Net Zero Briefing

Introduction to net zero for the plastics industry

British Plastics Federation

British Plastics Federation (BPF)

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1 The case for net zero

The concept of 'net zero' is broad and, whilst the term has been in common use for some time, it has also been loosely defined. At the global level, net zero emissions are reached when anthropogenic (i.e. human-caused) greenhouse gas (GHG) emissions to the atmosphere are balanced by anthropogenic GHG removals over a specified period of time.[1]

At the company level or in a corporate context, the definition of net zero is not sufficiently clear, leading to confusion and inconsistent claims. Efforts are being made to better define net zero for business in line with science and a recent example is the launch of a corporate net zero standard. [2]

Country level

At the country level, net zero means that the country's total GHG emissions would be less than or equal to the emissions the country removed from the atmosphere. This would be achieved by a combination of reducing the existing gross emissions and actively capturing emissions for removal.

In June 2019, the UK became the first major economy to pass a law to become a net zero emitter by 2050. This is based on research which suggests that humanity must reach net zero emissions by 2050 at the latest in order to have a reasonable chance of limiting global warming to 1.5°C – the ambitious target of the Paris Agreement.

The UK carbon reduction target

Under the 2008 Climate Change Act the UK government committed to an 80% reduction in carbon emissions (relative a 1990 baseline) by 2050. This was amended by a Statutory Instrument (SI 2019 No. 1056) in June 2019 to extend the commitment to a 100% reduction (relative to 1990 levels) by 2050.

Achieving this target would make the UK a 'net zero' emitter.

The achievement so far

UK progress in reducing GHG emissions since 1990 is shown in the graph on the right. This shows that the 2019 CO_2e emissions were 44% lower than in 1990. It is significant to note that the UK economy, as a whole, has effectively 'decoupled' CO_2e emissions from growth as measured by Gross Domestic Product (GDP) and that during the same period the UK GDP grew by ≈ 80%.[3]

At the national level this may initially appear to be good progress but the achievement to date varies widely by sector. The broad sectoral changes since 1990 are shown in the GHG table on page 2 and these show that:

- Most of the reductions to date are in 'easy to reach' sectors where investment can be concentrated and paybacks are good. The 'harder to reach' sectors are far more problematic to decarbonise.
- The progress to date uses a 'territorial basis' for measuring emissions, as is the case with all national emissions under Paris Agreement, and this masks 'consumption' emissions related to imported manufactured goods for example.

Other countries

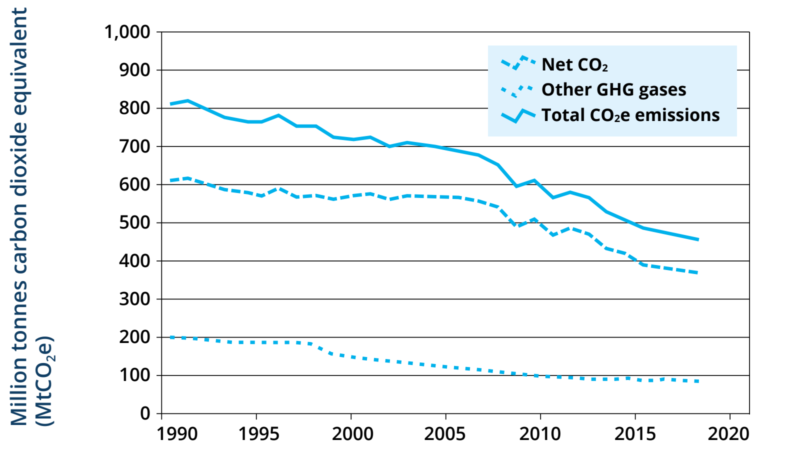
Similar targets to those set by the UK have been made by many other countries, most have made 2050 the target date but some have set more aggressive targets, e.g., Norway has committed to net zero by 2030 (with international offsets). In most cases these are, at the moment, internal targets but they are rapidly being translated into law.

Greenhouse gas emissions	2018-2019 % change	1990-2019 % change
Total:	**-3%**	**-44%**
Energy supply	-8%	-66%
Business & industry	-3%	-32%
Transport	-2%	-5%
Residential	-1%	-14%
Agriculture	+1%	-13%
Other	+2%	-73%
Waste management	-1%	-71%

UK progress since 1990

The UK has reduced total GHG emissions by 44% relative to 1990, however, much of the manufacturing capacity has moved abroad ever since and most of abatement achieved has been in 'easy-to-reach sectors'.[4]

UK CO_2e emissions (1990–2019)



1 IPCC, https://www.ipcc.ch/sr15/chapter/glossary/
2 https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf
3 GDP data (1990–2019), UK Office for National Statistics, www.ons.gov.uk/economy/grossdomesticproductgdp.
4 2019 UK Greenhouse Gas Emissions", Mar. 2021, www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics

Sector changes in UK CO_2e emissions over time

The rapid rise in energy supplied by re-newables has started to decarbonise the UK's energy supply sector but this is not matched in most of the other sectors, e.g. energy supply was 34% of emissions in 1990 and in 2019 had decreased to 21%.

Carbon capture technologies

Carbon capture can be from:

- A point source, e.g., a power station (this can also be from incineration, fermentation or composting facilities), where the CO_2 is concentrated and easier to sequester before it reaches the atmosphere, referred to as carbon capture and storage (CCS).

- A diversified source, e.g., Direct Air Capture (DAC), where the CO_2 is captured from atmospheric air.

In both cases the captured CO_2 can be used as a feedstock for new products. This is referred to as carbon capture and utilisation (CCUS).
The important issue for CCUS is that the captured CO_2 should be physically removed from the atmosphere, permanently sequestered and that all the process emissions (including upstream and downstream) are included in the balance.

Company level

At the company level, perhaps the best definition is provided by the Science Based Targets initiative (SBTi):
To reach net zero emissions, companies should:

- Achieve a scale of value-chain emission reductions consistent with the depth of abatement achieved in pathways that limit warming to 1.5°C with no or limited overshoot and;

- Neutralise the impact of any source of residual emissions that remains economically unfeasible to be abated.

Embodied or operational?

Embodied carbon is the total GHG emissions generated in producing a product ready for the consumer while operational carbon is the total GHG emissions generated in the use of the product by the consumer.

Carbon Neutrality ≠ Net Zero

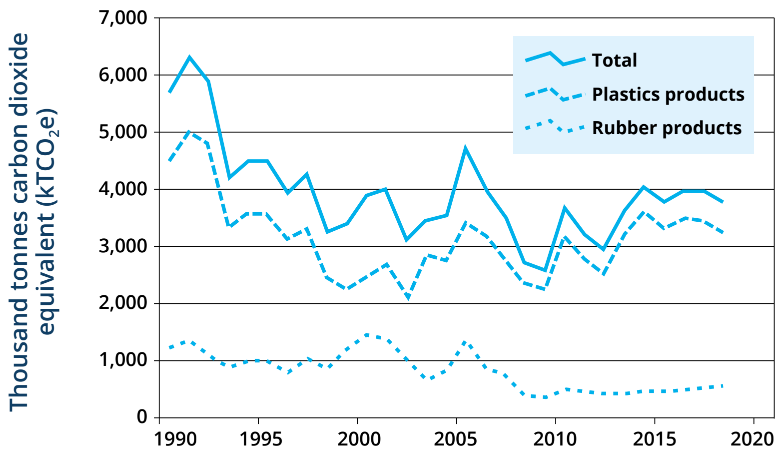
For products or activities, carbon neutrality is defined by a standard produced by BSI PAS 2060:2014. This can be used by individual companies but is different to net zero in several areas, however, PAS 2060 and carbon neutrality can be useful as a transition path to net zero.

Net zero targets include all Scope 1, 2 and 3 emissions whereas PAS 2060 only requires Scope 1 and 2 (although Scope 3 emissions are encouraged).

Emissions from the UK plastics and rubber sector[5]

This data is based on the UK Standard Industrial Classification (SIC) Codes 22.1 and 22.2 for manufacture of rubber and plastics products. These emissions are 'territorial' and only cover emissions inside the UK's borders.

Plastics and rubber sector CO_2e emissions (1990–2018)



5 UK Office for National Statistics, https://www.ons.gov.uk/businessindustryandtrade/datalist?:uri=businessindustryandtrade/datalist&q=&sortBy=relevance&page=154

2 Translating aspiration into action

The policy initiatives and strategies will only be achieved by action. This is not incremental change; it will be a step change for many sectors.

The path to net zero will require two separate types of actions, incorporating both reductions and capture, these are:

- Emission reductions in both the supply-side and the demand-side.
- Emission capture to balance the residual emissions.

The relative contribution in terms of CO_2e emissions for a range of sectors in 2019 is shown in the pie chart on this page. The 'hard-to-reach' sectors will be the most challenging and expensive to decarbonise.

Emission reductions

Supply side (21% of CO_2e emissions)

The electricity supply system is rapidly being decarbonised through the introduction of renewables, e.g., solar and wind, but this has supply risks when the sun doesn't shine and the wind doesn't blow. Offshore wind and tidal energy are also important sectors for the growth in renewable energy. The need to provide a reliable base load for the UK is one of the reasons for the current investment in large-scale nuclear e.g., Hinkley Point C (under construction) and other proposed reactors, and research into Small Modular Reactors that can be built in factories and provide an expandable base load.

The 'electrification' of the UK economy at the demand side will also mean that the capacity of the supply side and the supply grid will need to increase to provide resilience. This is a large-scale infrastructure project needing strategic network upgrading.

The use of fossil fuels for energy supply is planned to decrease quickly, e.g., coal will stop by 2024 and gas-fired without CCUS will stop by 2035.

Demand side

Note: demand side emissions are based on the source, i.e. electricity use emissions are attributed to power stations & included in supply side emissions.

Decarbonisation of the demand side has three main actions that are needed, these are:

- Reductions in fossil fuel use – use of fossil fuels for heating and transport will be phased out and replaced with electrification, hydrogen and biofuels.
- Electrification – reduced emissions from renewables and nuclear on the supply side will drive electrification.
- Energy efficiency – improved energy efficiency will be needed to reduce electricity use and supply grid pressures.

These actions will drive change for every sector:

Business and industry (17% of CO_2e emissions) – this covers a wide range of activities but progress to date has been good.

The biggest challenge in this sector is the electrification of heat. Many low temperature processes, e.g., plastics processing, are already largely electrified for heat and it is technically feasible to electrify up to 50% of the processes currently using fossil fuels.

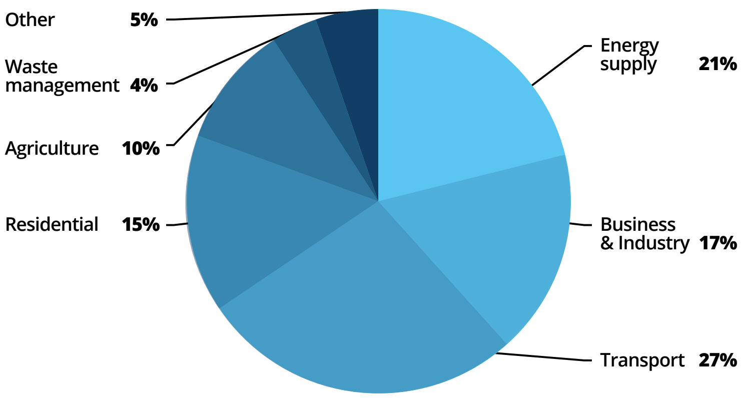
High temperature processes, e.g., iron, cement and steel or glass making, mainly use fossil fuels due to the much lower cost of gas. Green hydrogen has potential for high temperature heat but will initially need price support, technology development and security of supply, e.g., a transport infrastructure.

Industry may need transition support in developing products that not only have reduced emissions during production (embodied carbon) but also have less emissions during use.

UK CO_2e emissions by sector in 2019[6]

Business and industry have a part to play in reducing emissions to achieve net zero but other sectors, e.g., transport, residential housing and agriculture, are hard-to-reach and will involve significant investment and structural changes to society.

CO_2e emissions by sector



6 2019 UK Greenhouse Gas Emissions", Mar. 2021, www.gov.uk/government/collections/final-ukgreenhouse-gas-emissions-national-statistics

Transport (27% of CO_2e emissions) – this is the largest emitting sector and includes surface transport, aviation and shipping with the major emissions from passenger road transport. Progress to date has been poor. The introduction of electric vehicles (EV) and the phase out of sales of petrol and diesel cars and vans by 2030 will improve matters. In the heavy-duty vehicles sector (HGVs, buses, and coaches) the use of biodiesel will, in the short-term, reduce emissions but it is predicted that there will be a phase out of diesel for heavy duty vehicles in ≈ 2040 when EV or hydrogen technology is more mature and the infrastructure is more developed.

Aviation and shipping are difficult to decarbonise and need developments such as hydrogen power, Sustainable Aviation Fuel (SAF), CO_2 removal and potentially electrification in the long term. There are already considerations of limiting aviation growth and operating firm demand-side policies to reduce travel demand.

Residential (15% of CO_2e emissions)
Progress to date hs been poor. Achieving net zero will require significant action in areas such as:

- Improved insulation and sealing to reduce heat losses/heat gains, e.g., insulation (external, internal, cavity wall and loft), improved windows and doors.
- Decarbonised heating, e.g., heat pumps, green hydrogen and biomass as fuel, or the use of local heat networks.

This is a hard-to-reach sector due to the variability of buildings, the cost of improvements and the scale of investments.

Agriculture (10% of CO_2e emissions) – these are the emissions from livestock (CH_4), soils and machinery.

The decreases to date have been due to decreasing animal numbers and fertilizer use but the sector needs to improve forestry levels, cut food waste and there will be policies to encourage a reduction in meat and dairy consumption.

Waste and other (9% of CO_2e emissions) – these are the emissions from biodegradable waste in landfill where methane (CH_4) is the largest contributor, refrigerant gas leakage and other waste emissions, e.g., incineration without CCUS.

These emissions have decreased by > 70% since 1990 due to the removal of biodegradable waste from landfill, an increase in the use of landfill gas for energy (CH_4 is a much more potent GHG than CO_2), increased recycling and improvements in the refrigerant gases used.

What is a carbon footprint?

A carbon footprint is simply the total of all the carbon emissions that result either directly from a site or as a result of the site's activities. This is expressed in terms of the total CO_2 emissions. In some cases, the actual gases emitted are not simply CO_2 but include other greenhouse gases (GHG), e.g., methane (CH_4) or nitrous oxide (N_2O). These emissions are converted into CO_2 equivalents (CO_2e) to allow a total equivalent CO_2e to be calculated.

There are a range of reporting methods largely based on the GHG Protocol which provides methodologies for classifying and reporting emissions.[7]

Many of the rules for carbon footprinting are similar to accounting rules and they are designed to allow emissions in a supply chain to be accounted for without double-counting. In the simplest case, e.g. a plastics processing site, it is possible to calculate the emissions within a site's control. Upstream emissions can then be calculated from the raw materials supplier data.

> **Commitments alone are not enough. We need real change in the real world. The data does not match the rhetoric and the gap is getting wider and wider.**
>
> **FATIH BIROL**
>
> **Executive Director of IEA**
> **23 April 2021**
>
> www.state.gov/leaders-summit-on-climate/day-2/

> **The International Energy Agency (IEA) has effectively declared fossil fuels to be 'stranded assets' due to declining use of fossil fuels in the future.**
>
> **IEA**
>
> **'Net Zero by 2050', 2021**

7 www.ghgprotocol.org

3 Definitions: emissions & reporting

Scope 1: Direct emissions

These are emissions that a site directly causes and controls. In this case, the CO_2e is actually emitted either at the site or by an asset that the site controls. Typical examples are:

- Gas burnt for heating or process use on a site directly emits CO_2e at the site and is in Scope 1.
- A company car or company truck (owned or on long-term lease) directly emits CO_2e at various places but is controlled by the site.
- Leakage of refrigerants, e.g., from chillers, air conditioners or compressed air dryers, is a GHG emission at the site and controlled by the site. Special conversion factors are used for refrigerant emissions because of their high damaging effect on the atmosphere.

Scope 2: Indirect emissions from imported utilities

These are emissions from purchased electricity or other utilities, e.g. imported heat or steam. In this case, the CO_2e is not actually emitted at the site but is emitted some distance from the site by the power station that generated the electricity, heat or steam.

Scope 3: Indirect emissions

These are emissions that a company causes to occur but where it does not control the asset. Typical examples are:

- When staff travel by air then the site does not control the asset (the plane) but the journey accepts a portion of the emissions from the flight.
- All transport in vehicles owned by other organisations, e.g., trains, rental cars or commuting, where the site does not control the asset.
- Product transport where the vehicle is not owned by the company, e.g., contract transport companies.
- All emissions related to the full value chain including impact from products sold.

Emission sources and factors

The table on the right gives a list of common emission sources listed by scope. To create a carbon footprint, 'activity data', e.g., distance travelled, litres of fuel used or electricity used must be converted into equivalent CO_2e emissions. Conversion factors are available from the UK government.[8] This gives the values to be used to convert activities into CO_2e emissions.

- Sites should record and refine CO_2e emissions to quantify the carbon footprint.

Reporting

Carbon footprints should be reported for a complete year in terms of CO_2e.

Scope 1	Scope 2	Scope 3
Direct emissions (site controls the asset)	Indirect emissions from imported utilities	Indirect emissions (site does not control the asset)
Gas (process or heating) Oil (process or heating) Bottled liquid or gaseous fuels (e.g., LPG for fork lift trucks) Other fossil fuel Owned or leased cars, buses, trucks or other vehicles Process emissions Refrigerant emissions (e.g., replacement of losses due to leakage) Other direct emissions	Emissions from purchase of electricity Emissions from the import of heat or steam	Employee business travel — personal car Employee business travel — train, bus, other means Employee business travel — plane Employee business travel — rental car Employee business travel — taxi Employee commuting Water supply and disposal Product transport — where the company does not own the vehicle Waste disposal/recycling

The scopes for carbon footprinting

The three main divisions of the emissions are used to assess the total emissions from a site or company. The objective is to be consistent in collecting information. Much of the published guidance is on how to report the available data so that it can be compared with other sites and avoids issues such as 'double counting' in the production of a site carbon footprint. Calculating Scope 3 emissions for products is recommended as this can sometimes offer the best opportunities for CO_2e reductions.

Scope 3 Indirect emissions (upstream)	Scope 1 Direct emissions + Scope 2 Indirect emissions from utilities	Scope 3 Indirect emissions (downstream)
Required by GHG Protocol Product Standard	Required by GHG Protocol Corporate Standard	Required by GHG Protocol Product Standard

8 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021

How to measure carbon footprint

Preparing an initial carbon footprint will necessarily involve estimations and approximations because some of the data will not be easily available. After a site has prepared the initial carbon footprint the data collection should become part of the normal operations. It is much easier and more accurate if the data are collected continuously.

Allocating an emission to Scope 1 or Scope 3 is sometimes an area of confusion. The key issue is whether the site has control of the asset or not. Actual ownership is less important than control, e.g., emissions from a vehicle either owned or on a long-term lease are included in Scope 1 but emissions from a vehicle which is not owned by the site, e.g., a rental car, are included in Scope 3.

One of the best and simplest explanations of how to measure and report emissions is the UK government publication 'Guidance on how to measure and report your greenhouse gas emissions'.[9]

This was published in 2009 but the methodology remains the same (even if the conversion factors have changed).

Dealing with savings

The current methods are excellent at calculating embodied and operational emissions resulting from production or the complete lifecycle. They do not, however, account for products that save carbon over their life cycles. To illustrate this, reducing housing emissions requires improved insulation and this needs:

- Internal wall insulation.
- External wall insulation.
- Cavity wall insulation.
- Loft insulation.

All these methods primarily use plastics to reduce emissions as plastics often provide better thermal efficiency and superior performance than other materials, leading to emission reductions. The current calculation methods can calculate the emissions resulting from the life cycle but are incapable of calculating the carbon saved by the products, i.e., the negative or avoided emissions. This is also the case for:

- Plastics in cars or aeroplanes which reduce weight and hence fuel consumption.
- Plastic packaging which minimises damage to the product, increases the product life and avoids food waste leading to emission reductions.

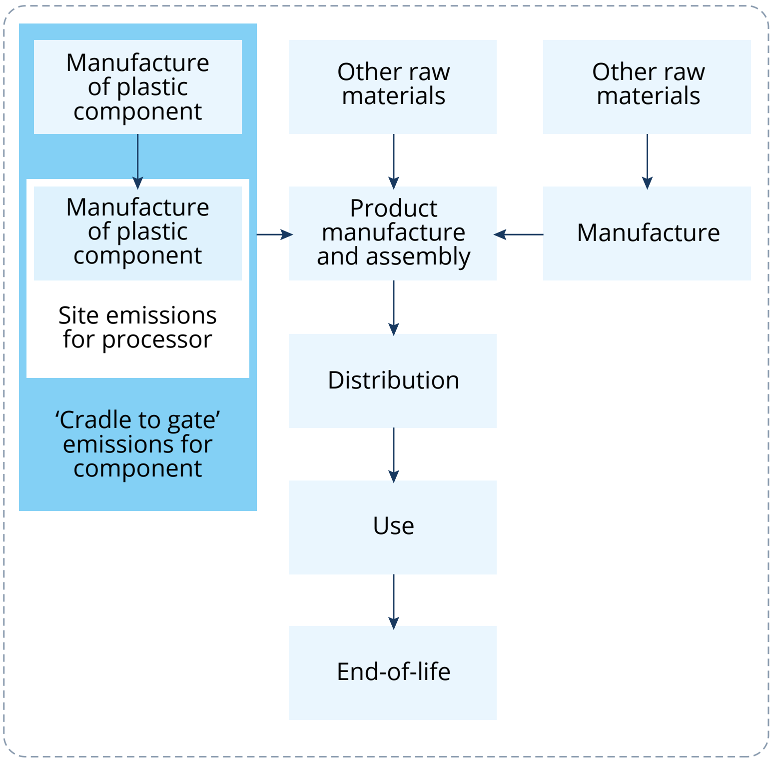
Calculating carbon avoided over the lifecycle of the product would show the contribution of plastics to achieving net zero but there is currently no methodology for doing this. This is similar to energy management where it is easy to measure 'energy used' but impossible to measure 'energy avoided'. In this case methods of measurement and verification have been developed to realistically assess actions over the complete life cycle.[10]

This concept is similar to the 'negawatts' concept developed by Amory Lovins to describe energy savings from energy efficiency actions.

The difference between site and product emissions

Emissions can be tracked at several different levels, at the site, to the factory gate, over the complete product life cycle or in the full value chain of a company. A low or no-carbon product should only be defined in terms of the complete life cycle to ensure that the total emissions are included.

'Cradle to grave' emissions for product with plastic component



9 https://www.gov.uk/government/publications/guidance-on-how-to-measure-and-report-your-greenhouse-gas-emissions

10 International Performance Measurement and Verification Protocol (IPMVP)', 2016, Efficiency Valuation Organization, evo-world.org/en

4 The plastics industry

The plastics industry value chain spans a wide range of companies varying from large multi-national petrochemical companies through to small local processors and recyclers. Decarbonising and achieving net zero needs cooperation across the value chain. The difficulty of achieving net zero varies depending on the location in the value chain and the company's resources.

Raw material suppliers

The raw material suppliers to the plastics industry are primarily large petrochemical or energy companies who developed as plastics suppliers in order to extract the maximum value from the fossil fuel feedstock. The production of plastics is currently responsible for ≈ 4-6% of the world's petrochemical use.

The petrochemical feedstock is cracked to produce monomers and then the polymers which are compounded, tuned and converted to granules or powder to meet specific needs. This is normally carried out by the petrochemical company or a subsidiary.

The use of fossil-based sources means that the raw material has an embodied carbon of ≈ 2.5 kg CO_2e/kg plastic (this varies with the specific plastic and the processing method).

Processors

Plastics processors convert granules or powder into components using processes such as extrusion, injection moulding or blow moulding. Processors range in size from multi-national processors with multiple sites through to smaller local processors with a single site.

The processes vary in energy intensity, e.g., film extrusion is ≈ 1.35 kg CO_2e/kg, injection moulding is ≈ 3.12kg CO_2e/kg and rotational moulding is ≈ 5.8 kg CO_2e/kg. The global average for plastics processing is ≈ 2.9 kg CO_2e/kg processed but this is sensitive to the process and to the production rate. This does not include the embodied carbon in the raw material.

Plastics processing is already electrified for the main processes (including most process heat generation). This means that decarbonisation of the supply side will effectively do the 'heavy lifting' for many processors.

End-of-life

Improvements in the end-of-life treatment of plastics through improved recycling rates have the advantage of decreasing emissions and improving circularity of plastics. Using recycled plastics can reduce the embodied carbon of the material at the input stage to processing from ≈ 2.5 kg CO_2e/kg plastic (see above) to ≈ 0.5kg CO_2e/kg plastic. This is an 80% reduction in the emissions but is only for the raw materials phase.

Processors – Actions

The manufacturing phase of the product life cycle can be responsible for 5–36% of the total emissions for typical products. This means processors need to think about the complete life cycle of the product and not simply about the manufacturing stage.

How are we going to get there?

> **...about half the reductions to get to net zero emissions by 2050 will need to come from technologies that are not yet ready for market today.**
>
> **FATIH BIROL**
>
> **Executive Director of IEA**
> **23 April 2021**

Become carbon neutral

Carbon neutrality as defined by PAS 2060 can be implemented to reduce the net site (operational) emissions across Scope 1 and 2. Carbon neutrality is not the same as net zero, but can provide a transition to net zero.

Reduce energy use

Decarbonisation of the electricity system will help processors achieve net zero but reducing the absolute demand for electricity is an essential action.

Use renewable energy sources

The potential for on-site renewables at many plastics processing sites is somewhat limited due to geographical considerations, i.e., available space, but for some this can be a viable option to reduce grid use and even to export to the grid. The current cost of renewables installations requires sites and companies to take a longer-term view of the investment required.

Reduce absolute materials use

Every material comes with embodied carbon in some shape or form. Absolute materials use can be reduced through:

- Reduced materials content, e.g., lightweighting, combining parts or reducing the part count.
- Reduced production use, e.g., improved quality, internal re-use or production controls.

Either route will reduce the embodied carbon entering the site.

Reduce climate impact of raw materials

Recycled materials can greatly reduce embodied carbon in products.

This may also involve schemes to recover materials at end-of-life, e.g., PVC-U.

Bio-based materials present an opportunity to remove fossil-based feedstocks from the life cycle. However, not all biobased materials are low carbon and LCAs should be utilised.

Reduce gas use

At the processor level, except for rotational moulding, the main direct use of fossil fuels is for gas in site heating. (This will be low in comparison to other emissions (≈ < 2%))

Reduce transport impacts

Product transport in the sector is primarily by road transport, i.e., HGV and vans, and these are responsible for ≈ 5% of the total UK emissions. For most sites this will be contracted transport (Scope 3 emissions) and (depending on the customer locations) these emissions will be 5-10%.

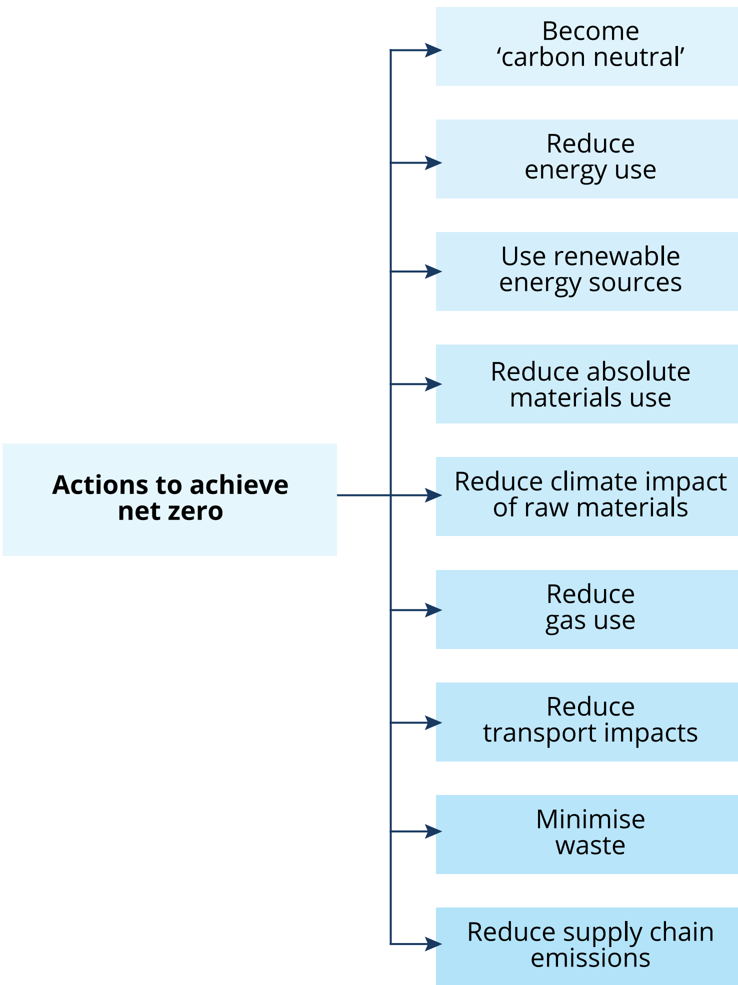
Minimise waste

Plastics processing also uses packaging, oil and hydraulic fluids, water and a range of other consumables. Minimising waste of every resource will be necessary.

Reduce supply chain emissions

Achieving net zero will involve dealing with indirect emissions (Scope 3 emissions) and this will need cooperation up and down the supply chain.

The actions to reach Net Zero



5 Planning and setting targets

Setting targets

There is a rapidly increasing number of schemes and opportunities for target setting and promotion of progress towards net zero. These are being promoted vigorously by climate action groups to encourage companies to commit or make pledges to achieve net zero. There is some cross-over between many of these but the two main schemes are described below:

Science-based targets

The concept of 'science-based targets' has been developed by the Science Based Targets initiative (SBTi). This is a partnership between CDP (formerly the Carbon Disclosure Project), the United Nations Global Compact (UNGC), World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). SBTi encourages companies to set emissions targets to avoid the impacts of climate change in line with the ambitions of the Paris Agreement. It does not specifically prescribe what actions companies should take as this is up to the companies to define but it does provide oversight of the targets and their alignment with climate science.

SBTi has produced some excellent resources on how to set science based targets and these should be consulted to inform companies net zero targets.[11]

The process can be divided into 5 steps as follows:

STEP 1

Commit to setting a science based target

This involves sending a commitment letter to SBTi. The company is then listed as 'committed' on various web sites.

STEP 2

Develop a target

After commitment, companies have 24 months to develop, submit and communicate targets in line with the SBTi criteria. There are specific criteria for some industry sectors but plastics processing companies can use the general SBTi criteria.

STEP 3

Submit the target for validation

The developed targets are submitted to SBTi which evaluates the targets against science based criteria and provides feedback. The SBTi validation service is not free and currently costs ≈ USD 5,000 for large companies. For SMEs (< 500 employees), there is a streamlined process to reduce the burden on the company which costs ≈ USD 1,000.

STEP 4

Communicate the target

After validation, the targets must be made public within 6 months and SBTi will publish the targets after one month unless otherwise instructed.

STEP 5

Disclose the progress

Progress and emissions must then be disclosed annually to monitor progress. Disclosure can be via annual reports, websites or externally via CDP.

SBTi and Race to Zero target setting processes

The SBTi and Race to Zero target setting processes are very similar. Both ask companies to commit/pledge before planning or developing a target.

SBTi process	Race to Zero process
Commit to a science based target ↓	Pledge ↓
Develop a target ↓	Plan ↓
Submit target for validation ↓	Proceed ↓
Communicate the target ↓	Publish
Disclose progress	

Science-based targets
www.sciencebasedtargets.org

Race to Zero
unfccc.int/climateaction/race-to-zerocampaign

11 'SBTi Corporate Manual', June 2021, Science Based Targets, sciencebasedtargets.org/resources/files/SBTi-Corporate-Manual-v1.1.pdf
'How to guide for setting science based targets', April 2021, Science Based Targets, sciencebasedtargets.org/resources/files/SBTi-How-To-Guide-1.pdf.
'SBTi Criteria and Recommendations', April 2021, , Science Based Targets, https://sciencebasedtargets.org/resources/files/SBTi-criteria-V4.1.pdf

Race to Zero

Race to Zero is a global campaign to encourage companies to take rapid action to halve global emissions by 2030 and to deliver net zero by 2050. The process can be divided into 4 steps as follows:

STEP 1
Pledge
This requires a pledge made by the head of the company to achieve net zero as soon as possible (by 2050 at the latest) to limit global warming to 1.5°C. The pledge should include an interim target to reduce emissions by 50% by 2030.

STEP 2
Plan
A plan should be developed within 12 months of the pledge to describe the short, medium and long-term actions to be taken to achieve interim and long-term pledges.

STEP 3
Proceed
Plans are not enough and companies need to take action and follow their plans to deliver their pledges.

STEP 4
Publish
Companies commit to at least annual reporting on the actions and progress towards the targets. These reports should be via public platforms for transparency, e.g., platforms feeding into the UNFCCC Global Climate Action Portal.

Companies can choose either of these processes but the important thing is to start the journey as soon as possible. The costs will only increase with delay.

- Plans for net zero can include offsetting but should not delay decarbonisation and be used only for residual emission or economically unfeasible to abate emission sources.
- There are many terms and concepts used in the net zero field and some of these are further explained in special guides.[12]

Don't make a pledge without a plan

Both SBTi and Race to Zero require a company to commit or pledge to reduce emissions before starting the work of developing a target or strategy. In many cases, and rightly so, companies will be reluctant to make a commitment or pledge to a 30-year undertaking before producing a plan and testing the viability (and costs) of the plan. Companies have multiple stakeholders and must demonstrate a business and/or social case for any action.

This should never be an excuse not to act, the pressures and risks are too great for inaction.

Companies are advised to plan carefully and implement wisely. This is a 30-year programme, if we start out in the wrong direction then the efforts will potentially be wasted. The science and landscape of net zero are developing and improving rapidly to enable companies to take action.

Achieving net zero will be a transformative experience for every company and they will approach it in different ways.

- No matter what the pressures, companies are advised not to 'make a pledge without a plan'.
- The trajectory to net zero will vary greatly across companies however, timely planning is imperative for all.

Net zero is still part of sustainability

Achieving net zero is an immensely important topic with world-wide ramifications but it is still a sub-set of the overall sustainability agenda.

The specific actions taken by a company to achieve net zero will inevitably advance the company's sustainability credentials but companies should remember that sustainability is much broader than net zero.

12 'Race to Zero Lexicon', April 2021, Race to Zero, racetozero.unfccc.int/wp-content/uploads/2021/04/Race-to-Zero-Lexicon-1.pdf

6 Conclusion

Climate change is undoubtedly the most pressing environmental issue that humanity is being confronted with. The UK has been at the forefront of setting legislation on net zero to achieve decarbonisation in line with the goals of the Paris Agreement. Similarly, all industrial sectors in the UK need to demonstrate willingness and support to make this goal a reality.

The plastics industry is one of the great manufacturing strengths of the UK providing solutions and enabling technologies for all the other economic sectors to thrive. From manufacturing to end of life, plastics contribute to greenhouse gas emissions, however, at the same time, plastics are indispensable in so many sectors from packaging, pharmaceutical, transport and construction. Plastics also enable low carbon technologies while contributing to emissions savings through their use in insulation, automotive sector, renewable energies and avoiding food waste.

The industry needs to demonstrate its contribution towards decarbonisation and the BPF will pursue this goal together with its members across the entire plastics value chain.

Abbreviations and acronyms

BSI	British Standards Institution
CO_2e	Carbon Dioxide Equivalent
CCUS	Carbon Capture Usage and Storage
CDP	Carbon Disclosure Project (now just CDP)
DAC	Direct Air Capture
EV	Electric Vehicle
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
HBRF	High Blend Renewable Fuels
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
PAS	Publicly Available Specification from BSI
QES	Qualifying Explanatory Statement
RTFO	Renewable Transport Fuel Obligation
SBTi	Science Based Targets initiative
SECR	Streamlined Energy and Carbon Reporting
UNGC	United Nations Global Compact
WRI	World Resources Institute
WWF	World Wide Fund for Nature

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