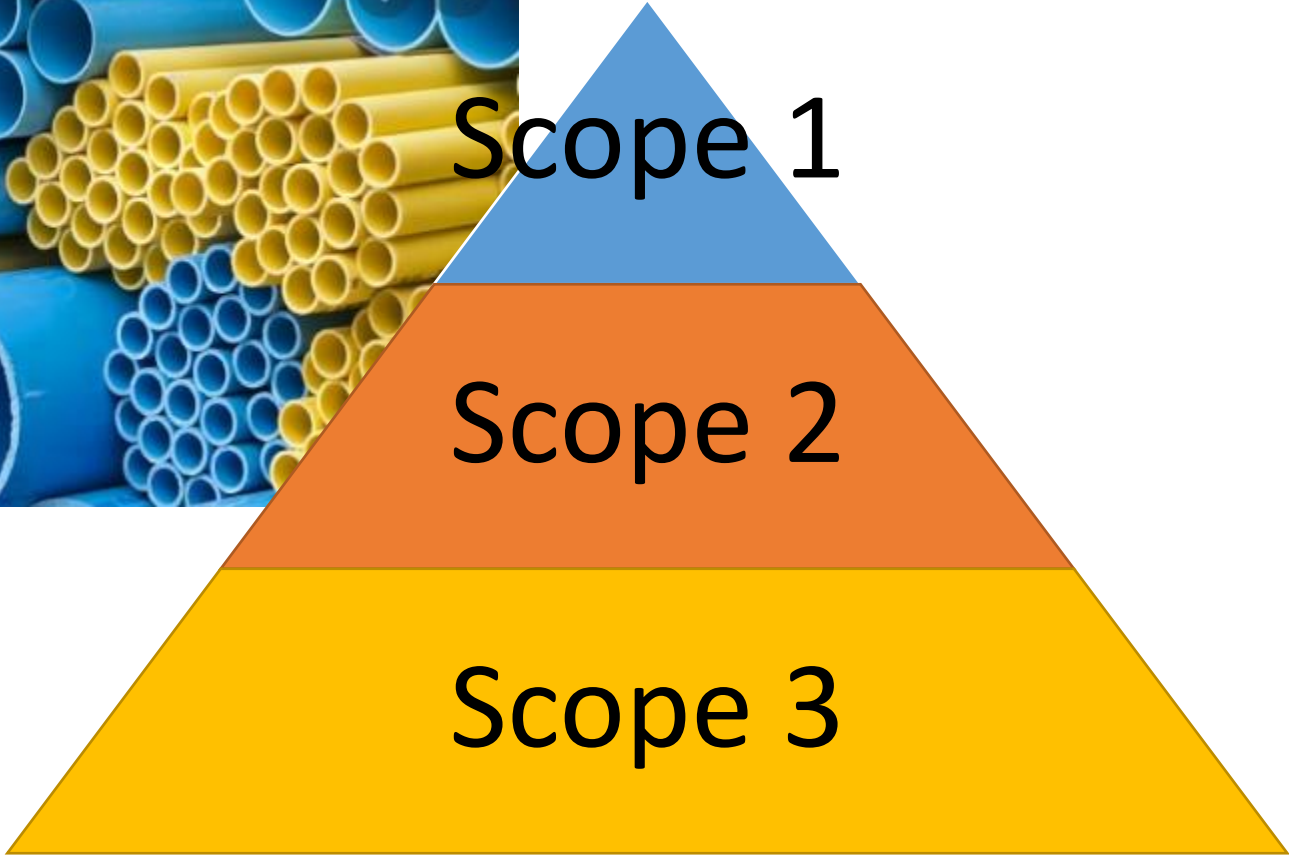
Scope 2 Examples

Electrically powered plant and processes

Scope 3 Examples

- Transportation and distribution
- Raw material production
- Employee travel
- Waste disposal

Relative size of carbon emissions associated with plastic pipes



Scope One reductions

Move away from fossil fuels

- Electric forklift trucks
- Electric company vehicles
- Replacement of gas / oil for space heating



Scope Two reductions

- Self generation of electricity
- Going to a 100% zero carbon energy provider



Scope Two reductions

Reduction in resource waste

E.g.

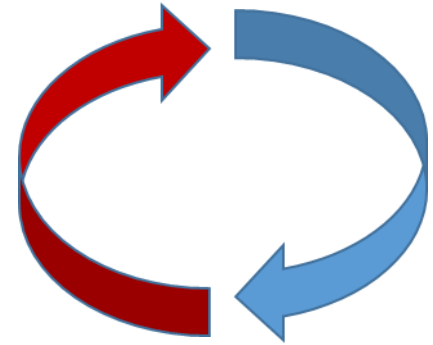
- Scrap product
- Compressed air leakage
- Lighting management
- Inverter drives for electric motors
- Insulating extrusion machines
- Behavioral changes
- Switch it off!





Scope Two reductions

Heat recovery



Heat recovery from air compressors / extruders

- Warm up raw material prior to processing
- CHP Plant
- Factory heating



Scope Three reductions

Use of recycled materials

Plastic pellet life cycle saving using 100% Recycled Vs 100% Virgin	Total energy saving*
HDPE (High-Density Polyethylene)	88%
PP (Polypropylene)	88%

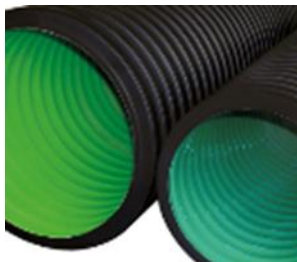
Common sources of recycled plastics are single use consumer waste e.g. water, milk, shampoo and drink bottles.

Key is improving recycling collections and processing across the UK

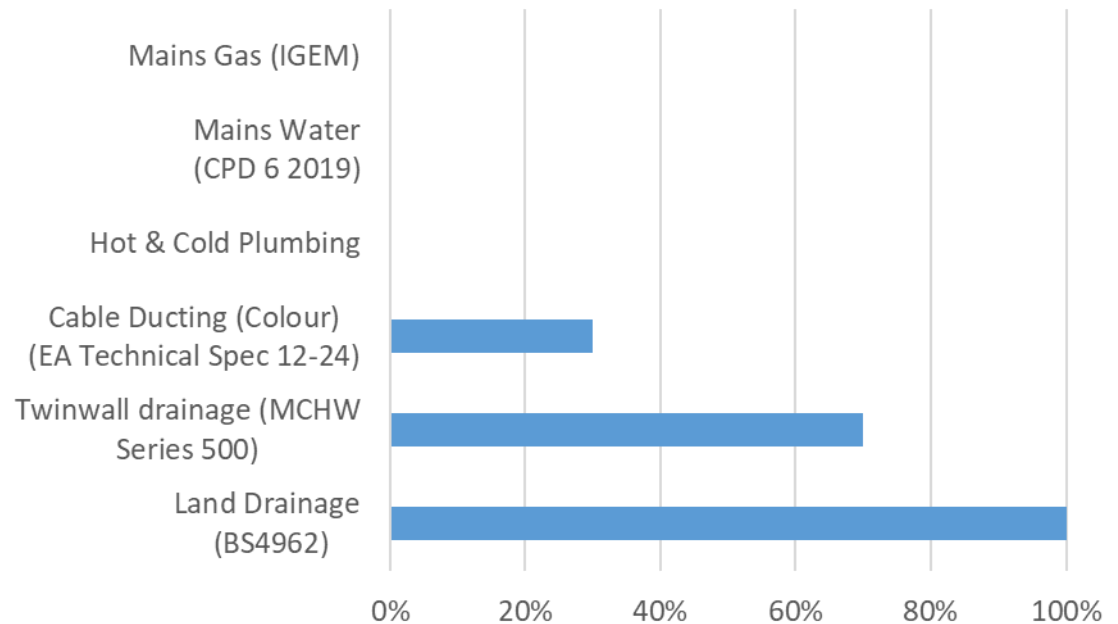
**Dat source: [APR-Recycled-vs-Virgin-May2020.pdf \(plasticsrecycling.org\)](https://www.plasticsrecycling.org/APR-Recycled-vs-Virgin-May2020.pdf) - The Association of Plastic Recyclers White Paper: Virgin vs. Recycled Plastic Life Cycle Assessment Energy Profile and Life Cycle Assessment Environmental Burdens May 12, 2020*

Scope Three reductions

Use of recycled materials

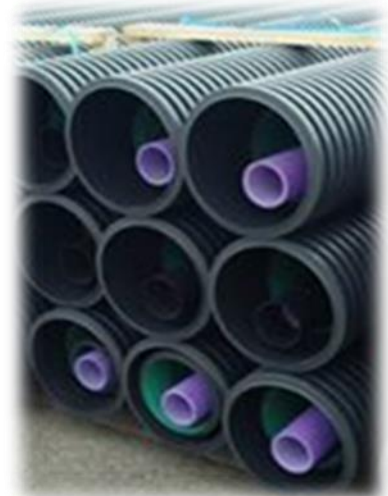


Volume of recycled raw material used



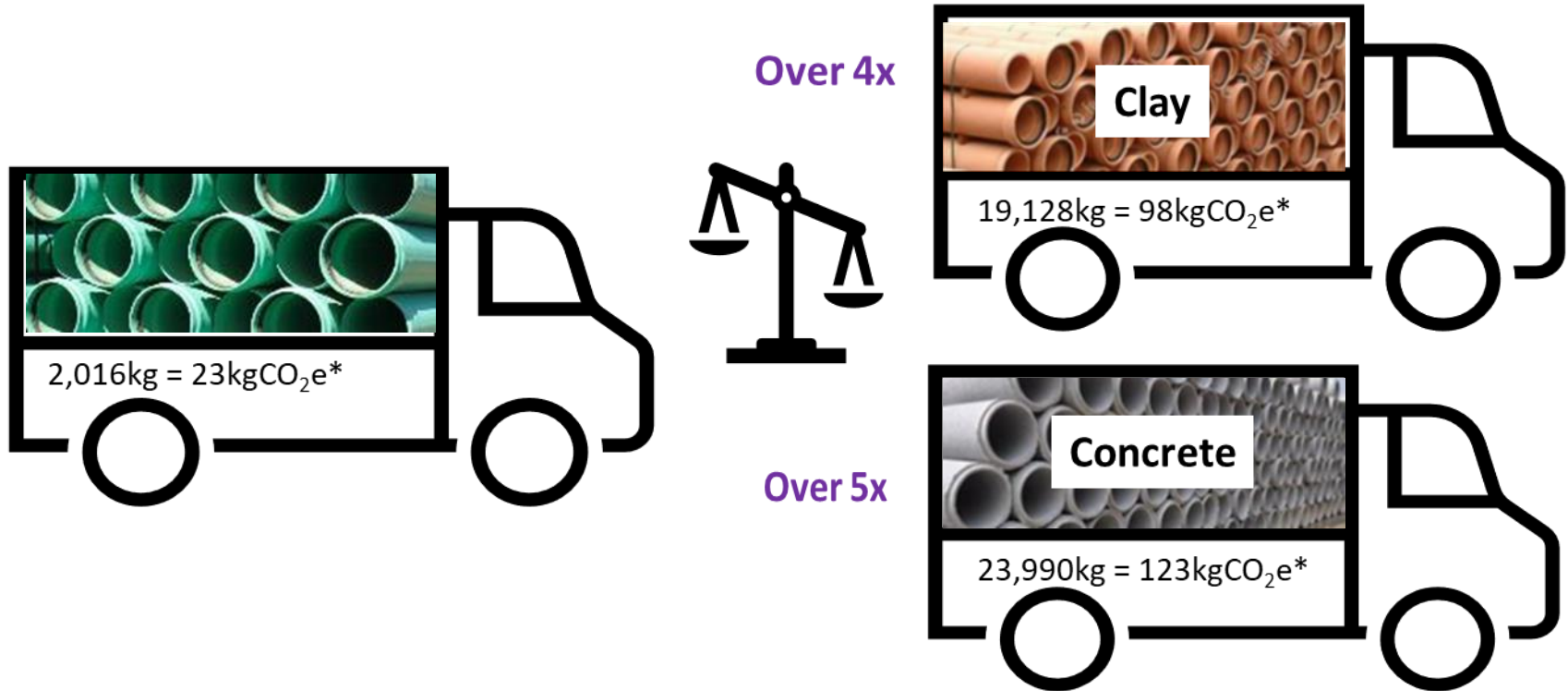
Scope Three reductions

Optimising transportation



Scope Three reductions

Carbon emissions comparison



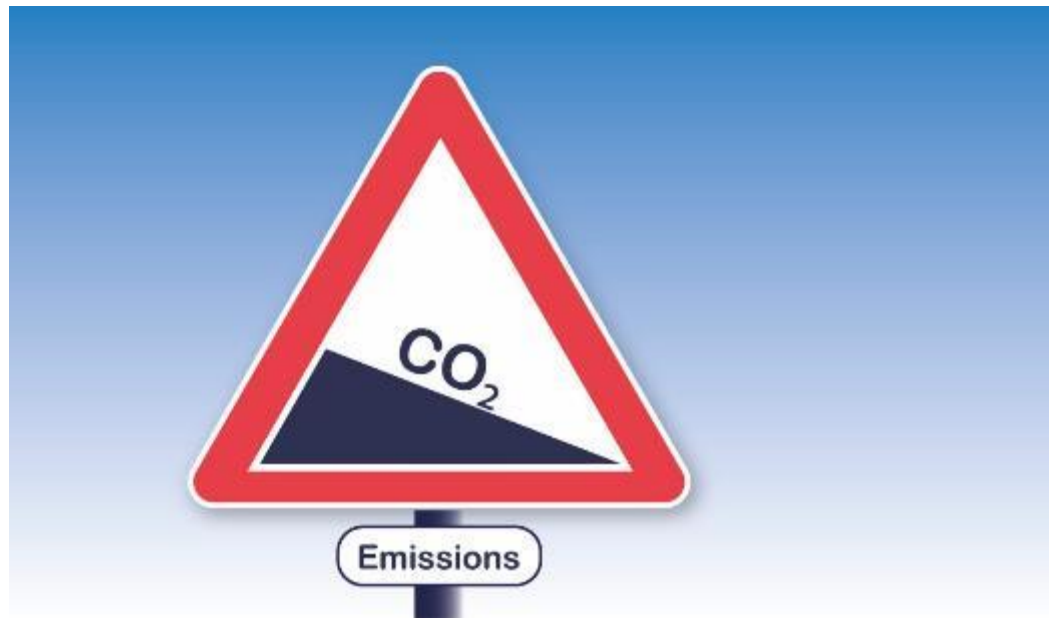
- Calculation based on 100km journey and full load of 225mm pipes
- [CO2 calculator of greenhouse effects for transport and logistics \(carboncare.org\)](https://www.carboncare.org/)

Scope Three reductions

Influencing our raw material suppliers

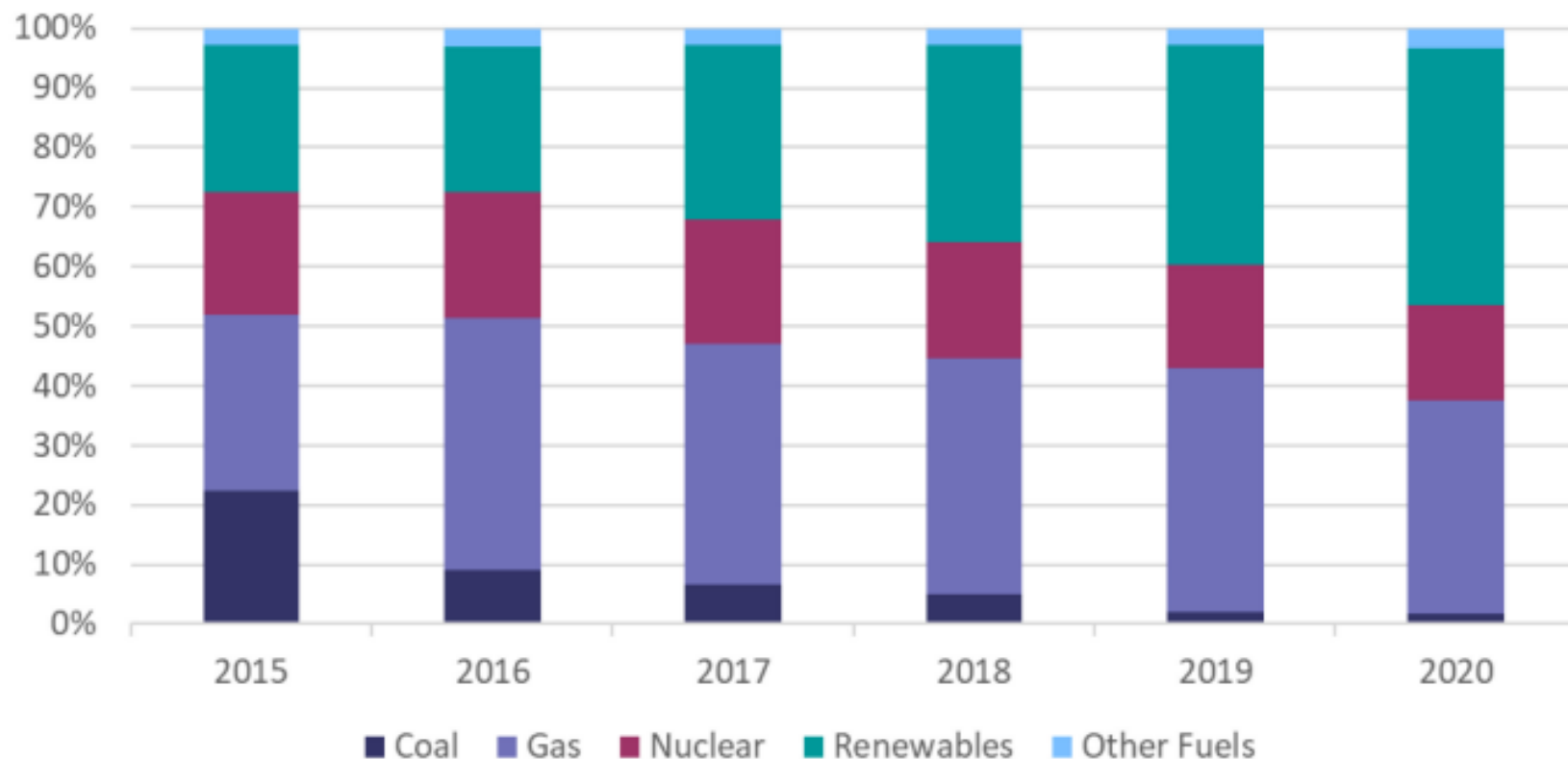


How plastic pipes can help us reach Net Zero



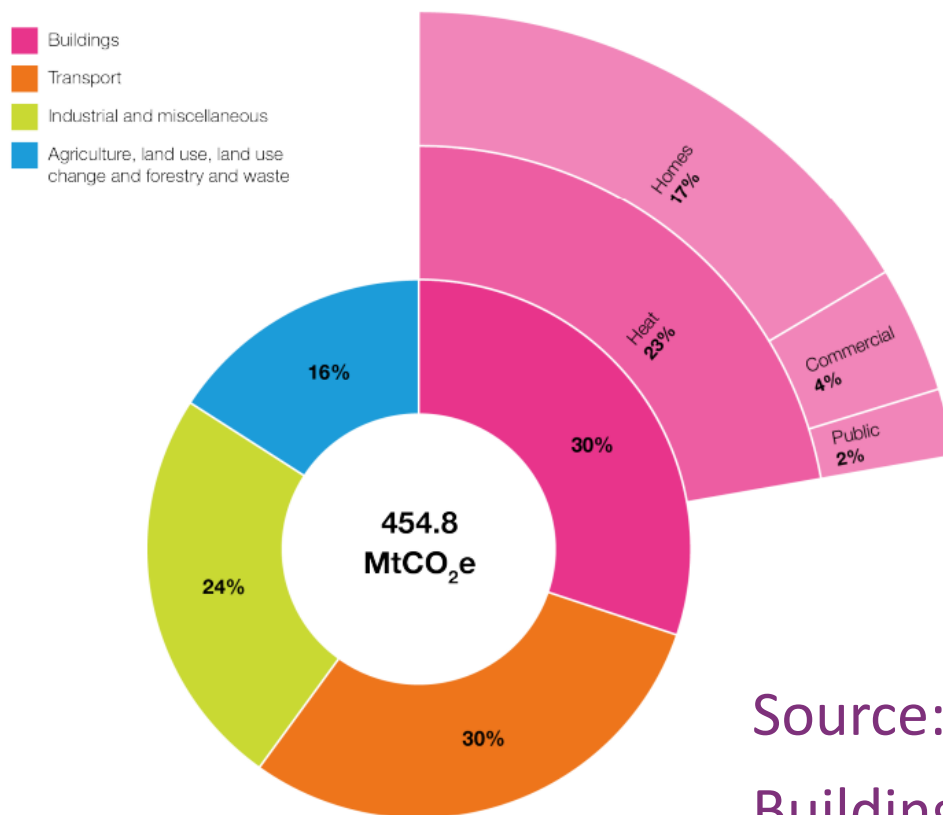
UK sources of electricity

Chart 5.4 Shares of electricity generation by fuel, 2015-2020 ([Table 5.6](#))



The heating challenge

Figure 2: UK emissions in 2019



Source: Heat and Buildings Strategy 2021

How we currently heat our homes

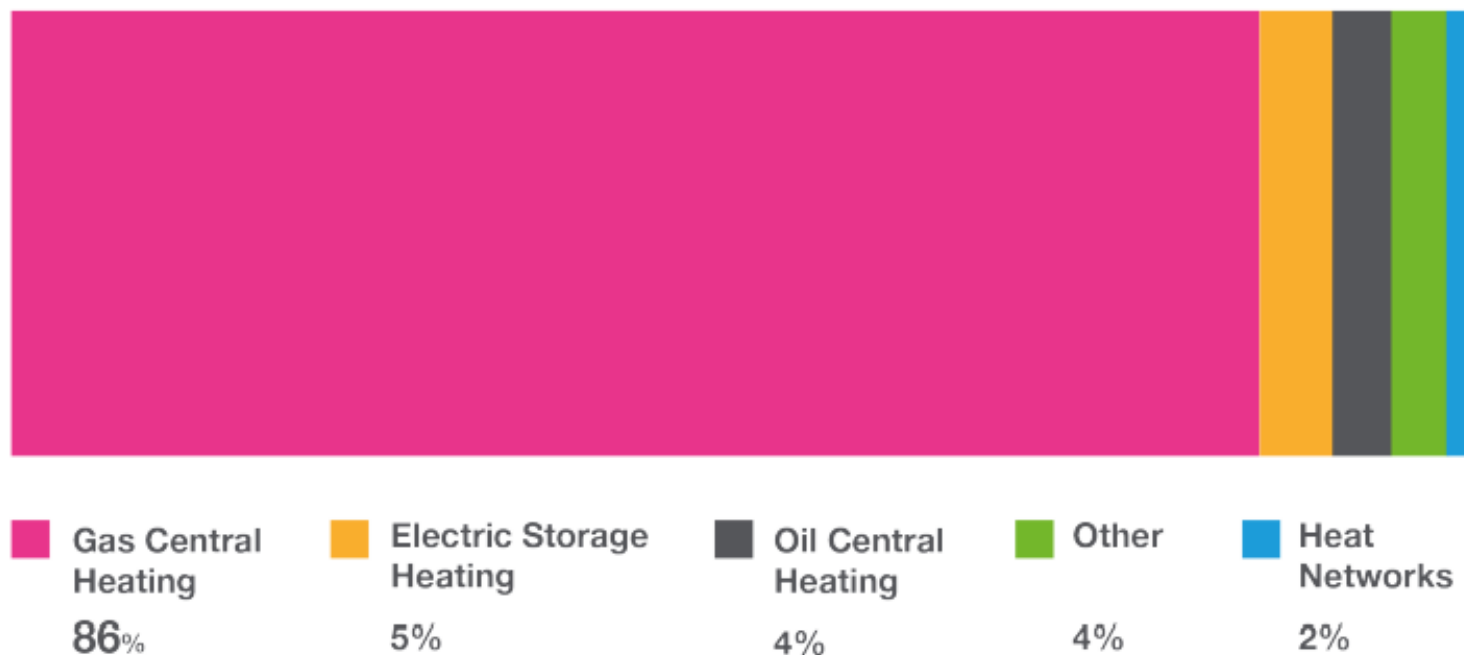


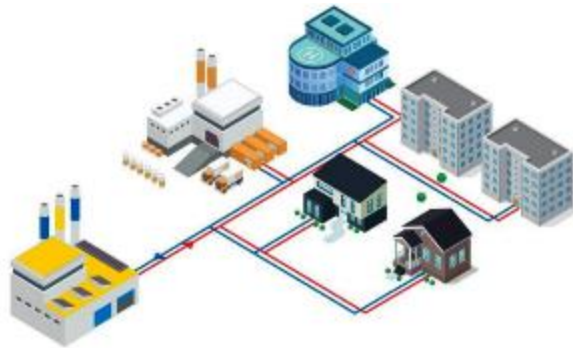
Figure 8 shows the proportion of homes in England using different sources of heat in 2019. Notably gas central heating is used to heat 86% of homes in England.²⁴⁰

How do we decarbonise heating?

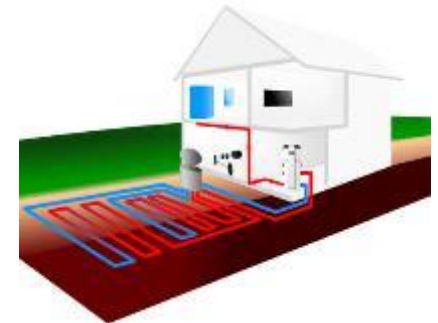
Hydrogen



District Heating



Heat Pumps



Gas boilers will be banned in new homes from 2025

Hydrogen



Hydrogen production

Grey Hydrogen

Produced using fossil fuels. 99% of current global production

Blue Hydrogen

Produced using fossil fuels but using carbon capture & storage (CCS) to reduce emissions

Green Hydrogen

Produced via electrolysis using renewable energy (wind / solar) to make it **zero carbon**

Hydrogen distribution

- Use existing polyethylene (PE) gas pipe network
- Cannot be transported via older metal gas pipes
- 90% of UK gas network already PE



A photograph of a large, multi-story brick building at Keele University. The building features a prominent clock tower with a white face and a dark roof. A wide, colorful path leads towards the building, with the words "Keele University" painted in large blue letters on the green grass. The path is decorated with a colorful geometric pattern. Several people are walking on the path. The sky is blue with some white clouds, and there are green trees in the foreground and background.

UK hydrogen trials

Various UK trials are under way. At Keele University - 20% blend of hydrogen is injected into gas grid for heating 100 homes and 30 faculty buildings

Hydrogen challenges

- Timescales (5GW by 2030?)
- Cost to consumer
- Carbon emissions from production
- Technology conversion required



District heating / heat networks



Possible heat sources for district heating

- Gas / gas CHP
- Heat pumps
- Biomass
- Anaerobic digestion
- Solar thermal
- Deep geothermal
- Waste heat





The UK aims to grow district heating from 3% to 18% of the UK's total heat demand by 2050

District heating pipework

Advantages of plastic pipes over steel:

- High corrosion resistance
- Faster installation (no welding)
- Flexibility and long coils
- No expansion bends required



Trend from steel to plastic

	Projects last 5- 10 years	New schemes
Heat sources	Gas / gas CHP	Waste heat / heat pumps
Flow temp (°C)	80-95	50-70
Project location	Inner city, large diameter pipes for existing buildings	More projects in suburban areas (e.g. new housing)
Common pipe material	Steel	Plastic or steel

District heating challenges

- Higher capital costs than gas boilers
- Risk of future income to investors
- Low awareness in market
- No ability to switch provider



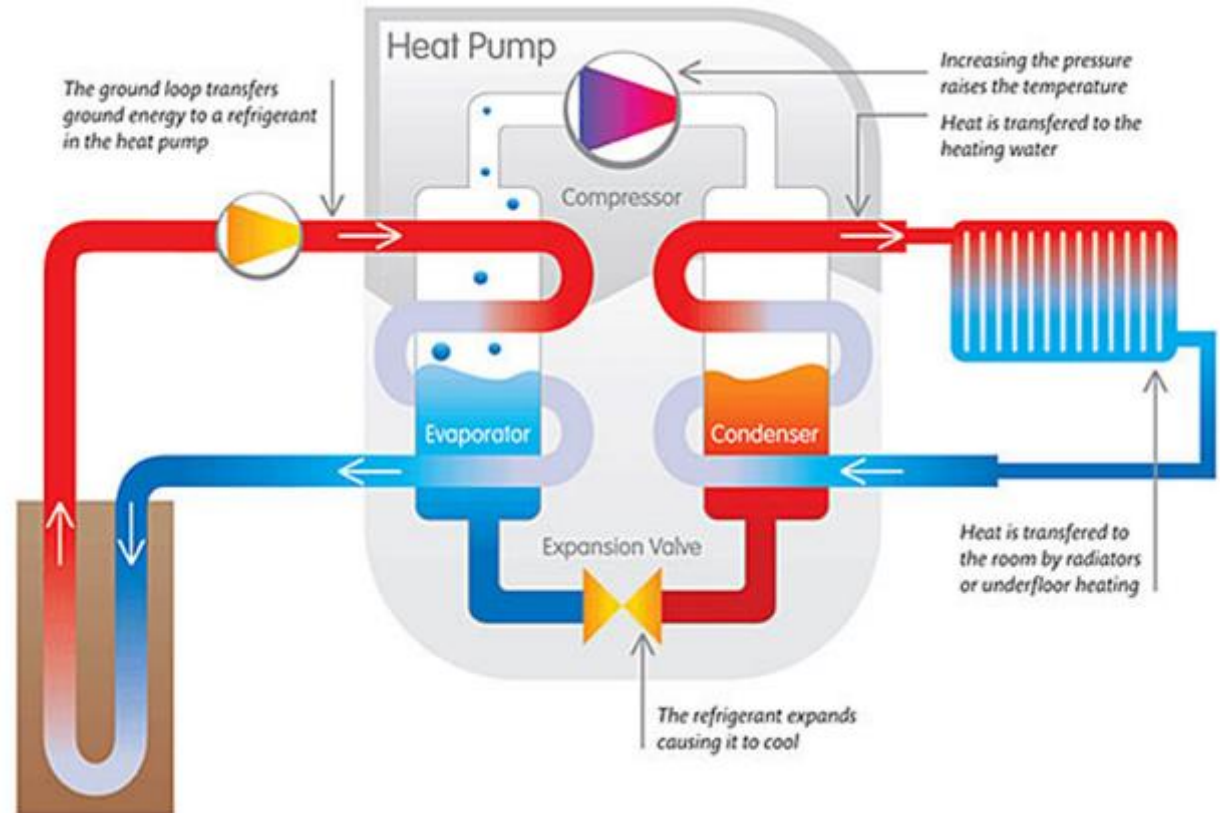
Heat pumps



How does a heat pump work?

3 main types:

- Ground (GSHP)
- Air (ASHP)
- Water (WSHP)



Ground source pipework

To extract heat from the ground with PE 100 pipes, there are 3 main options:

- Boreholes up to 150m deep
- Pipes in foundation piles
- Large horizontal collectors where pipe is 0.8-1m deep



Air source pipework

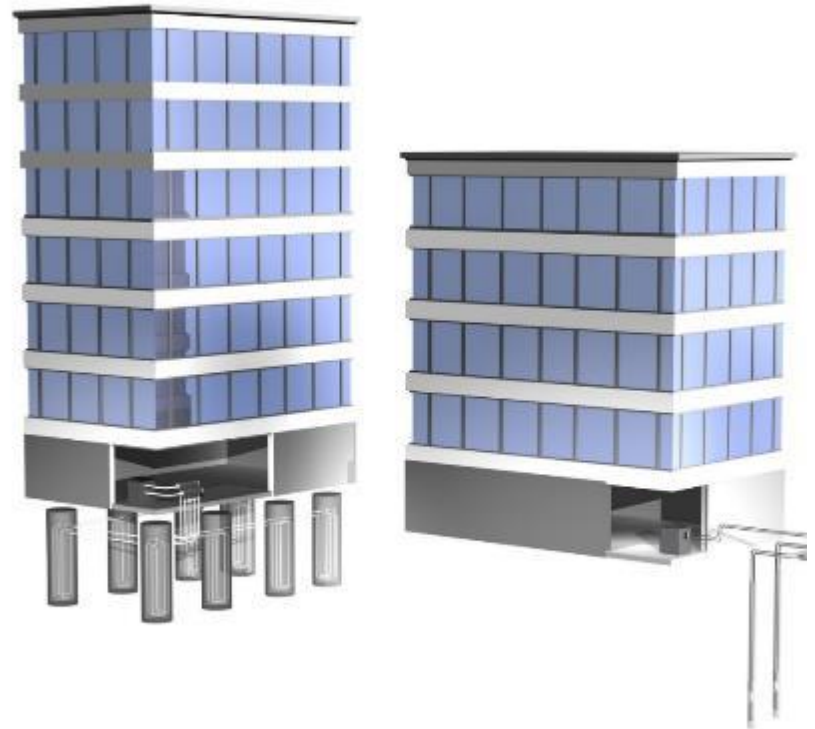
In some cases, ASHPs are located away from the building.

In these cases, they use **pre-insulated district heating pipe** to transfer heat back to the building.



Heat pump challenges

- Higher capital costs of heat pump vs gas boiler
- Need to train more heat pump installers
- Gas is cheap – high levy on electricity prices



Underfloor heating

UFH is ideally matched with a heat pump to increase the efficiency

UFH always installed using plastic pipes due to the high flexibility needed:

- PE-Xa / PE-Xb / PE-Xc
- PE-RT or multilayer PE-RT
- PB



Plumbing pipework EPD

Based on a apartment installation of plumbing pipe & fittings for 100m²

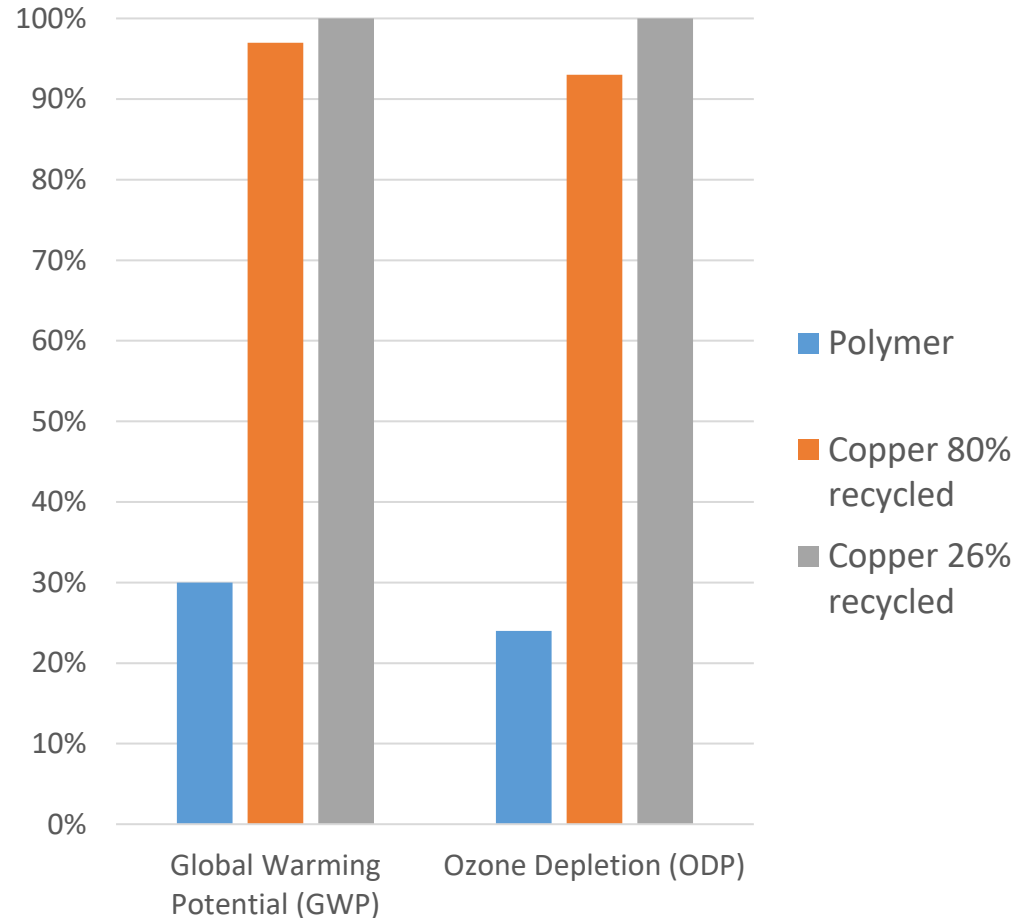
Global Warming Potential

Polymer up to 3x lower than copper

Ozone Depletion

Polymer up to 4x lower than copper

Source: TEPPFA



Other Net Zero plastic pipe applications

- Ducting for EV charging points
- HVAC and electrical pipework at wind farms



Learning objectives summary

- Plastic pipes should not be viewed in the same vein as single use plastic packaging
- Plastic pipe manufacturers are starting their journey to Net Zero and beginning to implement measures
- Plastic pipes are already used widely in Net Zero applications due to their high thermal, chemical and mechanical properties

Any questions?

BRITISH PLASTICS FEDERATION PIPES GROUP

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About Us

BRITISH PLASTICS FEDERATION PIPES GROUP

The British Plastics Federation (BPF) Pipes Group is the leading trade federation of the UK plastic piping systems industry and a member of the European Plastic Pipes and Fittings Association (TEPPFA).

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Applications

Under the directive of the BPF Pipes Group Council the group is split into Application Groups encompassing the wide range of applications covered by plastic piping systems.

- > Civils/Utilities
- > Building Services

Support and Downloads

Access information resources in the form of News Articles, Guidance Notes and Position Statements which cover areas of interest to specifiers, manufacturers and installers of plastic piping systems.

> Learn More

Webinars

Schedule of upcoming BPF Pipes Group webinars. These free webinars cover a range of topics and are delivered by our members who are experts in their application areas.

> Learn More

www.bfpipesgroup.com

Future webinars

- Designing Drains And Sewers – 24th November 2021

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