The role plastic pipes will play in delivering Net Zero

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BRITISH PLASTICS FEDERATION PIPES GROUP

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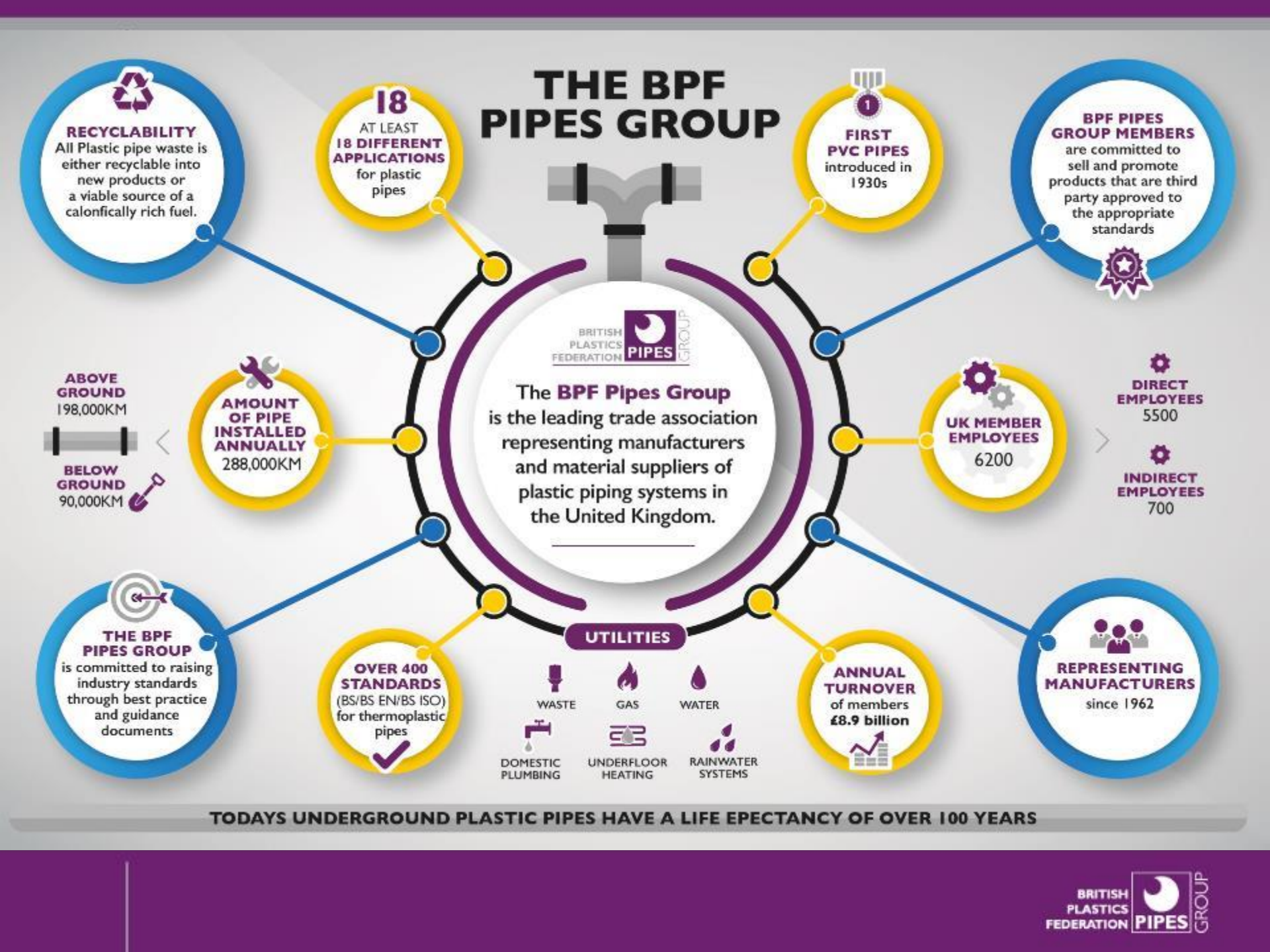

TODAYS UNDERGROUND PLASTIC PIPES HAVE A LIFE EPECTANCY OF OVER 100 YEARS

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Learning objectives

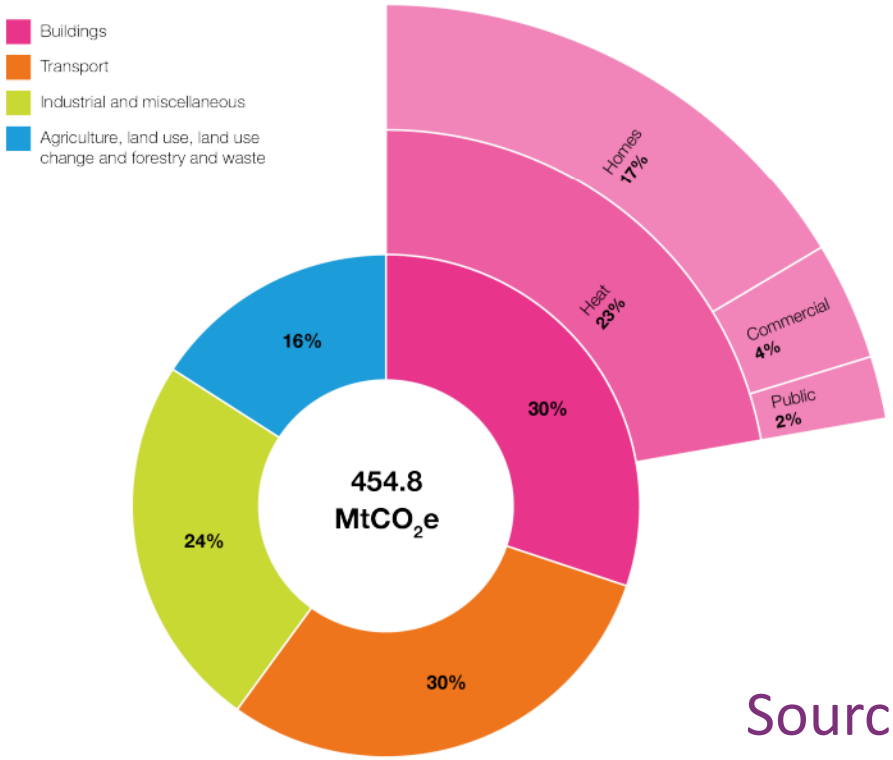
- Explain what Scope 1, 2 & 3 carbon emissions are
- Give examples of how a plastic pipe manufacturer can reduce carbon emissions
- Explain the applications of plastic pipes to help achieve Net Zero

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



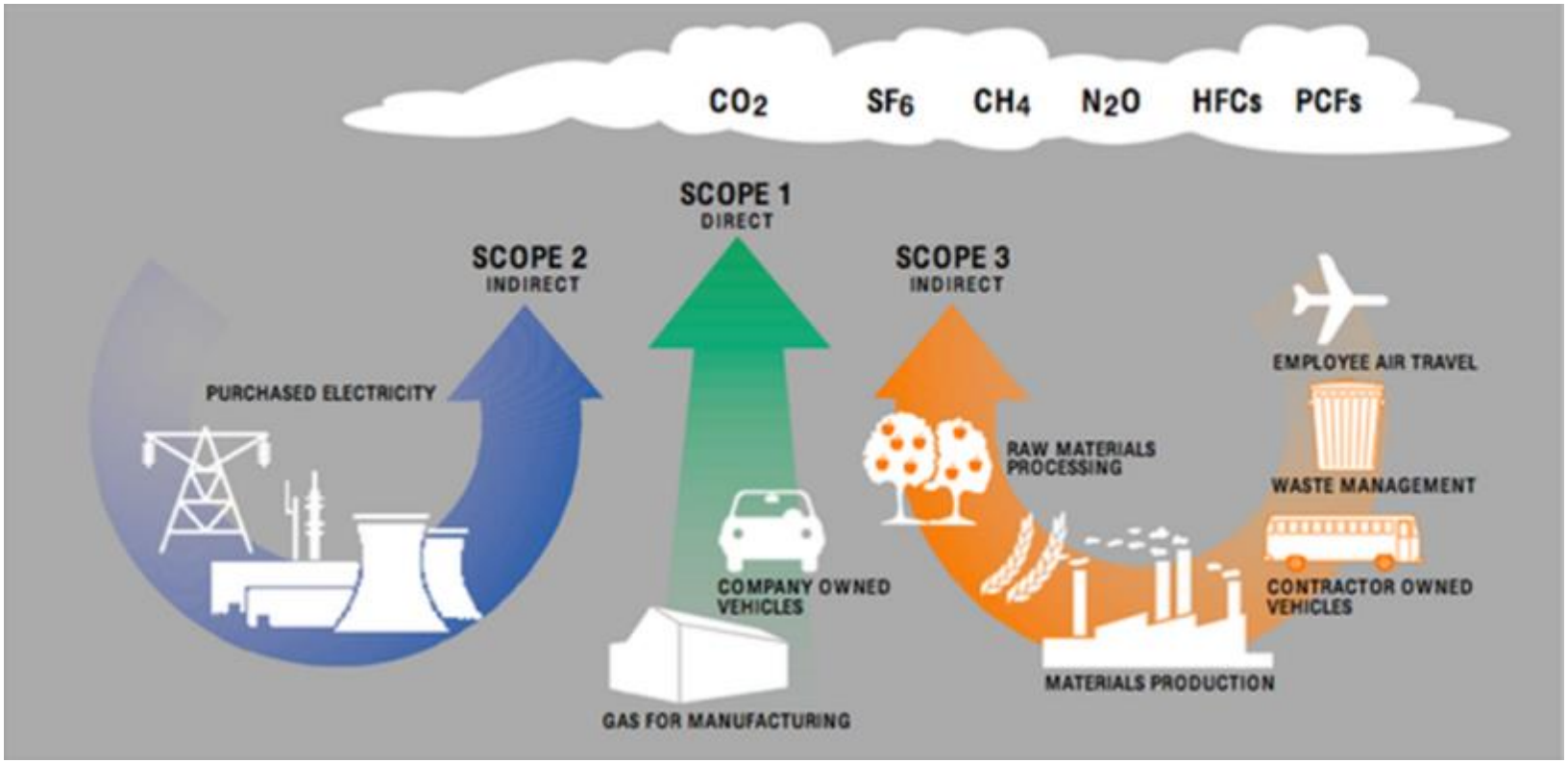
Source: Heat and Buildings Strategy 2021

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
- CO_2 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

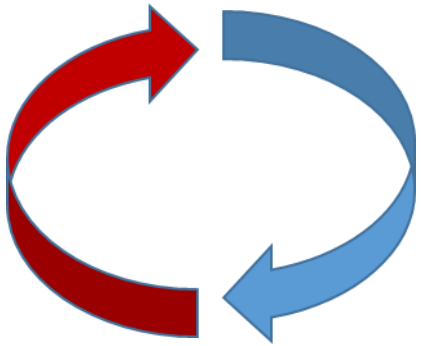
Reduction in resource waste

E.g.

- Scrap product
- Compressed air leakage
- Lighting management
- Invertor 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%

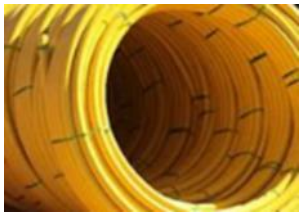
Common sources of recycled plastics are single use consumer waste e.g. water, milk, shampoo and drink bottles.

Key is improving recycling collections and processing across the UK

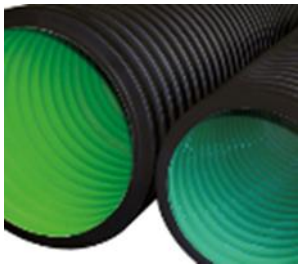
*[*Datasource: APR-Recycled-vs-Virgin-May2020.pdf (plasticsrecycling.org)](#) - The Association of Plastic Recyclers White Paper: Virgin vs. Recycled Plastic Life Cycle Assessment Energy Profile and Life Cycle Assessment Environmental Burdens May 12, 2020*

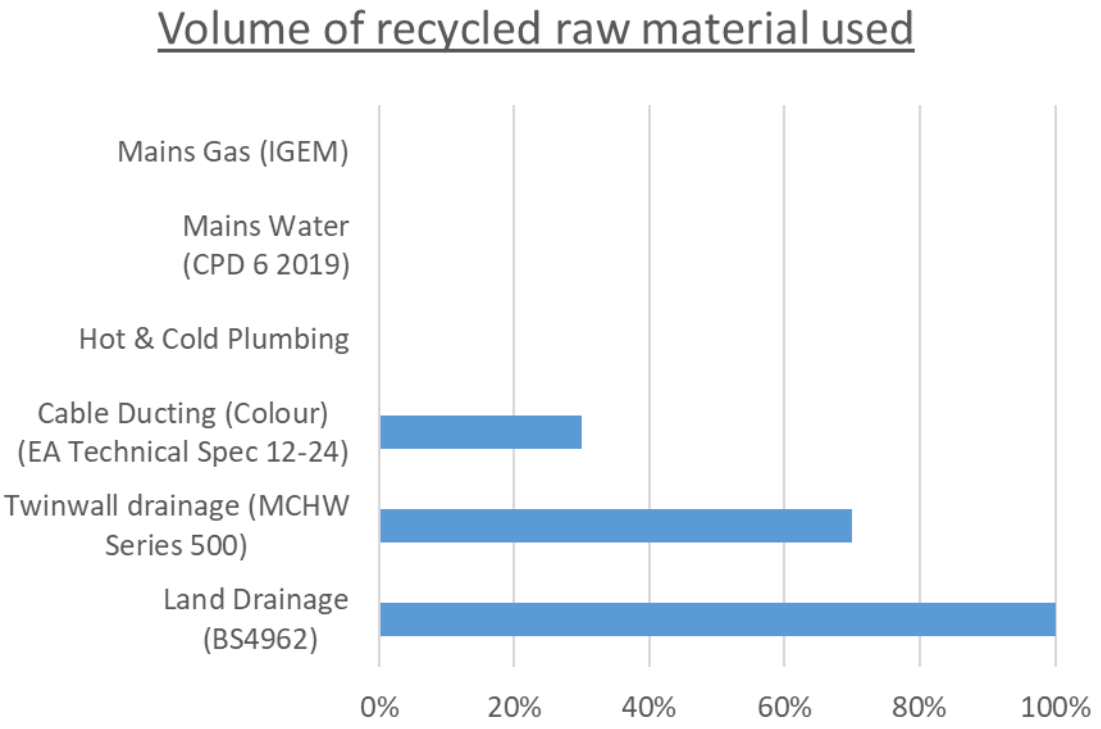
Scope Three reductions

Use of recycled materials



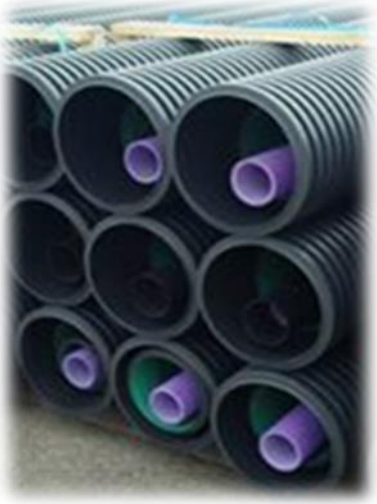




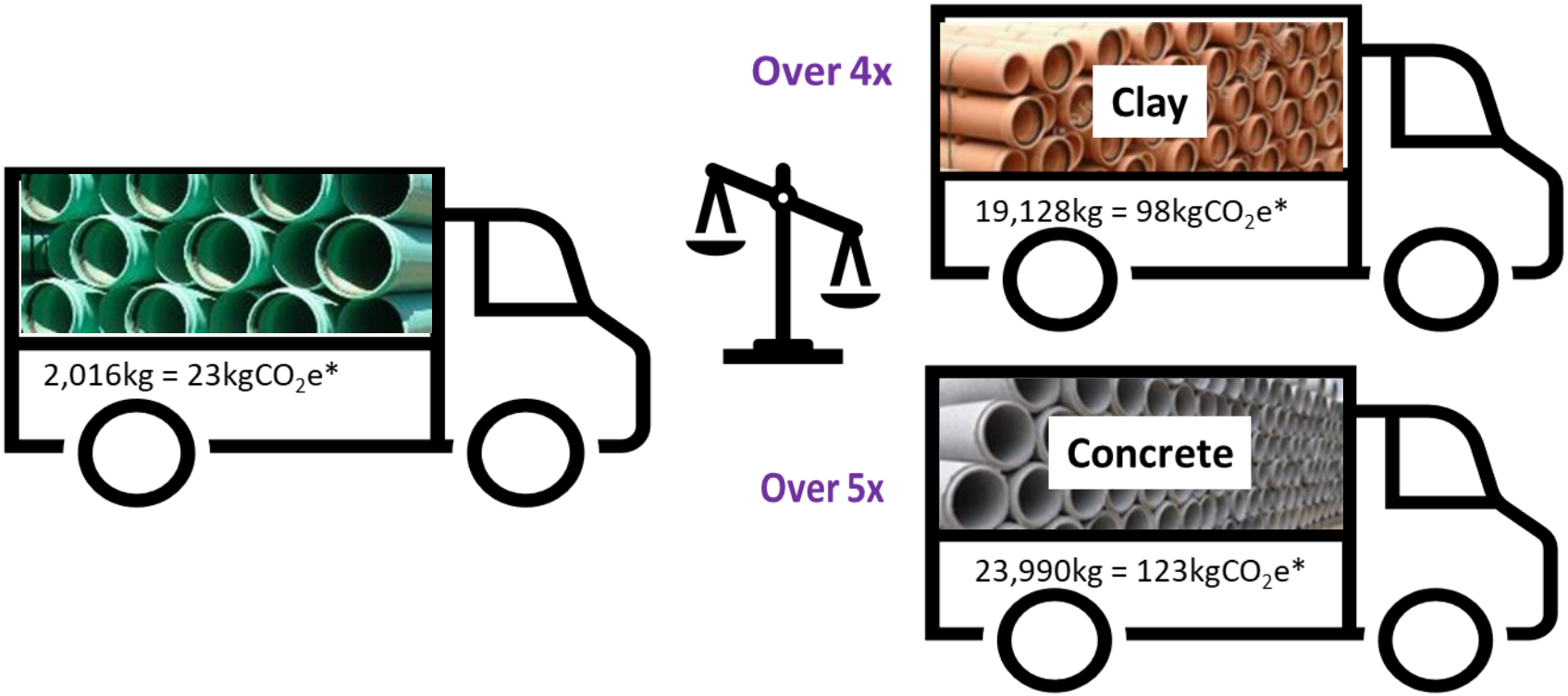
Scope Three reductions

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)*

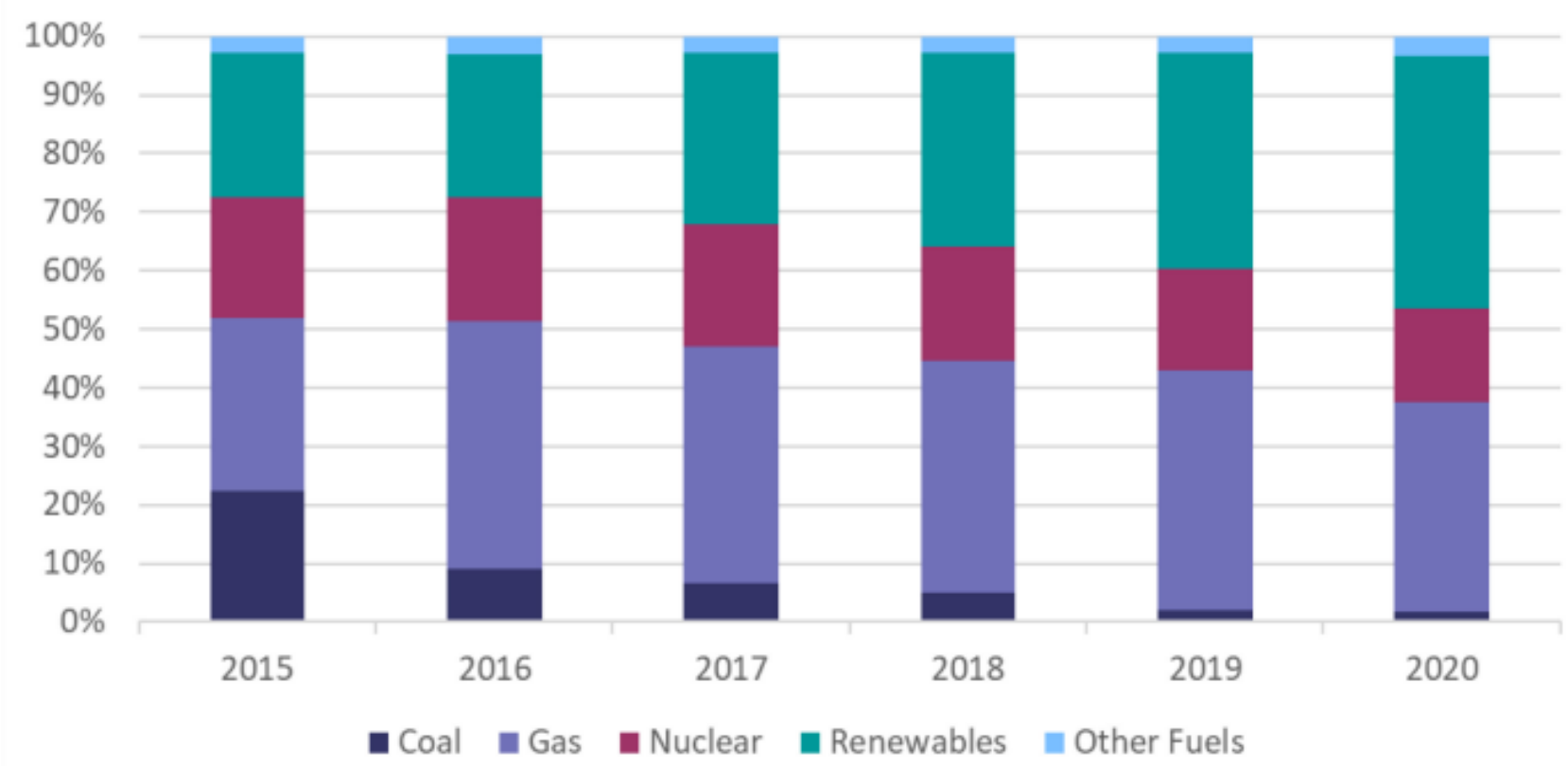
Scope Three reductions

Influencing our raw material suppliers

How plastic pipes can help us reach Net Zero

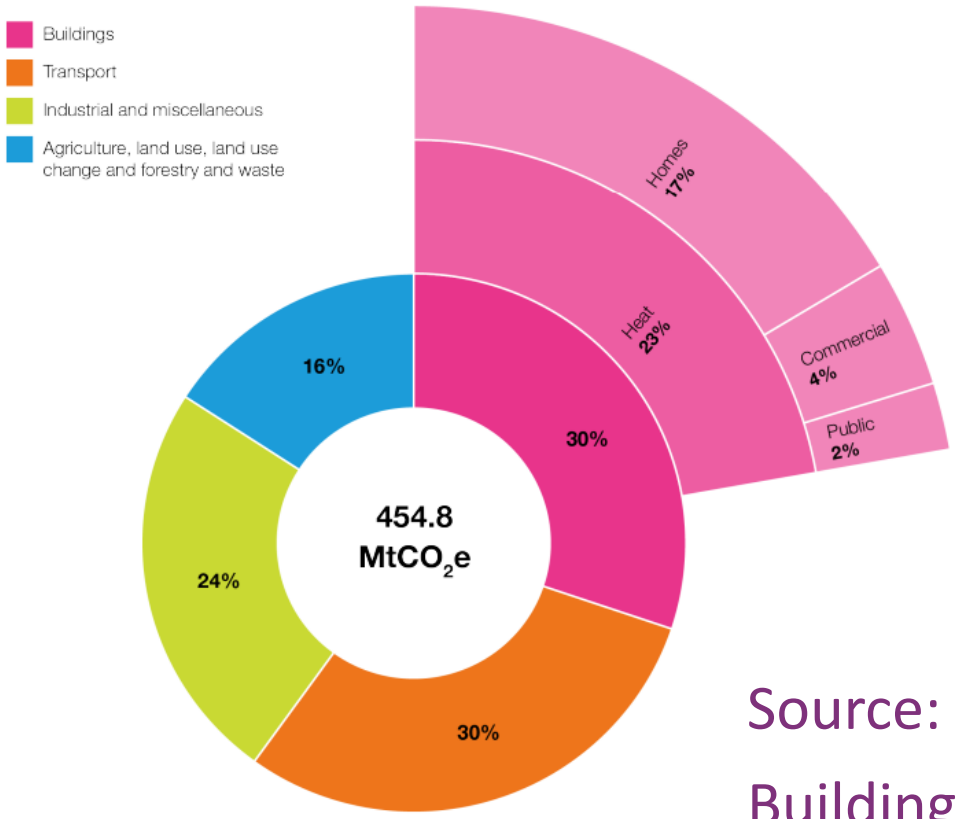
UK sources of electricity

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

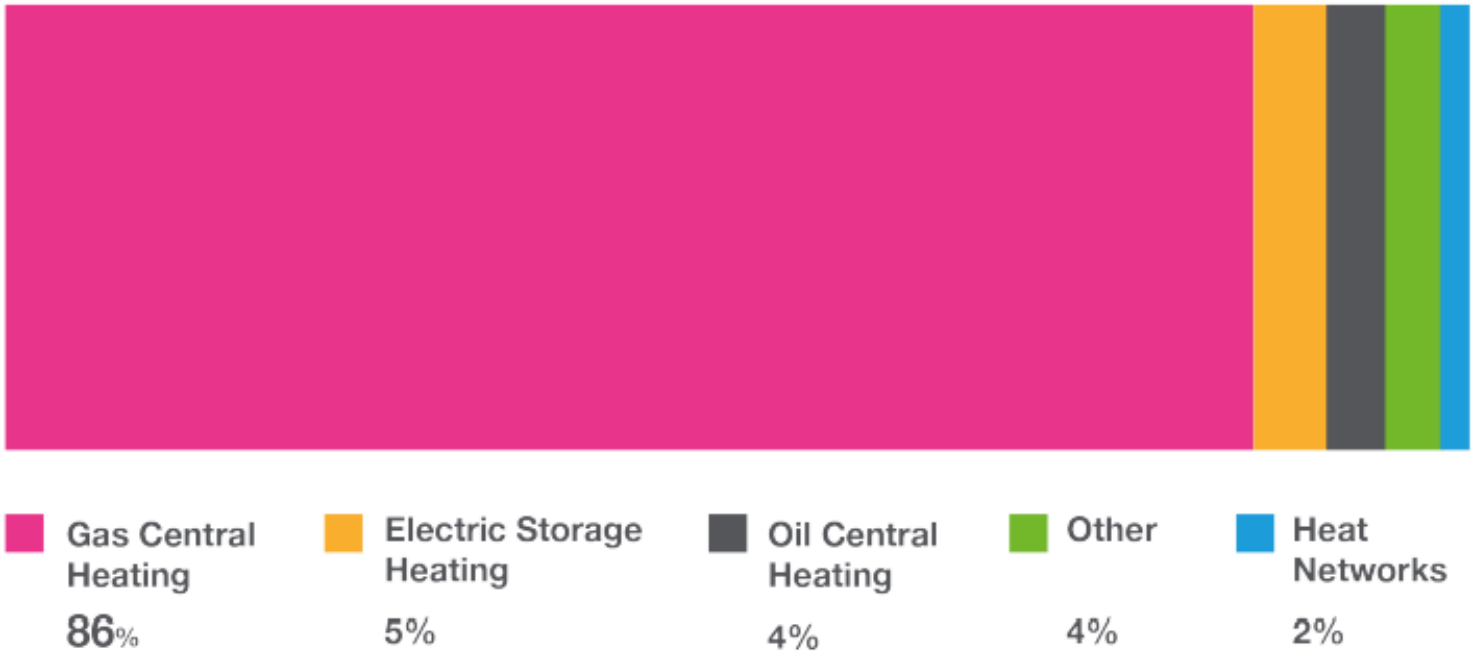


Figure 8 shows the proportion of homes in England using different sources of heat in 2019. Notably gas central heating is used to heat 86% of homes in England.[240]

How do we decarbonise heating?

Hydrogen

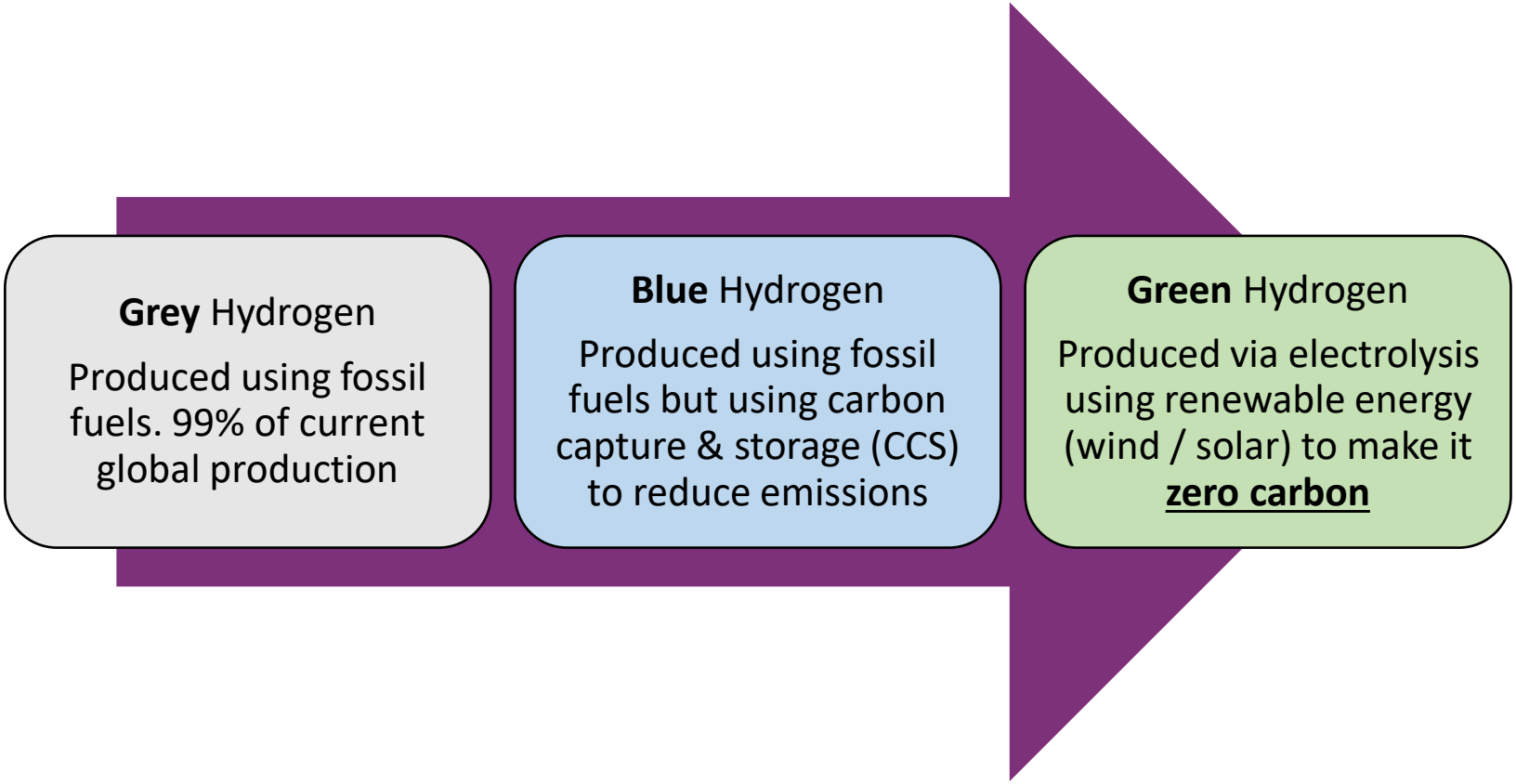
District Heating

Heat Pumps

Gas boilers will be banned in new homes from 2025

Hydrogen

Hydrogen production



Hydrogen distribution

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

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 TRUST

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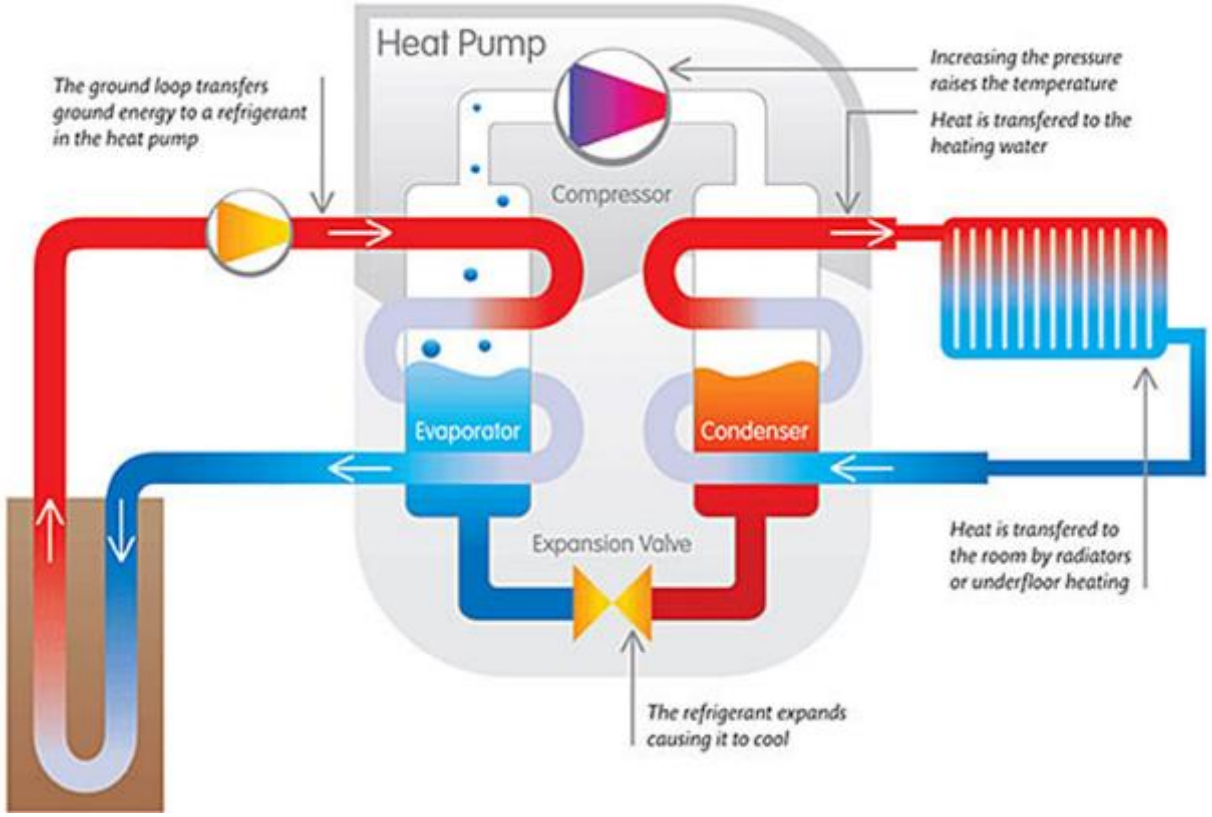
Heat pumps

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

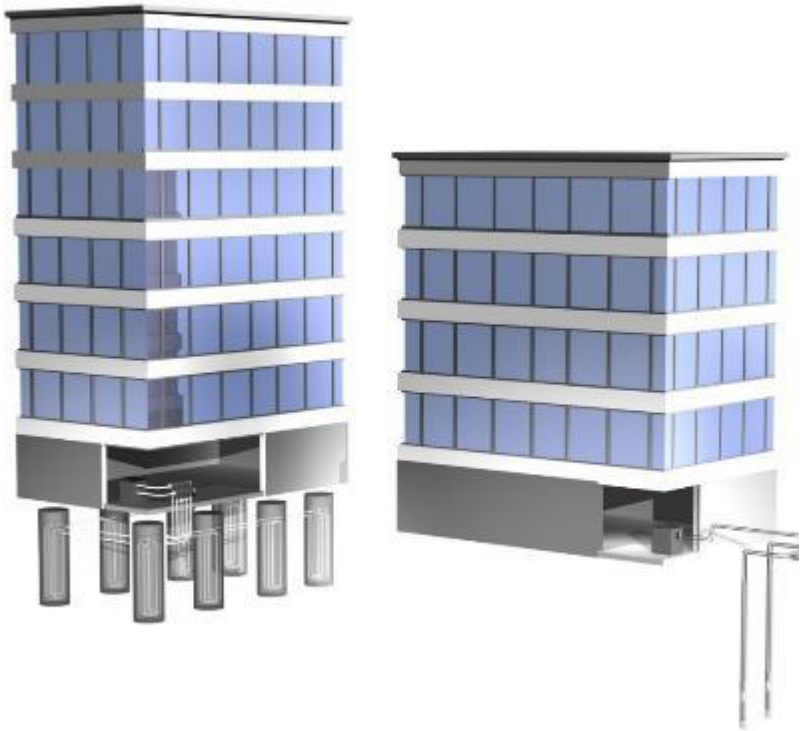
Air source pipework

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

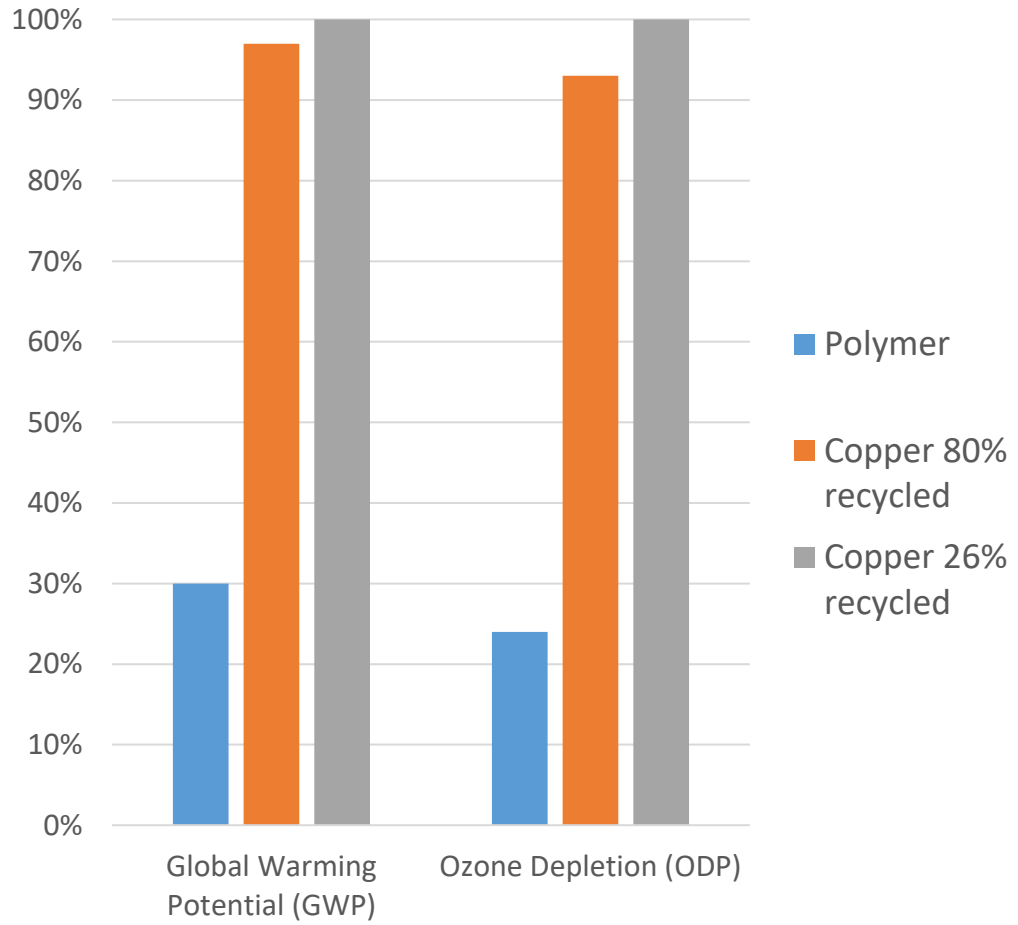
Global Warming Potential

Polymer up to 3x lower than copper

Ozone Depletion

Polymer up to 4x lower than copper

Source: TEPPFA



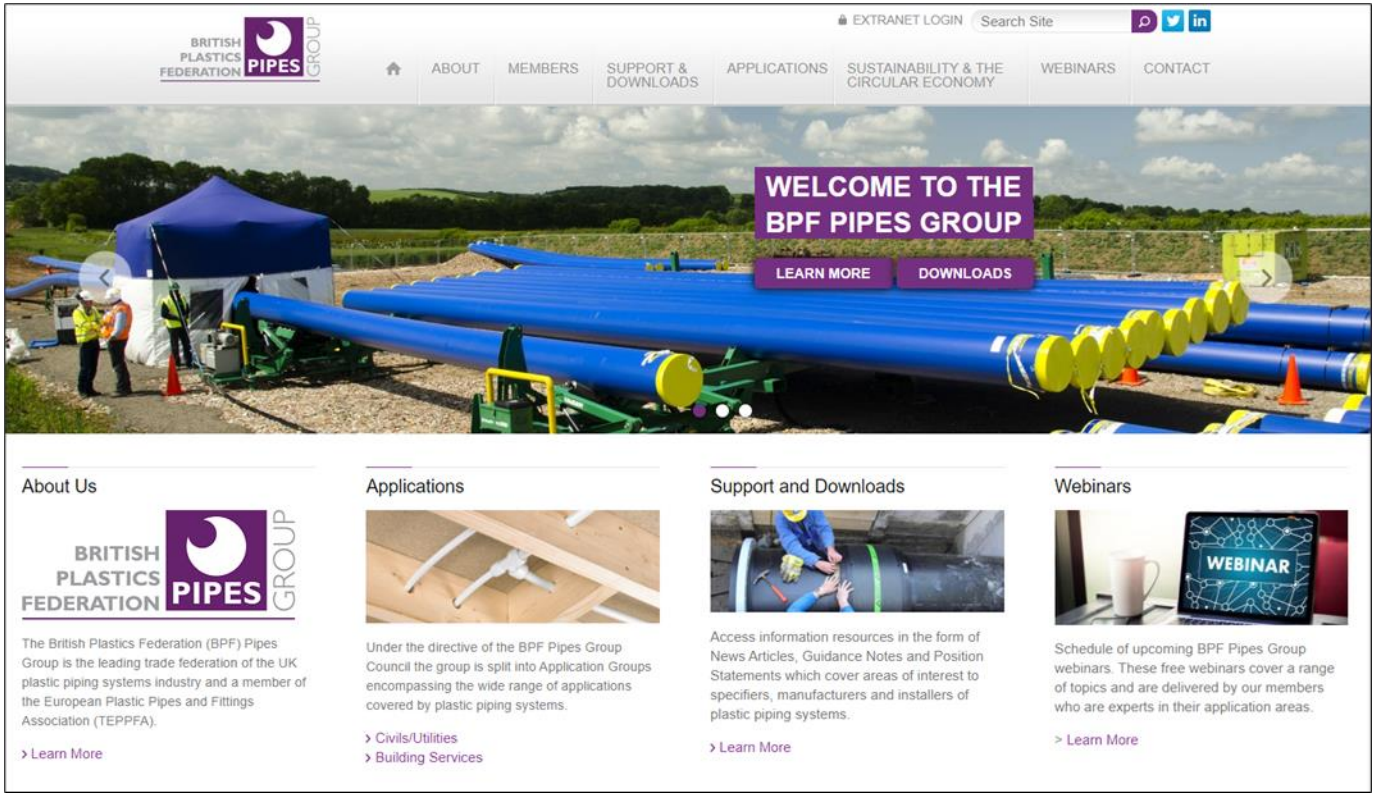
Other Net Zero plastic pipe applications

- 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?



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Future webinars

- Designing Drains And Sewers – 24th November 2021

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