

**Closing the loop:**  
Viridor's roadmap  
to a truly circular  
plastics economy

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# Executive summary

The way we extract, consume and dispose of materials has a major impact on our carbon footprint. Too often the circular economy is seen as a separate part of the environmental debate. But it is not. Living in balance with the planet requires us to build a world where nothing goes to waste. This is our plan to lead the way.

Against the backdrop of COP26 governments and companies have been lining up to make net zero commitments to deliver the goals of the Paris Agreement. In the UK, the Government has committed to banning petrol and diesel cars by 2030, decarbonising our electricity supply and phasing out gas boilers by 2035, changes that would have been unthinkable just a few years ago.

Yet, to meet net zero, this is not enough. We need to expand the debate beyond heat pumps, renewables and electric vehicles, important though they are. Transformation is needed across all sectors of the economy. In particular, our consumption of products in a 'take, make, use, lose' society.

The circular economy – ensuring the products we use stay in use or are reused for as long as possible to minimise waste – is often treated separately from the climate debate. But the wasteful use of products generates significant greenhouse gas (GHG) emissions in extraction, manufacture and disposal. As Viridor has developed our Environmental, Social and Governance (ESG) strategy, the case for us to address climate and circularity together has become overwhelming.

Recycling materials displaces the need to generate new, or virgin, products with higher embedded emissions. Removing those materials from the waste stream also avoids the GHG emissions associated with their disposal. This is particularly

true for plastics, where current levels of recycling have resulted in the plastic content of the residual waste stream accounting for about 70% of the fossil carbon footprint of an energy from waste (EfW) plant. Finally, the production of virgin plastic generates lifecycle emissions up to 6 times greater than recycled plastics<sup>2</sup>.

At Viridor, we are focussed on plastics recycling and reprocessing as a key area for improvement – both in reducing GHG emissions and addressing the ecological harm of plastic in the environment. There are key challenges limiting a more circular plastics economy:

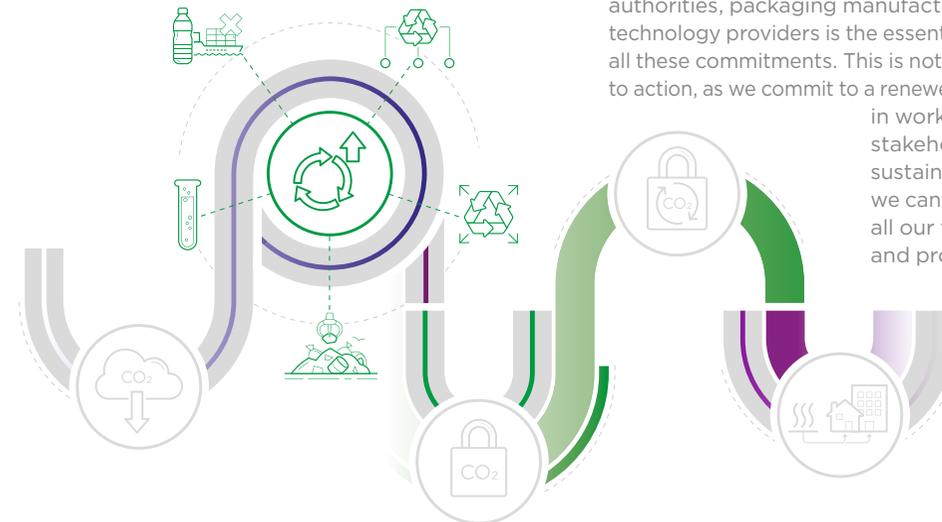
- 1. Exports of plastic waste which could be recycled and reprocessed domestically;**
- 2. Widespread use of non-recyclable plastics;**
- 3. Too low recycling levels of recyclable plastics, especially some such as plastic film;**
- 4. Lack of scale for chemical recycling to complement mechanical recycling and to deliver infinite recyclability;**
- 5. Lack of technology to produce fully circular recycling (e.g., returning plastics used in food packaging back to food-grade recycled materials for some plastics).**

We have identified five key commitments that Viridor will make to address these issues and help create a more circular plastic economy a reality:

- 1. End plastic waste export**
- 2. Drive an infrastructure market for recycling**
- 3. Expand operations to hard-to-recycle materials**
- 4. Extract plastics from general waste and drive novel reprocessing techniques**
- 5. Drive innovation and regulatory improvement to achieve complete plastic circularity**

**Building from these commitments, Viridor will end our export of plastic waste and focus on reprocessing all four major forms of plastics, working with industry and Government to achieve fully circular recycling for polyethylene terephthalate (PET), high- and low-density polyethylene (HDPE and LDPE) and polypropylene (PP) by 2025. Using CO<sub>2</sub> captured from our EfW plants we will target the end of plastic dependency on fossil fuels by 2040.**

The resources and waste industry deals with what everyone else no longer wants or needs. There is little control over what we receive and our ability to deliver these ambitions depends substantially on the actions of others. Partnership with the Government, local authorities, packaging manufacturers, innovators and technology providers is the essential element to achieve all these commitments. This is not an excuse, but a drive to action, as we commit to a renewed ambition and vigour in working across all these stakeholders to build the sustainable society we know we can achieve and on which all our future well-being and prosperity depends.



<sup>1</sup>Doughnut Economics: Seven Ways to Think Like a 21st Century Economist, Kate Raworth, (2017).

<sup>2</sup>Virgin plastics – 2.4 tCO<sub>2</sub>e/tonne; recycled plastics – 0.4 tCO<sub>2</sub>e/tonne. Material Economics, The Circular Economy – a Powerful Force for Climate Mitigation, [www.materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1](http://www.materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1)

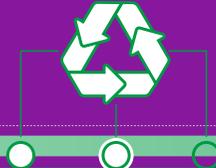
# Our commitments



## End plastic waste export

Recycling and reprocessing in the UK ensures the best traceability of materials from disposal to new raw material. It also ensures that those who pay for recycling (consumers) see the economic benefit from local jobs and investment. To drive ending plastic waste export, we will:

- **Open our new Avonmouth Polymers reprocessing plant, bringing onstream the capacity to end Viridor's bulk export of plastic waste, which represents up to 8% of total UK waste plastic export.**
- **Expand operations, with an ambition to invest in new plastic recycling and reprocessing facilities.**
- **Promote a ban on plastic waste export aligned with policy to enable reprocessing infrastructure to be built in the UK.**



## Drive an infrastructure market for recycling

The UK recycling sector is severely hampered by volatile prices and short-term contracts. This undermines investment and technology development (as minimising the cost of building is required to help minimise the risk). Systemic change is needed and to drive this, we will:

- **Work with current policy reforms, Government and regulators to create an infrastructure investment environment in recycling and reprocessing to deliver increased UK based recycling rates and quality.**
- **Promote a ban on the routine use of all but the four most recyclable plastics on the market.**



## Expand operations to hard-to-recycle materials

The pots, tubs and trays in food packaging recycling rate is far below that for bottles. Plastic films have a collection rate for recycling just 7%<sup>3</sup> and represent the greatest area of opportunity for increasing circularity and cutting carbon. We will:

- **Actively seek to expand Viridor's operations to cover LDPE film achieving all four major plastics recycling within our operations.**
- **Promote, including in partnerships like Plastics Pact, the inclusion of plastic films in 'Consistent Collections' from the start.**
- **Work with our supply chain to identify better recycling solutions for pots, tubs and trays materials.**



## Extract plastics from general waste and drive novel reprocessing techniques

Even with increased recycling rates, the content of plastics in the non-recycled waste stream is expected to remain at c. 16%<sup>4</sup>. Those plastics make up to 70% of the fossil emissions of an energy from waste (EfW) plant. Extracting and recycling these plastics could deliver a double win for the resources and waste sector (increasing recycling and reducing the fossil GHG emissions). The circular economy will only be realised if materials are returned to the market for the same uses after reprocessing as they had before – this is closed-loop recycling, and we want to see this rise. We will:

- **Trial and expand plastic removal from material destined for our EfW plants.**
- **Work with Government and the regulator to achieve a recognised 'end-of-waste' status for effective chemical recycling.**
- **Continue to explore and partner with third parties on chemical recycling.**



## Drive innovation and regulatory improvement to achieve complete plastic circularity

Plastics deliver a great deal of good by prolonging food shelf life and cutting down waste. A combination of regulatory and technology limitations prevents plastics from being infinitely recycled and returned back to the material grade delivered at first production (e.g., food-grade). We will:

- **Work with technology partners and the supply chain to develop ways to convert pots, tubs and trays back into food-grade materials.**
- **Achieve food-grade reprocessing in PET at all our reprocessing plants.**
- **Work with Government and the regulator to achieve a more equitable system for achieving food-grade PP and HDPE. Targeting circularity in all four plastics by 2025.**
- **Monitor technology development for uses of CO<sub>2</sub> as a basis for new virgin polymer to replace current fossil-based alternatives with a target date of 2040 for ending fossil dependency.**

<sup>3</sup>UK Household Plastics Collection Survey 2020, Recoup, [www.recoup.org/p/380/uk-household-plastics-collection-survey-2020](http://www.recoup.org/p/380/uk-household-plastics-collection-survey-2020)

<sup>4</sup>Greenhouse Gas and Air Quality Impacts of Incineration and Landfill, Eunomia, 2020, [www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill/](http://www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill/)

# Introduction

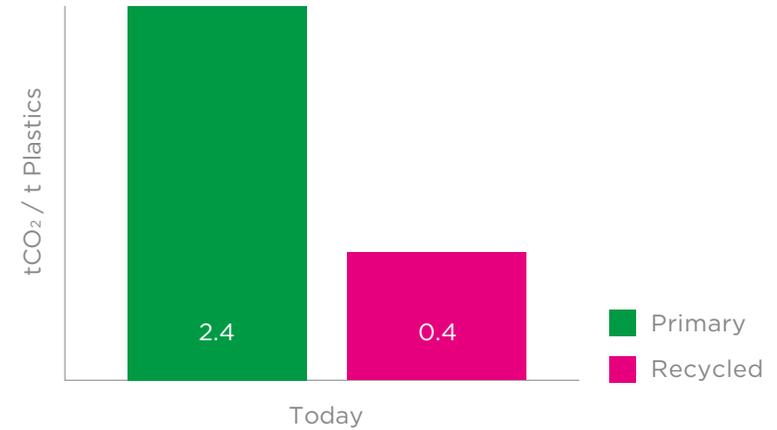
Climate change rightly continues to dominate the world of ESG<sup>5</sup>. A recent report by the Intergovernmental Panel on Climate Change (IPCC)<sup>6</sup> states in the starkest terms that the world has deviated from the course of maintaining the benign and stable climate that has enabled humanity to develop and flourish.

As fossil fuels are the principal driver of climate change, much of the focus is on our everyday energy use. While understandable, this often misses out the embedded fossil emissions of the things we use. Zero Waste Scotland estimates that 80% of the emissions generated by the Scottish population are consumption emissions, coming from the goods and materials produced, used and often thrown away after just one use<sup>7</sup>. A focus on the energy we use to power and heat our homes and offices can unintentionally omit a major source of GHG emissions – the products made in a linear ‘take, make, use, lose’<sup>8</sup> - society. The transformation to a circular economy requires talking about both resource use and climate change; a focus on the products we use, as well as the energy that powers our daily lives. Building an increasingly circular economy is, therefore, not a sideshow in successful climate policy but integral to it. A circular economy is also an essential foundation to sustainably managing the extraction and use of limited planetary resources. The uncontrolled use of virgin materials is associated with land use change and, often, severe harm driving ecological decline.

**Viridor’s ESG strategy is based around two, inextricably linked, central pillars – carbon and circularity; the areas where we have the greatest ability to drive the greatest change.**

The linking of climate and circularity is key. For example, increasing plastic recycling diverts the material from the energy recovery process. This reduces fossil GHG emissions from the energy recovery process as plastic, while less than a fifth of municipal waste<sup>9</sup>, accounts for over 70% of the fossil GHG emissions produced by the EfW plants. Recycling displaces the use of virgin plastic and, as a result, reduces fossil GHG emissions associated with the production of new material (Figure 1).

Figure 1: Carbon emissions from primary and recycled materials<sup>10</sup>



<sup>5</sup> ESG stands for Environmental, Social and Governance.

<sup>6</sup> Climate Change 2021, The Physical Science Basis, IPCC, [www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Full\\_Report.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf)

<sup>7</sup> The Carbon Footprint of Scotland’s Waste – Carbon Metric Technical Report for 2017 and 2018, Zero Waste Scotland, [www.zerowastescotland.org.uk/press-release/carbon-impact-scotland%E2%80%99s-waste-reaches-record-low-%E2%80%98more-needs-be-done%E2%80%99](http://www.zerowastescotland.org.uk/press-release/carbon-impact-scotland%E2%80%99s-waste-reaches-record-low-%E2%80%98more-needs-be-done%E2%80%99)

<sup>8</sup> Doughnut Economics: Seven Ways to Think Like a 21st Century Economist, Kate Raworth, (2017)

<sup>9</sup> Greenhouse Gas and Air Quality Impacts of Incineration and Landfill, Eunomia, 2020, [www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill/](http://www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill/)

<sup>10</sup> Material Economics, The Circular Economy – a Powerful Force for Climate Mitigation, [www.materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1](http://www.materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1)

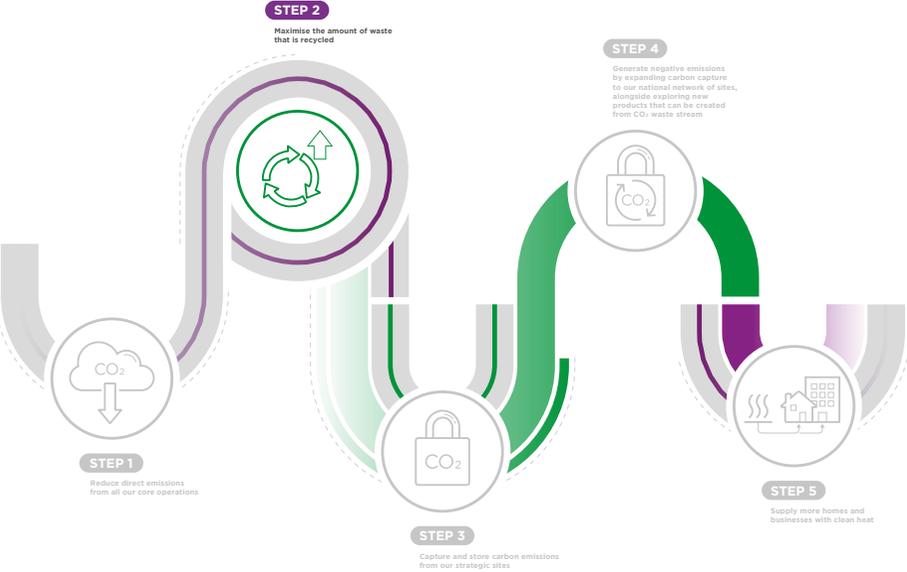
# Introduction

Recognising the carbon and circularity interdependency, Viridor’s commitment to circularity forms a critical and integral part of our 5-step decarbonisation plan.

The second step of our decarbonisation ambition - Maximise the amount of waste that is recycled - is focussed on an increasingly circular plastics economy to avoid GHG emissions associated with virgin material production and driving down the fossil content of non-recyclable waste (Figure 2). This integration ensures that any synergies can be exploited, and potential conflicts mitigated. Critically, this approach will take place in line with the waste hierarchy - driving down waste and increasing recycling before disposal is explored.

Our sector exists to ensure safe and effective processing of waste, focussed more than ever before on tackling climate change and improving resource use. By integrating climate and circularity as the two pillars of our ESG strategy, we can ensure that **Viridor is leading the change that builds a world where nothing goes to waste.**

Figure 2: Viridor’s Roadmap to net zero and net negative emissions



## Recycling and carbon accounting

How and where GHG emissions are reported is controlled through an international set of rules collectively known as carbon accounting. The resources and waste sector experiences a carbon accounting challenge that can stand in the way of companies taking the right actions.

All direct GHG emissions caused by our operations – such as EfW and landfill, as well as energy used to operate our reprocessing facilities fall within scope 1 and 2 emissions (those considered as being under our control). Increasing recycling, therefore increases the GHG emissions within those specific reporting categories.

However, recycling materials reduces both resource use and GHG emissions associated with production. This benefit although accrues to the seller of the packaging (e.g., the packaging milk or drinks manufacturer) rather than the recycler. In 2018 the GHG emissions avoided by the resources and waste sector were considerably exceeding the emissions from those activities (-50Mt CO<sub>2</sub>e saved and -36Mt CO<sub>2</sub>e emitted).<sup>11</sup>

Driving the circular economy will therefore reduce overall GHG emissions but could increase the accounted scope 1 and 2 emissions for the resources and waste sector. As such, a review of carbon accounting for this sector to ensure it drives the right action would be valuable. We need a system that rewards all those in the supply chain who work to reduce the emissions rather than just one entity. Working with sector bodies and NGOs, Viridor will engage with the Government to encourage it to introduce the best carbon accounting to ensure that the right behaviours are incentivised, and what happens on the ground can be reflected in the benefit accrued by those making the right decisions.

<sup>11</sup> Ricardo, Quantification of greenhouse gas emissions from recycling and waste management activities in the UK, 2021, [www.esauk.org/application/files/7816/2911/4009/ESA\\_GHG\\_Quantification\\_Final\\_Report\\_23\\_06\\_2020\\_Issued.pdf](http://www.esauk.org/application/files/7816/2911/4009/ESA_GHG_Quantification_Final_Report_23_06_2020_Issued.pdf)

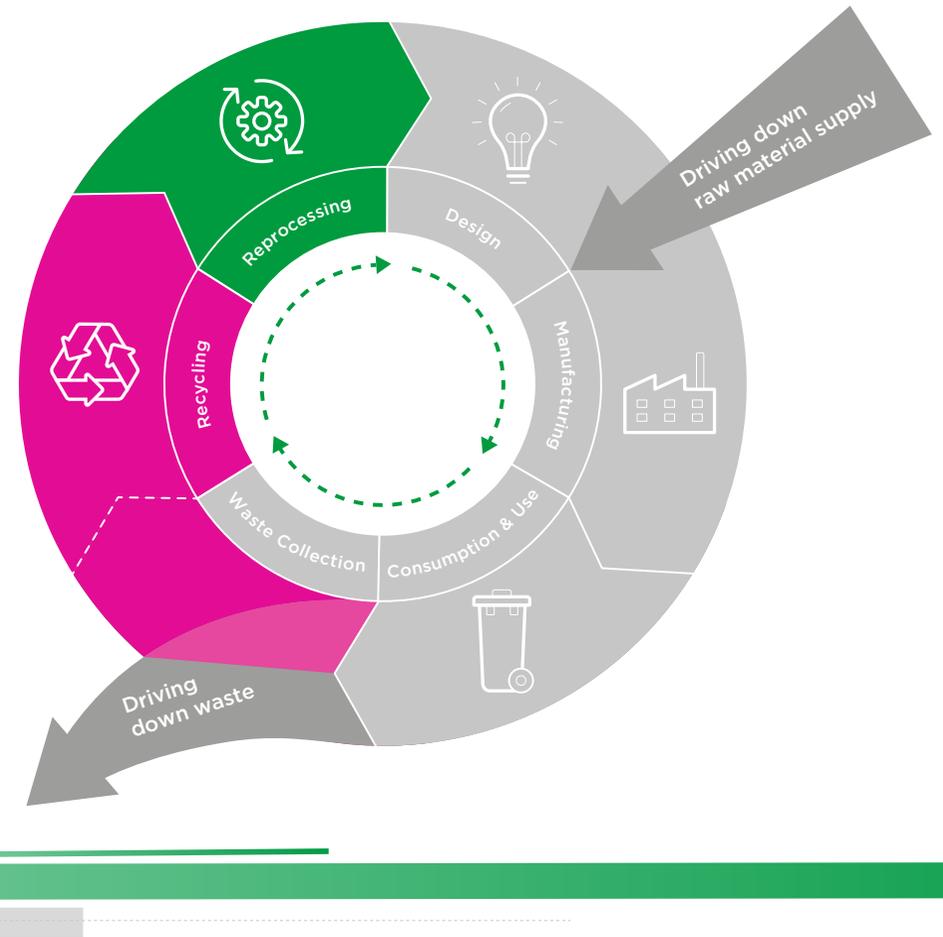
# Context

The resources and waste sector faces critical and growing pressures to respond to two key environmental impacts that us humans are having on our planet: climate change and unsustainable resource use.

Ultimately, addressing these impacts is driving at the same goal – creating a world where business operates within the ecological limits of the planet. As a business operating in a sector that exists as a response to environmental concerns, it is right and necessary that we lead on driving the structural changes needed to create a sustainable ecological footprint. Neither Viridor, nor any other actor in the resources and waste sector is yet at this place and this transformation will define our sector for the decades ahead.

A circular economy is about driving down the use of new, or virgin, resources and reducing waste (Figure 3). This can be achieved in two ways – firstly, by making products that last for longer and can be reconditioned or repurposed to prevent generation of waste, and secondly, by maximising recycling of those materials whose life really has come to its useful end.

**Figure 3:** Building the circular economy



## What success looks like

International examples show that where policy is effective, a circular economy can thrive. In Japan, a focus on metals recovery has resulted in an extraordinary 98% metal recycling rate.<sup>12</sup>

Circularity is a well embedded concept in Japanese culture, driven in large part by the country’s geological and geographical constraints, as well as its status as a major industrial producer despite very limited domestic mineral and metal resources. The circular economy in Japan has advanced thanks to numerous policies and laws implemented since the 1970s, but the greatest progress in its legislation occurred in the 2000s, with the passage of the Law for the Promotion of Efficient Utilisation of Resources, and the upgrade of the 1998 Home Appliance Recycling Act through the passage of the 2012 Small Home Appliance Recycling Act. Both encouraged recycling of the great majority of electrical and electronic products, resulting in the recovery of

between 74% and 89% of materials, which are in turn sent directly to manufacturers of those same products, thereby effectively closing the loop.

The circularity forms such an important part of the Japanese economy, that it is measured through different national indicators, including the GDP, industry-specific targets, as well as indicators of societal effort to achieve circularity.

The UK Government, responding to stalling recycling rates, is undertaking major reform of recycling policy and has set a new recycling target of 65% by 2035<sup>13</sup> to drive the UK towards a more circular economy. The Climate Change Committee has indicated that a more ambitious 68% target by 2030<sup>14</sup> is achievable (for England) and, for plastics, Viridor is a founding member of the WRAP Plastics Pact, which targets 70% by just 2025.<sup>15</sup>

<sup>12</sup> The Institution of Environmental Sciences, [www.the-ies.org/analysis/circular-economy-japan](http://www.the-ies.org/analysis/circular-economy-japan)

<sup>13</sup> Circular Economy Package policy statement, July 2020; [www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement](http://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement)

<sup>14</sup> Climate Change Committee, Joint Recommendations, 2021 Report to Parliament; [www.theccc.org.uk/publication/2021-progress-report-to-parliament/](http://www.theccc.org.uk/publication/2021-progress-report-to-parliament/)

<sup>15</sup> WRAP, Our plan for sustainable planet; [wrap.org.uk/sites/default/files/2020-12/OUR-PLAN-FOR-A-SUSTAINABLE-PLANET.pdf](http://wrap.org.uk/sites/default/files/2020-12/OUR-PLAN-FOR-A-SUSTAINABLE-PLANET.pdf)

# Context

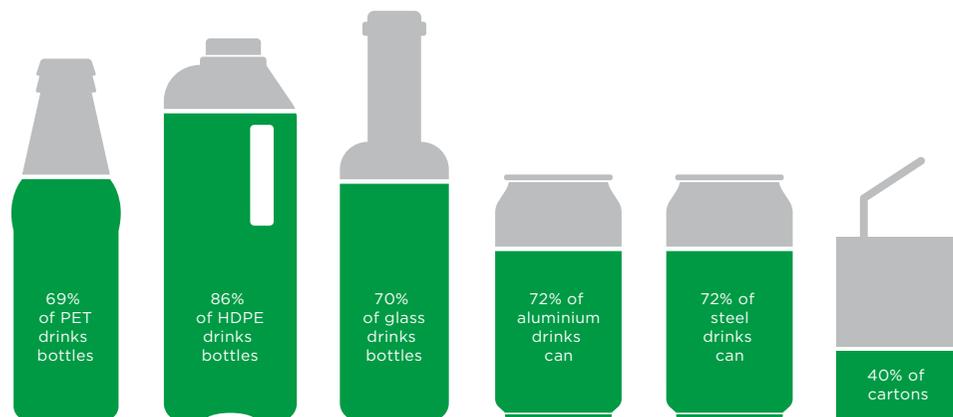
The need to reduce resource use is set out in the United Nations' 12th Sustainable Development Goal of 'responsible consumption and production'. Businesses are responding to this increased focus.

Consumer brands are making commitments to increase recycled content in packaging as well as exploring alternative materials to reduce their environmental impact. Supermarkets are collecting plastic films for recycling and stocking loose products for customers to fill their own containers to cut down on unnecessary packaging.

These examples are encouraging, but also demonstrate the integrated nature of the supply chains required to achieve a truly circular economy – from product packaging, waste minimisation policies at the point of sale, the recycling collections at home, work and on the go and finally the sorting

and reprocessing of that material to be introduced back into the circular economy. **Building a world where nothing goes to waste cannot be achieved in isolation.** While, growing public concern about pollution and climate change is driving action across the private sector, including in the resources and waste sector, the scale of change needed will only be realised by the full value chain working together. As a sector whose economics are driven by policy, there is a critical and valuable role that Governments national and local can play in helping to build this integrated circular economy, spanning the gaps between companies and sectors.

Figure 4: Drinks container recycling rates, UK 2017<sup>16</sup>



## The role of trust

Everyday householders sort their waste into recyclable and non-recyclable portions. We do not pay or reward them, nor are there any significant penalties for not recycling, but the entire supply chain from manufacturers through to reprocessors depends on this behaviour.

Ultimately, households do this for two reasons: they believe it is the right thing to do, and we make it easy enough for them through provision of separate bins, labelling and guidance. But as people, who are also customers and voters, become increasingly concerned about the environment, an ever-greater focus on what happens to their recycling is inevitable. This is already being seen in concerns over waste plastic exports and recycling practises in general. One response that is already being seen, and could become more significant, is a move away from some materials, in particular plastics, and onto other materials with a potentially greater environmental impact. While driving down unnecessary plastics is certainly critical, there are many situations where plastic combined with recycling and reprocessing remains the lowest environmental

impact option. If we do not create a truly circular economy for plastics, where consumers can trust that what they recycle is reprocessed and returned to the economy, the risk of moving away from plastics will grow and, perversely, increase environmental harm. This is already happening in the alternative milk market. Often associated with low environmental impact diets, alternative milks are almost exclusively packaged in sealed cardboard packaging. This packaging which is a composite of paper, plastic film, metal foil and a plastic cap, is far less recyclable than its plastic bottle alternative (86% of HDPE drink bottles are recycled versus 40% of cartons; Figure 4). Ensuring growing consumer confidence for the cradle-to-cradle use of materials, especially plastics, is key to helping the UK economy achieve both circularity and net zero emissions.

<sup>16</sup> Valpak analysis of Valpak data, Flow Reports, National Packaging Waste Database, Recoup and Alupro (2017); [www.valpak.co.uk/docs/default-source/environmental-consulting/databite-no-3-2017-update---drinks-container-recycling-rates.pdf?sfvrsn=37616410\\_0](http://www.valpak.co.uk/docs/default-source/environmental-consulting/databite-no-3-2017-update---drinks-container-recycling-rates.pdf?sfvrsn=37616410_0)

# Viridor's vision for plastics recycling and reprocessing

The Climate Change Committee (CCC) assesses that a 68% recycling rate by 2030, covering all wastes, is both achievable and necessary to meet the UK's net zero goal<sup>17</sup>.

Currently, recycling and other recovery for all waste categories sits at below 50%<sup>18</sup>. For some materials, such as plastic films, collection rates for recycling remain extremely low at c. 7% of the 311,000 tonnes placed on the market<sup>19</sup>.

Viridor has focussed its efforts on plastics recycling and reprocessing for two reasons. Firstly, diversion of plastics from the general waste stream reduces our EfW facilities' fossil GHG footprint and increases the capacity available to process non-recyclable lower carbon content waste. This in turn limits the number of EfW facilities needed to meet UK non-recyclable waste demand, while also driving up landfill diversion. Such plastic diversion improves the economics of energy recovery while simultaneously reducing its environmental impacts.

Secondly, while plastic recycling rates for drink (PET) and milk bottles (HDPE) are high (69% and 86% respectively), recycling rates for other packaging such as pots, tubs and trays, as well as the bottles found in the bathroom of every household, or plastic films are far lower. In addition, some of these plastics do not yet achieve full closed-loop status – for example polypropylene (PP), from which bottle tops are made, cannot yet be recycled back to food-grade material. Achieving the UK's circularity and carbon goals depends on continuously increasing recycling rates and closing the recycling loop. Doing so presents a potentially significant market, investment and jobs creation opportunity in increasing UK-based plastics recycling and reprocessing.

**Viridor's ambition is, therefore, to end our export of plastic waste and focus on reprocessing all four major forms of plastics, working with industry and Government to achieve fully circular recycling for polyethylene terephthalate (PET), high-and low-density polyethylene (HDPE and LDPE) and polypropylene (PP) by 2025. Using CO<sub>2</sub> captured from our EfW plants we will target the end of plastic dependency on fossil fuels by 2040.**

Achieving this goal requires a systemic approach, aligning the goals of the public sector with those of business and wider society.

**Viridor's 5 areas of focus to help make this a reality are a combination of company-focused and wider policy goals to help bring about a fully circular market for these four commodities:**



<sup>17</sup> Joint Recommendations, 2021 Report to Parliament, Climate Change Committee, [www.theccc.org.uk/wp-content/uploads/2021/06/CCC-Joint-Recommendations-2021-Report-to-Parliament.pdf](http://www.theccc.org.uk/wp-content/uploads/2021/06/CCC-Joint-Recommendations-2021-Report-to-Parliament.pdf)

<sup>18</sup> 45.4% excluding incinerator bottom ash metal (IBAm) recovery and 46.2% including IBAm recovery, [www.gov.uk/government/statistics/uk-waste-data](http://www.gov.uk/government/statistics/uk-waste-data)

<sup>19</sup> UK Household Plastics Collection Survey 2020, Recoup, [www.recoup.org/p/380/uk-household-plastics-collection-survey-2020](http://www.recoup.org/p/380/uk-household-plastics-collection-survey-2020)



# 1. End plastic waste export

The Climate Change Committee recommends phasing out export of waste by 2030 at the latest, through improvements in waste prevention and domestic recycling and recovery, while strengthening tracking and enforcement to ensure that any waste exports intended for recycling are being treated appropriately.

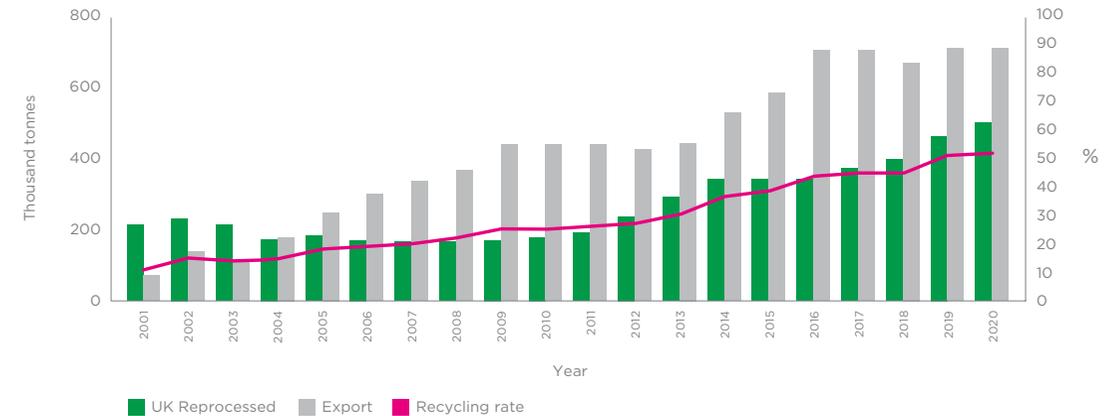
Ending plastic waste export is critical for two reasons. Firstly, as noted earlier, the entire recycling economy depends on consumer trust. Examples of where plastics waste exports have gone wrong and contributed to major pollution in other countries do enormous harm to that trust. UK based recycling and reprocessing can be more easily monitored, and regulations enforced than for exported material. Secondly, as consumers we all pay for our recycling and waste management. For that money to be reinvested in the UK, creating quality jobs across the country, it is important that where possible material is recycled and reprocessed locally. To plug this leak in the circular economy system, **we will:**

- Open our Avonmouth Polymers reprocessing plant with a capacity to reprocess 80,000 tonnes of plastics a year, thereby eliminating 89%<sup>20</sup> of Viridor’s plastic waste exports and

reducing the UK’s overall plastic waste exports by up to 8%<sup>21</sup>.

- Expand operations with an ambition to build new polymers and plastic reprocessing facilities.
- Promote a ban on plastic waste exports. To drive a circular economy, a ban needs to be aligned with policy reforms currently underway that drive the construction of new recycling and reprocessing infrastructure in the UK to meet the increased demand (Figure 5). Ending waste export and increased recycling rates have the potential to generate major UK inward investment and create jobs in construction and operation ensuring that the *economy* part of the circular economy is demonstrated across the UK. This is the subject of our second area of focus.

Figure 5: UK plastic packaging waste reprocessed locally and exported<sup>22</sup>

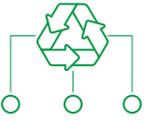


<sup>20</sup> Reducing Viridor plastic waste export from previous 35% to 4%.

<sup>21</sup> British Plastic Federation, Recycling Roadmap, www.bpf.co.uk/roadmap

<sup>22</sup> Plastics, Market situation report 2021, Plastic packaging, Wrap, www.wrap.org.uk/sites/default/files/2021-10/WRAP-Plastics-Market-Situation-Report-2021.pdf#page=7

## 2. Drive an infrastructure market for recycling



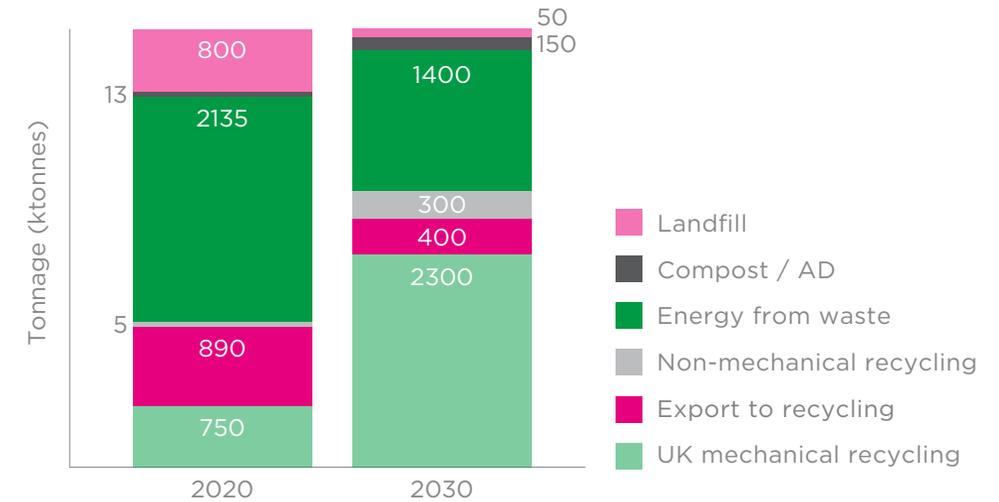
In their Recycling Roadmap, the British Plastics Federation set out a 2030 vision for UK plastic waste (Figure 6). To achieve this vision, they conclude that significant changes will be required across the whole value chain, most importantly investment in the UK recycling infrastructure to accommodate the supply of recyclable materials and stop reliance on exports.

The UK's recycling and reprocessing market is characterised by volatile commodity markets and incentive regimes, which results in short-term contracts choking strategic capital investment because of the high investment risk. This high-risk investment environment drives down capital expenditure, such that technological advances as robotics and AI are an exception not the rule. This contrasts markedly with the EfW market, where contracts are long-term, with stable revenues. The EfW technology is state-of-the-art and investment has risen sharply. Creating the same infrastructure investment environment as seen in EfW in recycling is the single biggest change for the sector that could deliver the UK recycling targets, and create both operational and construction jobs in the UK (rather than abroad). The vital reforms to recycling being driven by the Government are a key opportunity to create this market. To drive this, Viridor will work with Government and make the case for ensuring that the extended producer responsibility (EPR) scheme delivers long-term, low-volatility, infrastructure-like contracts to support investment in the critical infrastructure needed to achieve the UK's recycling targets.

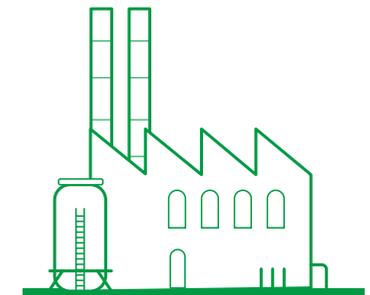
### We will:

- Work with current policy reforms, Government and regulators to create an infrastructure investment environment in recycling and reprocessing to deliver increased UK based recycling rates and quality. The Government's resources and waste strategy is a critical set of reforms which brings together new funding, ambitious targets, and supply chain wide obligations to drive up recycling rates. Ensuring that these reforms work to unlock infrastructure investment to ensure the targets are met and the reforms create UK based jobs is key. We will work closely with partners (e.g., WRAP and Green Alliance Circular Economy Task Force (CETF)) to promote a policy framework that recognises waste management infrastructure as critical to drive circularity, which aligns with climate goals.
- Promote a ban on the routine use of all but the four most recyclable plastics on the market. Expanded polystyrene (EPS), Polyvinyl chloride (PVC) and oxy-degradable plastics are among the most challenging products to recycle and should be entirely excluded from the plastics packaging

Figure 6: UK waste plastic flows 2020 and 2030 forecast<sup>23</sup>



market unless there is no realistic alternative. There are four main, widely recyclable plastic types - polyethylene terephthalate (PET), high- and low-density polyethylene (HDPE and LDPE) and polypropylene (PP). Viridor will work with Government and the supply chain to focus on these four plastics, simplify messaging to consumers, maximise recycling rates and minimise the risk of contamination, thereby driving up the quality of finished reprocessed products.



<sup>23</sup> British Plastic Federation, Recycling Roadmap, [www.bpf.co.uk/roadmap](http://www.bpf.co.uk/roadmap)



### 3. Expand operations to hard-to-recycle materials

The UK plastics recycling market is divided into three main areas – bottles, which are widely recycled; pots, tubs and trays, which have a medium recycling rate; and films, which have a very low recycling rate.

Bottles are among the most identifiable forms of plastic waste and have benefited from a focussed drive across the supply chain, thereby achieving standardisation of materials and high levels of consumer understanding and resulting in a recycling rate of over 59%. While this can rise to over 90%, through the implementation of deposit return schemes, the other sectors need more focus too.

The physical structure of pots, tubs and trays can cause low levels of recycling, particularly where the packaging is made from different material layers. Pots, tubs and trays are often downcycled or even sorted out from the recycling fraction and sent to landfill or energy recovery. The ability to recycle and reprocess these materials back into food-grade packaging would provide a key route to increase demand for, and the value of, these materials, which would in turn push up recycling rates.

Plastic films, in particular post-consumer film, such as crisp packets, bread bags and the bags in breakfast cereals, have very poor recycling rates. One option is to stop their use, but they often play a key role in increasing food shelf life.

The environmental benefit of these films, reducing food waste and associated emissions, should be considered against the harms they create (pollution or GHG emissions).

By recycling these materials, pollution and GHG emissions can be eliminated, while the benefits retained. It may be that in the future, innovations may remove the need for these materials, at present, they play a critical role in our society. Just 7% of films placed on the market are collected for recycling (Table 1). Local authorities do not routinely collect these plastics. As these materials are often highly coloured, the inks blend during the recycling process, creating low-quality plastics with limited uses.

Driving up recycling rates of these materials requires a combination of packaging redesign to remove unnecessary packaging and to eliminate characteristics that impede recycling (foil backed plastics are less recyclable, for example), and improved collection processes in order to supply the demand for recycled alternatives to virgin material. Viridor is already working with major supermarkets to collect post-consumer film in a bid to help kick-start this critical market.

Table 1: Tonnage of plastic packaging placed on the market and collected for recycling in 2019<sup>24</sup>

	Tonnes placed on the market	Tonnes collected for recycling	% Collected
Plastic packaging placed on market	2,290,000		
Plastic packaging consumed by households	1,448,000	566,000	39%
Plastic bottles	643,000	377,000	59%
Plastic pots, tubs, trays and other	494,000	161,000	33%
Plastic film	311,000	22,000	7%

**To do this, we will:**

- Actively seek to expand Viridor operations to cover LDPE film achieving all four major plastics recycling within our operations. The four major plastics that can readily supply the overwhelming majority of plastic packaging needs includes LDPE film. These have very low rates of recycling and can cause major issues when brought into existing rigid plastic recycling assets. Our ambition is to cover all the major plastics to ensure a complete circular economy approach.
- Promote, including in partnerships like Plastics Pact, the inclusion of plastic films in ‘Consistent Collections’ from the policy start. Consistent collections policy is a critical tool to enable people at home and at work to have a standard set of materials that are recycled.

As plastic film has low levels of recycling and, when put into dry mixed recyclate causes significant problems with machinery (film gets caught in drives, etc.), separate collection of films is vital. Film recycling could be a relatively easy win as the levels are so low, but to do so, consumers need to have it collected separately as soon as it is possible.

- Work with our supply chain to identify better recycling solutions for pots, tubs and trays materials. Pots, tubs and trays are less recycled than bottles and have only a 33% collection rate (Table 1). Ensuring that this material is both collected and has good end markets is a job for a partnership with the supply chain as well as policy makers.

<sup>24</sup> UK Household Plastics Collection Survey 2020, Recoup, www.recoup.org/p/380/uk-household-plastics-collection-survey-2020

# 4. Extract plastics from general waste and drive novel reprocessing techniques



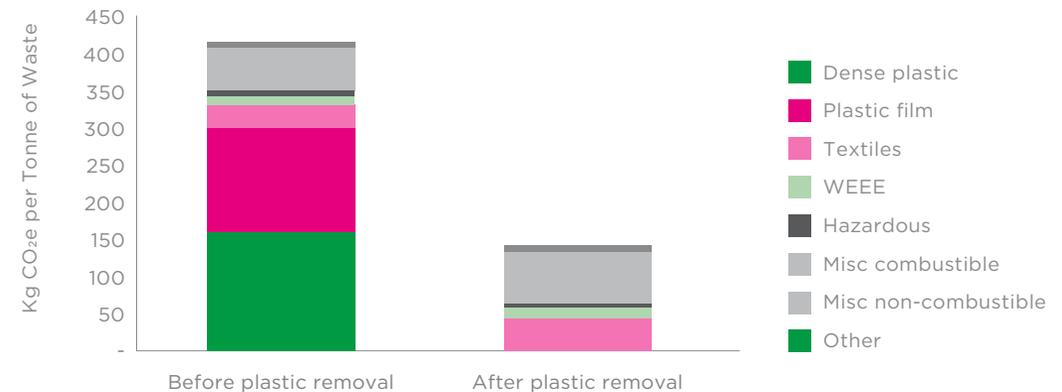
The steps outlined above to tackle recyclable plastics have the potential to make a difference, but even then, about 16% of the residual waste stream will still contain plastics.

Analysis done by Eunomia indicates that this will not fall with recycling reforms, as other materials will also be removed, resulting in a consistent c. 17% plastic content<sup>25</sup> (although total volumes are likely to fall). This plastic accounts for 70% of the fossil emissions of an EfW facility, and efforts to remove it before combustion are a key avenue to reducing our emissions and increasing recycling. Viridor already has two facilities in Scotland that remove a proportion of plastic from the black bag waste stream. Trials at these facilities have indicated an ability to remove 16% of waste (70% in form of plastics), thereby reducing the fossil emissions of a tonne of black bag waste by up to 281 kgCO<sub>2</sub>e (Figure 7). Once separated, however, contamination with other materials, including food waste, is high, and recycling to a good standard through mechanical processes is often too costly. In response to this challenge, a rapidly growing field of exploration is chemical recycling. This converts organic chemicals back into their constituent molecules, and should enable potentially infinite recycling of plastics (plastic, like paper, has a finite life when mechanically recycled). Viridor is actively exploring chemical recycling.

### We will:

- Trial and expand plastic removal from material destined for our EfW plants.
- Work with Government and the regulator to achieve a recognised 'end-of-waste' status for effective chemical recycling.
- Continue to explore and partner with third parties on chemical recycling.

**Figure 7:** EfW anthropogenic emissions per tonne of waste before plastics removal and after plastics removal (100% removal)



<sup>25</sup> Greenhouse Gas and Air Quality Impacts of Incineration and Landfill, Eunomia, 2020, [www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill](http://www.eunomia.co.uk/reports-tools/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill)

# 5. Drive innovation and regulatory improvement to achieve complete plastic circularity



By increasing recycling rates, we will move towards a more circular economy. However, genuine circularity is achieved when products are returned to the economy without degradation.

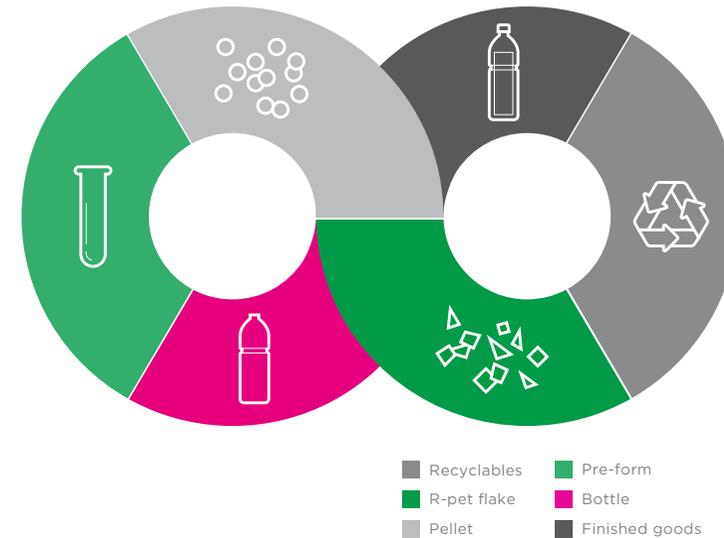
While food-grade to food-grade recycling is achieved with PET and HDPE containers (Figure 8), this is not the case with either PP or LDPE, which are widely used in packaging to prolong the life of foods and to protect products, reducing waste. Creating a recycled food-grade LDPE and PP together with effective collection and separation, would ensure closed-loop recycling on the four main recycled plastics (PET, HDPE, LDPE and PP).

As with all these actions, Viridor is committed to working with the supply chain as it is technology providers, i.e. packaging designers as well as collectors and sorters, all of which have a role to play in ensuring that PP can be traced and then reprocessed back to food-grade quality. Viridor is a proud partner of the NextLoopp project, an international collaboration across the supply chain that is seeking to create a process to deliver food-grade recycled PP.

Increasing recycling and plastics extraction has the potential to reduce the fossil GHG emissions of non-recyclable waste, but it will not achieve zero emissions. On the recycling side, the increases in recycling will not lead to a completely circular economy. The reality is that plastics, paper and all other material cycles experience loss or degradation to some degree. For plastics, this represents a key challenge, as plastics are a core

product of the fossil fuel industry. The need to drastically reduce fossil fuels necessitates a reduction of plastics derived from those fossil fuels. As we have seen, however, the benefits of plastics suggest they will remain part of the economy for some time. To this end, we will, in the medium to long-term, explore alternative feedstocks for plastics-based materials. The most promising option is the CO<sub>2</sub> stream from carbon capture. Viridor has already committed to deploying carbon capture to become a climate-positive business by 2045. While some sites are near carbon capture and storage (CCS) clusters or ports for CO<sub>2</sub> shipping, other more dispersed sites will not be able to connect to these sources of CO<sub>2</sub> offtake. Initial research suggests that CO<sub>2</sub> from CCS could be a valuable feedstock for creating the building blocks of plastic polymers. Viridor will continue to monitor these developments and seek to deploy pilot projects and operations as they become viable. In doing so, we will not only be able to become a climate-positive company but will also identify feedstocks to replace fossil-derived waste plastics as their incidence in the economy begins to shrink along the oil and gas industry. By working to ensure that the CO<sub>2</sub> from CCS becomes part of the circular economy and serves as feedstock for plastics remanufacturing, we will close the loop on plastics.

**Figure 8:** Closed loop recycling (food-grade to food-grade)



**We will:**

- Work with technology partners and the supply chain to develop ways to convert pots, tubs and trays back into food-grade materials.
  - Achieve food-grade reprocessing in PET at all our reprocessing plants.
  - Work with Government and the regulator to achieve a more equitable system for achieving food-grade PP and HDPE. Targeting circularity in all four plastics by 2025.
  - Monitor technology development for uses of CO<sub>2</sub> as a basis for new virgin polymer to replace current fossil-based alternatives with a target date of 2040 for ending fossil fuel dependency.
- These commitments combined with those for LDPE film set out in our 3rd commitment will enable full circularity on all four plastics.

# The need to make a market

The speed and scale at which Viridor's ambition to increase our plastics recycling and reprocessing operations in the UK is realised will depend significantly on policy effectively designating recycling and reprocessing as an infrastructure asset class with long-term contracts and stable revenues.

As with the resources and waste sector generally, the overwhelming majority of recycling industry capacity exists due to policy intervention to correct a market failure.

With the exception of some very pure material streams or high-value recyclates such as metals, it is cheaper and easier to produce new materials such as paper, glass, and plastic rather than recycle them. Policies had to be brought in to change the economics of recycling to make it feasible. These policies need to address two ends of the market - the first is making the material for recycling available at a scale and quality that enables a company to generate value from separating and reprocessing it (or selling it on for reprocessing). At the other end of the market is demand, i.e., ensuring that those companies that use raw materials choose to buy reprocessed rather than virgin products. Policies to date have increased the cost of disposal (through landfill tax) and driven some recyclate demand through producer obligations. Current policy reforms seek to increase these producer obligations and combine them with a recycled plastics content tax to further drive demand.

This policy work is critical to increase our recycling rates - without guarantees of supply and demand for output, reprocessing infrastructure cannot be built to meet our objectives. If infrastructure is not built to meet this demand, the UK will see increasing exports of partially-recycled wastes and along with them, the export of investment and jobs overseas.

Policy plays a key role here because of the fragmented nature of the supply chain. Unlike virgin plastic supplies that may come from one manufacturer, plastics can come from many different waste collectors - from local authorities to commercial and industrial businesses. As a result, long-term contracts for materials supply are difficult to achieve, because with contracts on short terms, when materials contracts run over shorter periods than the facility's depreciable life, investment in new high-quality infrastructure is stymied. As a result, recycling assets are built at risk (increasing their financing costs) and to a minimum specification to reduce the total capital at risk to a minimum.



# Going it alone versus a partnership

As this paper makes clear, creating a circular economy depends on all actors working in partnership. No one organisation can achieve this fundamental step-change alone. Critically, the policy framework, creating long-term stable conditions, sets the overarching context in which these supply chain partnerships can evolve. The longer these stable conditions are in place, the more sophisticated and ambitious the partnerships can become.

Initially focussed on recycling, they will evolve to develop innovations to expand into more challenging reprocessing, and to create more truly closed-loop recycling, where materials increasingly circulate without degradation. That evolution depends on a policy framework that sets ever-increasing ambition as its goal and allows innovation to focus on where it can deliver the most effective change. Viridor's ambition for a circular economy is therefore contingent on an effective suite of policy reforms that create an infrastructure asset class in the recycling sector.

This is not due to a lack of ambition or commitment; it is simply that investors will not put money behind recycling infrastructure at the pace and scale needed to meet these goals in the absence of clear returns. Policy has the potential to align the clear ambition of the whole supply chain with the economics of recycling and reprocessing. Without that overarching structure, the long-term nature of the contracts, circular economy will struggle to emerge as each actor cannot be sure as to what another part of the chain will do over the next 5 to 10 years.

## Measuring our progress

Any credible plan depends on a commitment to transparency and regular reporting. Viridor is already a sector leader by publishing a comprehensive annual ESG report and disclosing our progress on the Environmental, Social and Governance agenda.

We will report on progress against the 5 key areas of focus identified in this document through the annual ESG report as part of the decarbonisation ambition Step 2 - *Maximise the amount of waste that is recycled.*

