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TWELVE OPPORTUNITIES ON THE JOURNEY TO NET ZERO

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The DE-Carbonise Project

The case studies in this guide are drawn from our work on the DE-Carbonise Project.

Funded by the European Regional Development Fund (ERDF), DE-Carbonise delivered a business support programme to SMEs in the East Midlands of the UK between 2016–2022. It was led by the University of Derby, in collaboration with Derby City and Derbyshire County Councils that extended the earlier D2 Energy Efficiency/Low Carbon project and the BESPOKE energy efficiency scheme. DE-Carbonise provided:

- Decarbonisation audits, grant funding for energy efficiency measures, product and operations innovation and R&D, as well as business improvement consultancy for SMEs operating in a diverse range of sectors to support their journey towards Net Zero.
- Support to over a thousand SMEs between 2016–2022, providing grants worth over £1.6 million for energy efficiency measures that delivered savings of over £3/4 million per year and helping 273 SMEs to be significantly more resilient in the face of steep rises in energy costs.
- Consultancy to 153 SMEs with 47 of these continuing with larger collaborative R&D projects resulting in a further 32,000 tCO2e savings from product, process, and business innovation – vastly outperforming the original programme target of 2,400 tCO2e.

Follow this link www.derby.ac.uk/business-services/funding/de-carbonise-project/case-studies/ for case studies of how the DE-Carbonise programme supported SMEs across the East Midlands

DE-Carbonise statistics:

£7million

Project value

6 years

Project duration

1000+

SMEs support

273

Energy efficiency

153

Consultancy packages

47

R&D projects

32,600 tonnes

GHG reductions



Twelve Opportunities

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Introduction



The cost of energy is soaring, global temperature is rising, and wildfires, heatwaves, droughts, floods and storms are becoming increasingly frequent and intense. The impact of climate change is devastating for the planet, people and prosperity.

Businesses of all sizes are undoubtedly major contributors to environmental degradation, as well as being victims of climate change, the impact of rising energy prices and both global and local supply chain failures. The British Business Bank (2021) estimate that small and medium sized enterprises (SMEs) contribute around one third of all UK carbon emission. Regardless of how large or small your organisation is, our collective commitment to tackling climate change and repairing the planet’s damaged ecosystems will make a huge difference. Acting now will not only support your company in becoming more sustainable, actions that you take now will also help you to prepare for the global challenges that many more businesses will soon face.

The University of Derby has published the ‘Twelve Opportunities’ guides to help SME owners and managers navigate this wealth of support and to celebrate real-life decarbonisation interventions that include examples of carbon reduction, cost saving and clean growth. The guides signal some of the key steps along the pathway to Net Zero and describe examples of how some companies are already innovating in order to be resilient and competitive in the sustainable economy of the future. Together they offer a route map to decarbonisation, by providing SMEs with a set of tools, resources and inspiration to accelerate their journey towards Net Zero.

Opportunity 1: Get Carbon Savvy

Key facts:

69% of small businesses are unsure about how to measure the carbon emissions produced by their business (FSB,2021).

Opportunity:

SMEs are not currently required by law to lower green-house gas emissions, although this may change in the future. However, an increasing number of cities are already applying congestion and clean air charges that have implications for 'last mile' delivery. Going forward, understanding the role that carbon and other emissions play in your business is becoming increasingly important for firms of all sizes. Measuring and analysing your carbon footprint will highlight the carbon intensive areas of your business activity. These carbon 'hotspots' signal the potential for carbon, cost, and risk reduction. This in turn will help develop carbon literacy and carbon reporting capability amongst staff, as well as encouraging pro-environmental behaviour in the workplace and beyond. But how can this be achieved?

Key terms: carbon footprint, carbon hotspots, decarbonisation, scope 1, scope 2, scope 3

What is Net Zero?

The terminology can be confusing. Net Zero, sustainability, green business, low carbon, carbon neutrality and circular economy are all terms bandied about. Put simply, 'Net Zero' is the goal for firms that aim to avoid negative impacts of their business on the environment. A 'net positive' or regenerative enterprise aims to repair prior environmental damage, leaving the planet a better place, whilst also thriving as a business entity. Zero Carbon Business provide a very accessible definition of Net Zero and associated terminology.

The **Net Zero Standard** covers emissions from a company's entire value chain, including those produced by their own processes (scope 1), purchased electricity and heat (scope 2), as well as those generated by suppliers and end-users (scope 3). Most companies will require deep decarbonisation of 90-95% to reach Net Zero under the standard.

Unlike 'carbon neutrality' which, for some businesses, can be achieved largely by a shift to renewable energy sources, companies adopting the Net Zero Standard are required to set both near-term and long-term science-based targets across the whole supply and value chain. This means making rapid cuts to halve emissions by 2030. However, organisations must also set in place longer term measures to reduce emissions to close to zero by 2050, whilst neutralising any residual emissions that cannot be eliminated, via carbon removal or sequestration methods. This can seem daunting, but plenty of help is at hand. For example, the SME Climate Hub is an international initiative that empowers small to medium sized companies to take climate action, build resilient businesses for the future and partner with thousands of other like-minded businesses and governments globally to reach Net Zero emissions by 2050. Thousands of UK SMEs have joined the United Nation's Race to Zero campaign by pledging to reduce their emissions through the SME Climate Hub. It's a wonderful way to start your journey to Net Zero.

Carbon emissions are divided into three categories:

- **Scope 1:** Refers to Green House Gas (GHG) emissions that are a direct result of business operations. For instance, the fuels used for heavy machinery or company vehicles.
- **Scope 2:** GHG emissions that a business contributes indirectly. For example, electricity produced by energy companies, purchased to power facilities, and deliver operations.
- **Scope 3:** GHG emissions beyond business boundaries either downstream or upstream in its supply chain. For example, when procuring products or materials from a supplier. For many firms, these emissions represent the largest source of emissions and can represent the most significant opportunity for decarbonisation.

Scope 3 emissions are far harder to measure than Scopes 1 and 2, so some businesses are tempted to address only Scope 1 and 2 emissions and use carbon offsetting schemes to acquire 'carbon neutral' badges. However, for many firms, 50-90% of their emissions lie in their supply chain (Scope 3 emissions) and making spurious claims about carbon neutrality has been termed 'green washing'.

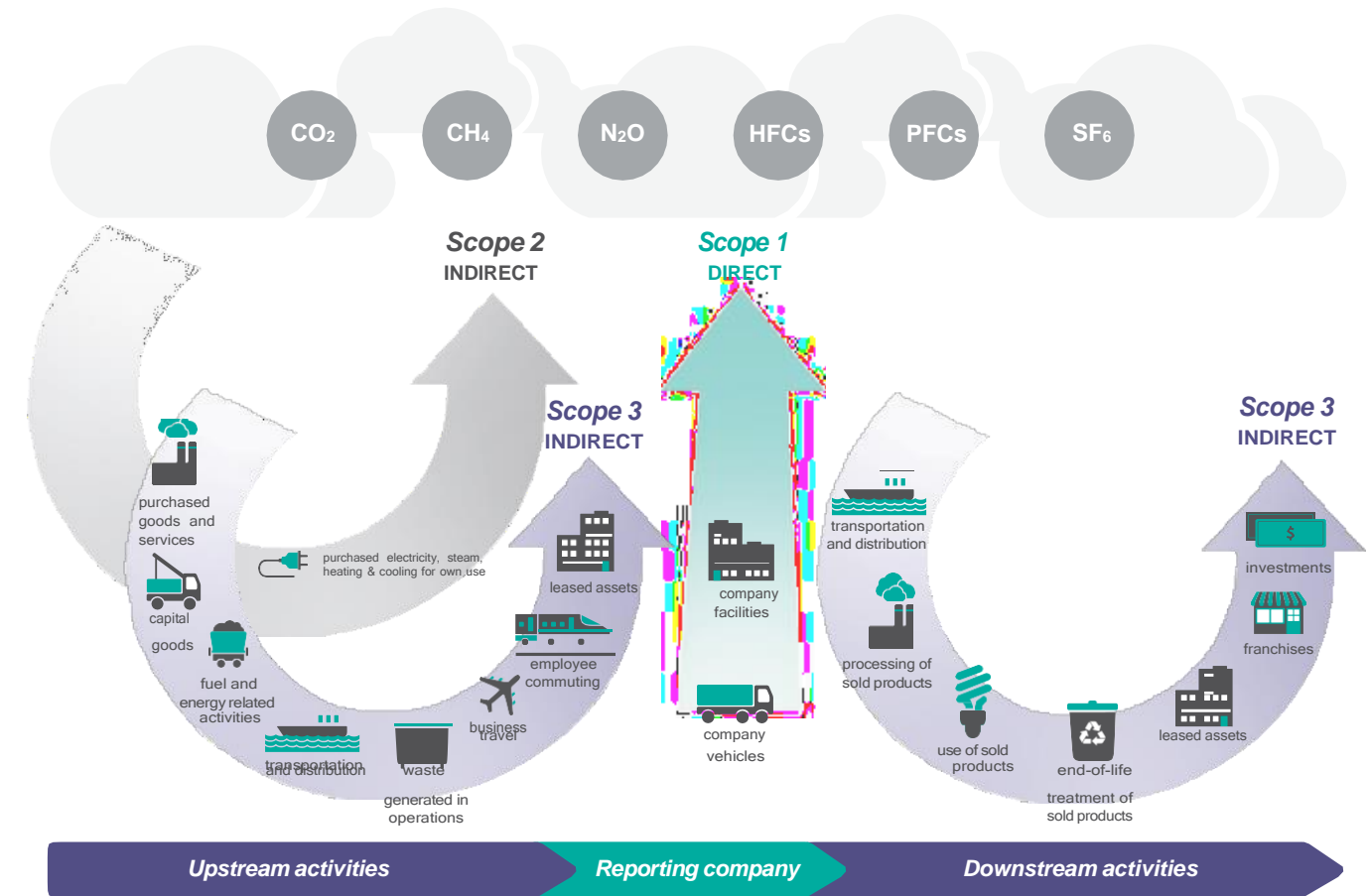


Fig 1.1 Overview of GHG Protocol scopes and emissions across the value chain.

Taking Action

The DE-Carbonise programme helped SME staff to deliver carbon reduction through a seven-stage cycle of continuous improvement.

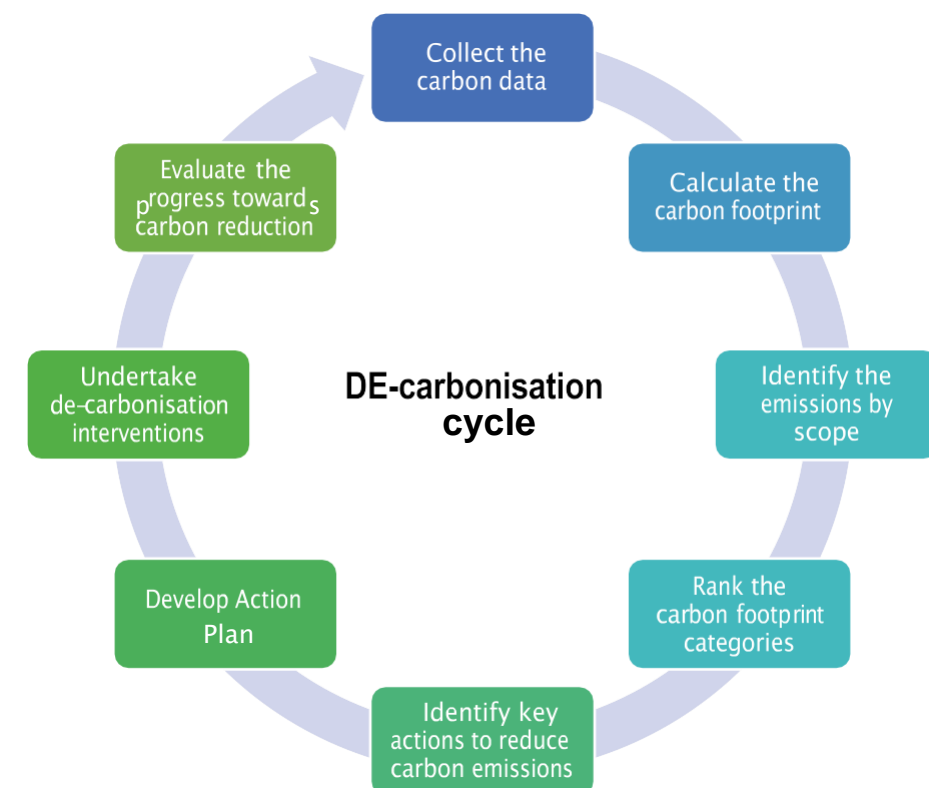


Fig 1.2 Decarbonisation Cycle, ERDF DE-Carbonise 2019-2022

Before any decarbonisation intervention, a 'carbon-footprint' audit of the business was undertaken that included premises, transport, products, services, operations, and processes as appropriate. Whilst there are several, free to access, carbon calculators available (please see the list below), the DE-Carbonise programme identified 6 main categories of carbon emissions from business operations. The 'DE-Carbonise Wheel' breaks each category into sub-categories for carbon calculation.

The categories of Fuel, Transport and Water are broken down into several sub-categories linked to the common carbon emissions. For example, there are four sub-categories such as electricity, gas, renewables, and others in the overall Fuel category. The category of Raw materials will reflect the specific material stream (metal, wood, plastics among others) and sources (primary, open-loop, closed-loop, or re-used). The Waste category reflects the type of waste (metal, wood, plastics among others) and its destination (combustion, composting, landfill, open-loop, or closed-loop). Like other funded programmes, the DE-Carbonise audit was administered by experienced staff and used the 'UK Government GHG Conversion Factors for Company Reporting' database produced by Ricardo Energy & Environment for the Department for Business, Energy, and Industrial Strategy (BEIS).

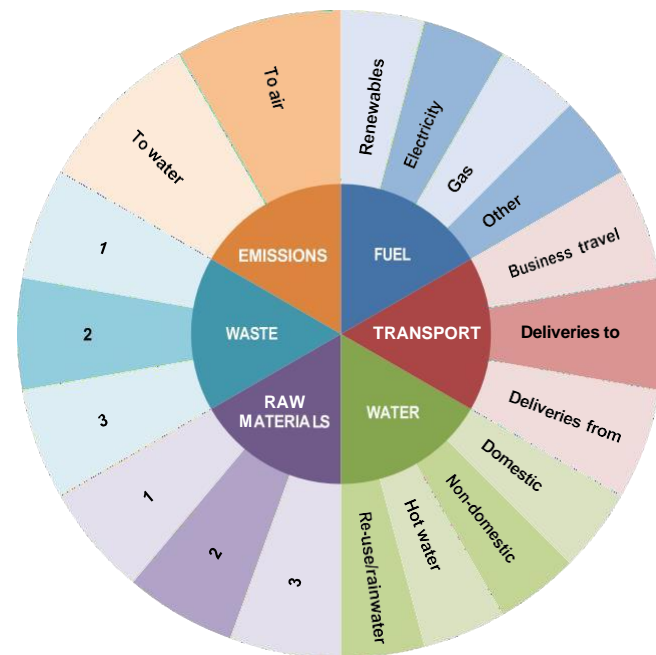


Figure 1.3 DE-carbonise Wheel. Source: DE-carbonise project, 2019-2022

Action checklist:

The following steps will provide a systematic analysis of carbon in your business:

- 1 Use one of the free carbon calculators to map your emissions across key business functions.
- 2 Identify emission hotspots in your business.
- 3 Assess the potential for decarbonisation in different areas of your business.
- 4 Get credible sustainable business advice to ensure accuracy, inter-dependencies, opportunities, risks, and limitations for decarbonisation.
- 5 Identify opportunities for decarbonisation initiatives to support business strategy and vice versa.
- 6 Explore the links between the carbon hotspots to identify synergies in your decarbonisation interventions.
- 7 Develop an action plan for decarbonisation that identifies areas that could yield easy wins first.
- 8 Undertake the decarbonisation interventions and evaluate effectiveness.
- 9 Develop the next set of decarbonisation interventions.

Tools:

Below, we list several free online tools that can be used for carbon foot-printing and identification of carbon hotspots.

- Normative calculator – SME Climate Hub
- Carbon Trust: [SME Carbon Footprint Calculator](#)
- Natwest: [Carbon Planner](#)
- Zellar: [SME Carbon Footprint Calculator](#)
- [Go Climate](#) – an international carbon foot-printing tool.

Helpful resources and support:

[ERDF DE-carbonise project, case-studies and business support](#)

[SME Pathways to Net Zero](#)

[Zero Carbon Business](#)

[Carbon literacy for SMEs online course](#)

References:

British Business Bank (2021) [Smaller businesses and the transition to net-zero](#)

Federation for Small Business (2021) [Accelerating Progress: Empowering small businesses on the journey to net-zero.](#)

In Practice

Decarbonisation cycle in action:

Rayden Engineering is a manufacturing company specialising in the fabrication and installation of high-pressure pipework systems from low to high alloy steels that operates in specialist market sectors such as the gas, oil, petrochemical and water industries. They approached the University of Derby DE-Carbonise team to help better understand their carbon emissions and create an environmental policy. The company also wanted to create a plan for the transition to a low emission fleet.

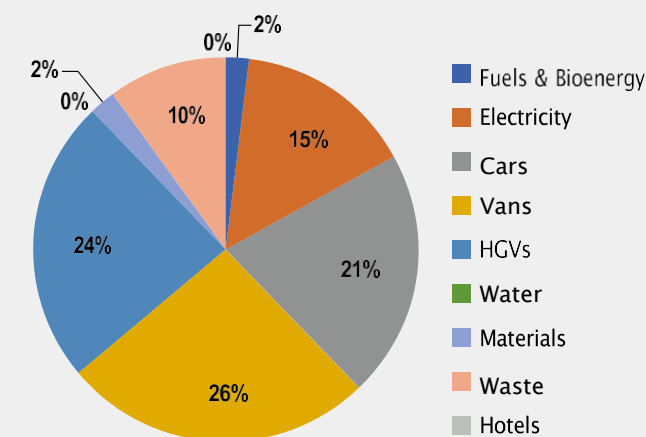
Based on the information provided by Rayden, the DE-Carbonise team calculated the company's carbon footprint and identified that the largest proportion of their carbon emissions was concentrated around transport, with vans, HGVs, and cars representing, respectively, 26%, 24%, and 21% of the total emissions.

The company now has a costed plan to transform their business fleet to plug-in hybrid alternatives that will radically reduce fuel and vehicle road tax expenses, whilst cutting emissions by 8 tonnes of CO₂e per year. The company recognises that reducing emissions associated with HGVs remains a challenge but will monitor the development of new technologies and availability of hydrogen refuelling stations over coming years.

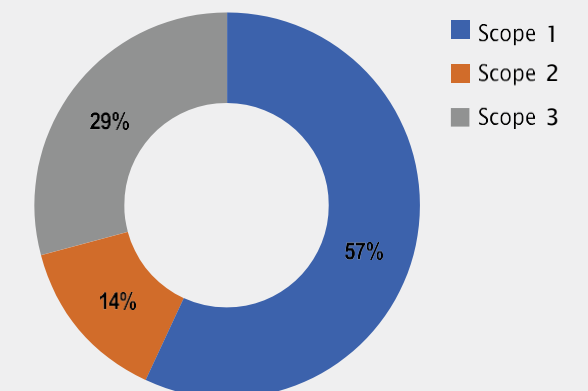
Read the full case study at:

www.derby.ac.uk/business-services/funding/de-carbonise-project/case-studies/case-study-rayden-engineering/

Emissions by category



Emissions by scope



Glossary

Carbon Footprint: The total of all the Green House Gas (GHG) emissions caused by a business or a set of business activities.

Carbon Neutral: Where any CO₂ that is released into the atmosphere from a company's activities is balanced by an equivalent amount being removed from the atmosphere.

Net Zero: To achieve a state where GHG emissions that enter the atmosphere are balanced out by activities that remove those emissions from the atmosphere.

Net Positive: The idea that businesses should put more back into the environment, society, or the economy than it takes out.

Regenerative: Refers to practices that reverse the effects of climate change by rebuilding, restoring, or replenishing natural resources. Frequently used in industries with an agricultural connection, such as food and beverage, apparel, or timber products.

Science-Based Targets: Emissions reductions targets are "science-based" if they are aligned to enable delivery of the Paris Agreement goals - limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C.

Opportunity 2: Energy Efficiency

Key facts:

67% of small businesses have taken steps to address their energy usage but only 18% have invested in generating their own energy.

Of those that have not yet taken steps to address their energy usage:

- 29% say energy is not a significant cost.
- 24% say that the return on investment takes too long or is too uncertain.
- 22% highlight the lack of capital (savings) as a reason why they are unable to invest. FSB (2021)

Opportunity:

In a resource-constrained world, businesses should look to energy efficiency as an important way to address variable costs. Energy is often a substantial cost for manufacturers that can be reduced through performance management and cost-effective technical improvements, especially if these are focused on heating processes and mechanical equipment.

Key terms: energy, energy efficiency, Environmental Management Systems (EMS)

Identifying opportunities for improvement

The UK Government estimates that the average SME could reduce its energy bill by 18–25% by installing energy efficiency measures with an average payback of less than 1.5 years. It is estimated 40% of these savings would require zero capital cost. The question for many smaller firms is where to start?

The [SME Guide to Energy Efficiency](#) provides a helpful starting point. Other helpful resources are listed below. As part of the DE-Carbonise programme we developed a [handy checklist](#) that reminds companies to make the most of their energy data; check settings on thermostats, lights and compressed air; invest in controls such as daylight sensors and variable speed drives for pumps and fans; encourage staff to switch computers and appliances off when not in use; and invest in the array of basic energy saving measures such as reducing drafts, fixing leaks, turning down heating/cooling, reducing unnecessary travel and deliveries as well more expensive measures such as insulation and Environmental Management Systems.

To achieve greater efficiencies, you will need to consider the energy consumption patterns within your operations, then design and implement energy efficiency interventions that reduce consumption and waste of energy in your business. To achieve continuous improvements in energy efficiency, firms need to have a good measurement system and effective performance management systems that are built on an accurate set of indicators and supported with regular energy audits and review.

Tools:

Energy Audit

A regular and accurate energy audit helps monitor how your energy is currently being used and can highlight the areas that need correcting. Identifying the inefficient areas across different departments, buildings, and sites is particularly useful and shows you what needs improving and what requires further investigation. A systematic walk-around your premises serves to identify energy-saving opportunities and a successful audit should be as thorough as possible, so a clear framework for the physical investigation is key.

Action checklist:

- 1 Investigate the energy efficiency opportunities within carbon intensive areas of your business.
- 2 Collect energy use data and calculate the energy use per source.
- 3 Collect data on energy consumption patterns per source and check manufacturers specifications to ensure there are no technical faults.
- 4 Rectify any operating faults and identify operational areas for energy efficiency interventions.
- 5 Set up energy efficiency targets.
- 6 Develop energy consumption measurement systems and assign responsibility for data input and monitoring.
- 7 Develop a performance management system that supports energy efficiency interventions and reports on the progress.
- 8 Communicate the progress on energy efficiency initiatives with staff and senior management and ensure long-term support and resource allocation.
- 9 Compare the energy efficiency of your business with others in the sector to establish opportunity for introduction of new and more energy efficient technologies and operational systems.
- 10 Change also means changing mind-sets, behaviours, and management systems throughout the business.

Identifying Opportunities for Improvement:

Whilst the capital outlay and lag time on return on investment remain important challenges for firms, two thirds of UK SMEs have started to address energy efficiency. In 2021, a British Business Bank survey showed that:

- 37% of SMEs installed energy efficient appliances
- 26% switched to a renewable energy provider/tariff
- 22% installed a smart meter
- 18% invested in microgeneration
- 14% installed solar panels
- 4% installed a heat pump

Smart Energy is the Government backed organisation that promotes the benefits of smart meters in the UK. With the help of over 500 small business owners, Smart Energy published [Costs, Energy & Going Green](#), to provide advice on where businesses can make energy savings.

Measurement and performance management:

After completing an initial carbon audit of your business, it is prudent to focus in on the most energy-intensive areas of your operations.

Your energy efficiency improvements need to have clear and measurable KPIs that your team can act upon. Three types of indicators can be used to manage your energy use. A lagging indicator is one that managers use to review performance at the end of a shift, day, or month. Status indicators, on the other hand, operate over a longer time horizon as they report a gradual deterioration of equipment, such as pump efficiency. Well-thought-through leading indicators for processes (such as temperature ranges or concentrations), however, can shed light on areas of real opportunity to improve energy efficiency. Instead of focusing solely on measuring energy usage, companies should manage operations for energy efficiency using a variety of leading, status, and lagging indicators suitable to your production activity.

A measurement system which includes a range of KPIs and processes for setting, monitoring, and acting on indicators needs to be supported by a performance management system. For medium sized companies, the performance management system should detail roles and responsibilities for staff involved in energy initiatives and corresponding motivational levers to encourage staff behaviours towards energy efficiency, for example, efficient working practices; health and safety practices; pro-environmental behaviour at the workplace and beyond.

A survey of 1,200 SMEs by the British Business Bank (2021, p.9 & 10) shows the most popular energy efficiency measures implemented and planned by companies in the UK.

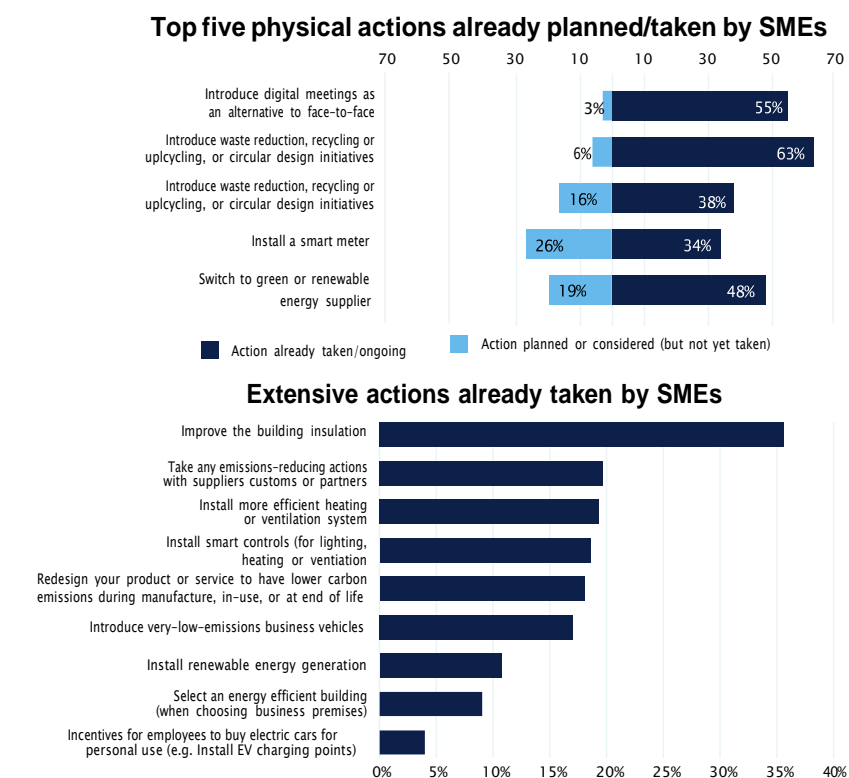


Fig 2.1 Most popular energy efficiency measures in UK

As the cost of electricity and heating fuel continue to rise sharply, many businesses (65–80%) will be looking to replicate the efficiencies made by companies that have already invested in better building insulation and more efficient heating and ventilation systems (See Fig 2.1). Still more may look more positively at the improving ROIs for installing their own renewable energy generation. Becoming energy self-sufficient has become a realistic goal for an increasing number of businesses. Could this be you?

Helpful resources and support:

[Energy Saving Trust - Guide to energy efficiency in the workplace](#)
[Energy Saving Trust - Energy efficiency support for businesses](#)
 UK Govt - [SMEs guide to Energy Efficiency](#)
 Smart Energy - [Costs, Energy & Going Green](#)
[DE-carbonise project - checklist](#)
 Money Expert - [Compare business energy providers](#)

References:

British Business Bank (2021) [Smaller businesses and the transition to net-zero](#)
 Federation of Small Businesses (2021) [Accelerating Progress: Empowering small businesses on the journey to net-zero.](#)

In Practice**Energy efficiency initiatives in action**

Cawarden are leaders in delivering demolition, land remediation and earthworks projects across the UK. As part of their strategic commitment to minimise their environmental impact and make the shift toward a low carbon economy, the company approached the DE-Carbonise programme to help further reduce their greenhouse gas emissions.

An emissions audit conducted by the DE-Carbonise team was used as the basis for a DE-Carbonise Action Plan. This provided clear steps for monitoring emissions and recommendations, which included a phased transition to Green Diesel HVO fuel. The Cawarden team embraced their decarbonisation journey with an open mind and made huge progress within a short space of time to evaluate, quantify and act, resulting in the following benefits:

- Annual carbon saving of 1,336.44 tonnes of carbon, a 76% reduction.
- Reduction in maintenance costs
- Reduction of noise levels
- Local air quality improvements

Cawarden has become an exemplar to other businesses that use heavy plant, demonstrating the cost and environmental benefits that can be gained through collaborating with university partners on pro-environmental business process improvement.

"With the support of the De-Carbonise Project, we now have a clear road map, recording and monitoring regime for our net zero journey. The roll-out of HVO and achievements in reducing our greenhouse gas emissions is a major step forward - and it will complement other initiatives we have in the pipeline to decarbonise the business."

Jonathan Groves - Quality Director



Read the full case study at:

www.derby.ac.uk/business-services/funding/de-carbonise-project/case-studies/case-study-cawarden-co-ltd/

The Arkwright Society

The Arkwright Society initially approached the ERDF DE-Carbonise team to survey the site and provide advice on how to reduce their energy bills and carbon emissions. The main challenge identified was the high energy use for heating and lighting at the site: costing around £88,000 and emitting the equivalent to 241 tonnes of carbon per year.

The DE-Carbonise audit identified a significant amount of old fluorescent and halogen lighting at the site. An inventory was conducted to plan for replacement with energy-efficient LED lights with sensors where appropriate. The heating was a mixture of electric storage and plug-in heaters and a range of gas boilers, some being incredibly old and having limited control. Also highlighted were poorly insulated parts of the buildings and areas where there were significant draughts or where doors were being left open with the heating on. There were also two large dehumidifiers which were kept on 24 hours, 7 days per week which consumed a large amount of energy.

The DE-Carbonise team produced a carbon reduction report which proposed the replacement of the old-style lighting and improvement to the heating systems, as well as reducing draughts and improving insulation. The organisation created a proposal for replacing lighting, buying the light fittings and sensors, and using their own maintenance team to carry out the installation.

For the heating improvements the business was able to obtain replacement efficient boilers provided by a sponsor and the DE-Carbonise grant supported the cost of the installation and improvements to pipework and control systems. The lighting, heating and sensor control improvements were supported with a DE-Carbonise grant of almost £12,300. The actions are forecast to save 20 tonnes of carbon per annum and reduce the organisation's energy costs by over £9,200 per annum (2021 prices), making the entire organisation more resilient.



Cromford Mills existing watercourse and wheels

Glossary

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Science-Based Targets: Emissions reductions targets are "science-based" if they are aligned to enable delivery of the Paris Agreement goals - limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C.

Opportunity 3: Resource Efficiency and Digitalisation



Key facts:

The use of digital technologies in manufacturing can drive up to **30%** yield improvements and **15%** waste reduction, and a **5-10%** reduction in operating costs. (IBM, 2020)

In a Made Smarter survey in 2022, one in three respondents said their latest business strategy included integrating digital technology or a roadmap towards automation, while two-thirds were considering industrial machinery, robotics and automation.

72% of micro and small firms are interested in improving their data and systems integration.

Opportunity:

Resource efficiency makes business sense. Leading companies are discovering that measures to improve resource efficiency also drive productivity gains and environmental benefits. By using resources more efficiently, we can live healthier lives, save money, create jobs, boost our economy, and respect the limits of the planet. Companies can also gain a wide range of benefits through automation and digitalisation. Predictive maintenance, for example, can alert organisations to potential equipment failures before they happen – avoiding the cost and energy wasted in unexpected downtime. Smart sensors on production lines can monitor and control machinery, improving overall efficiency, and save energy, water, gas, whilst reducing carbon emissions and improving air quality and temperature in the working environment.

Key terms: resource efficiency, industry 4.0, smart factory

Resource efficiency and Industry 4.0.

Since the Industrial Revolution, our wealth and well-being have relied on the intensive exploitation of natural resources, from metals, hydrocarbons, and minerals to biodiversity, and ecosystems. With an ever-growing economy, global resource usage has increased significantly between 1980 and 2022 and is predicted to keep rising. In some cases, exploitation levels came to exceed resources' natural regeneration rates. Such overexploitation ultimately threatens the livelihoods and well-being of people who depend on these resources and threatens the existence of ecosystems. If the exploitation of our natural resources continues at this pace many critical resources will soon be depleted.

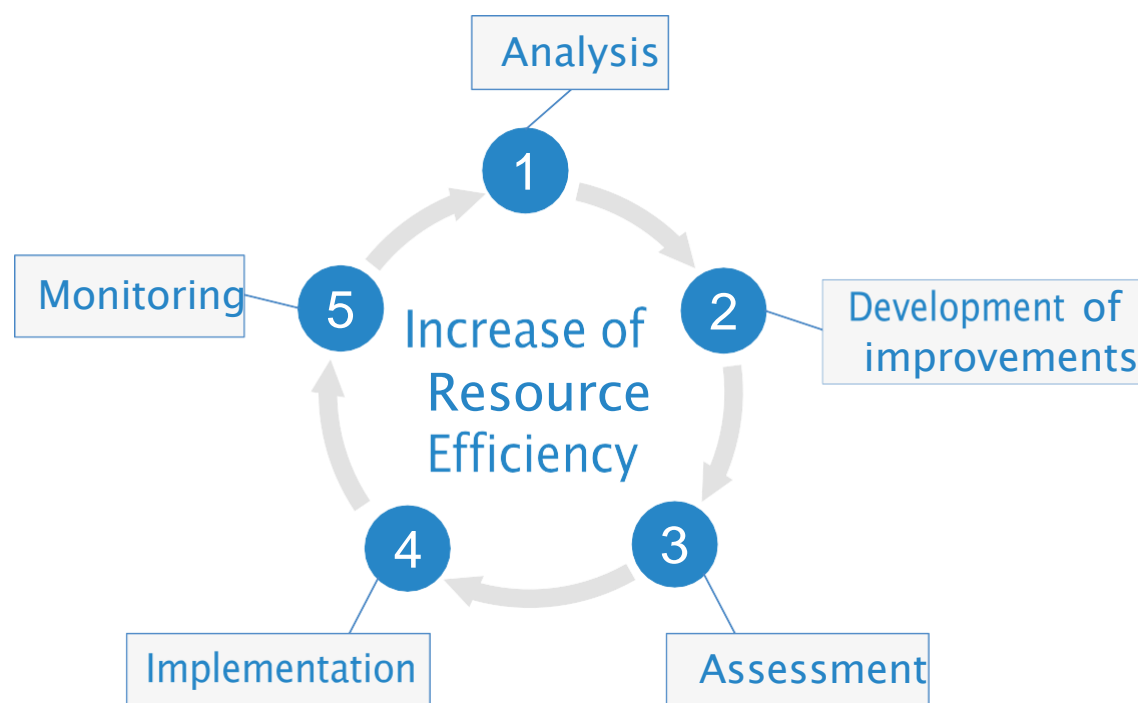


Fig. 3.1 Steps toward an implementation of resource efficiency measures (Green Policy Platform, Slide 15, Webinar 2 GIZ 2021)

By using fewer resources and optimising their use, businesses can become more environmentally friendly, competitive, and profitable. A significant increase in resource efficiency is essential to achieve sustainable green growth and is key to the transition to a low-carbon economy. The Green Growth Knowledge Partnership (GGKP) has a key role in this transition, by connecting policy, business, and organisations committed to collaboratively generating, managing, and sharing knowledge on the transition to an inclusive green economy. The GGKP offers access to the latest research, case studies, guidance, and tools. Figure 3.1 outlines the steps toward the implementation of resource efficiency measures. Webinars, courses, and academic programmes are also featured on the platform to facilitate ongoing learning and capacity building for green growth professionals.

For businesses, focusing on resource efficiency as part of operations management extends the benefits of energy efficiency initiatives to include wider business operations. Resource efficiency aims to transform processes or facilities, leading to improved efficiencies in energy, materials, and water use. To capture these gains, however, businesses need to embed new ways of thinking in their management teams, workforces, and organisational cultures. Manufacturing companies, in particular, are integrating new technologies, such as the Internet of Things (IoT), cloud computing and digital analytics, Artificial Intelligence (AI), and machine learning into their production facilities and throughout their operations. Commonly, these technologies are referred to as 'digitalisation', which, by definition, represents the use of digital technologies to support business model change, provide new revenue and value-producing opportunities.

'Industry 4.0' is the term used to describe this new industrial revolution – one that combines advanced manufacturing techniques with digital technologies (Figure 3.2) to create manufacturing systems that are not only interconnected, but communicate, analyse, and use information to drive further intelligent action back in the physical world. Industry 4.0 represents the current state-of-the-art practices in resource efficiency. Whilst it is a new term, it reflects the evolution of industry management systems as demonstrated by Figure 3.3. These approaches to production, operations, and innovation are revolutionising the way companies manufacture, improve, and distribute their products. These 'smart factories' are equipped with advanced sensors, embedded software, and robotics that collect and analyse data and allow better decision-making processes. Using high-tech IoT devices in smart factories leads to higher productivity and improved quality, as well as offering real opportunities to reduce emissions and tackle the global challenges of climate change and environmental degradation.



Fig. 3.2 Industry 4.0 and digital technologies. Source: HSRC (2019)

Industry 4.0 technologies and SMEs

Over the last few years, larger companies have rapidly embraced the challenges of the new paradigm and are currently working intensively on the introduction of Industry 4.0 technologies. Existing research also recognises that Industry 4.0 offers significant opportunities for Small and Medium-sized Enterprises (SMEs) which can use these technologies to increase their flexibility, productivity, and competitiveness. Yet, SMEs are struggling to adopt these technologies. The literature identifies several reasons for this, including economic factors, cultural issues, lack of skills and competencies, legal issues, technical concerns, and challenges in the implementation process.

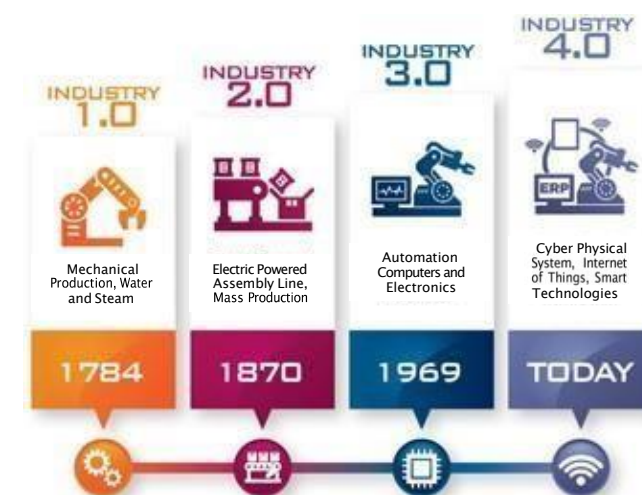


Fig. 3.3 Industrial revolution from i1.0 to i4.0. Source: Evodio Kaltenecker (2019)

In summary, Resource Efficiency and Digitalisation are essential for the future of manufacturing and have already had a great impact on the global economy. But in the rapidly changing international environment, smaller and medium manufacturing enterprises cannot be competitive with the same strategies as large enterprises. However, the DE-Carbonise programme and our own research have shown that smart factory approaches can be used by SMEs with immediate, and longer-term benefits, such as cost savings and improving working conditions for staff – see the In practice section below. As noted by Jung et al (2021), applied research at universities and international collaboration with leading institutes can reduce development costs, showcase industrial solutions for orientation and adoption, and foster global and open standards for improved compatibility, which can significantly benefit SMEs. The adoption of Resource Efficiency and Digitalisation practices has the potential to help SMEs overcome the technical and financial obstacles that they currently face.

In Practice

Resource Efficiency in action – Lindhurst Engineering

Lindhurst Engineering designs, manufactures, installs, and maintains a range of engineering solutions for sectors such as utilities, food and drink, transport equipment manufacturing, and construction. The company has worked in collaboration with the University of Derby over a number of years, and as part of the latest engagement wanted to decarbonise its business but faced several challenges. This included inefficient lighting and heating, low-tech manufacturing processes, as well as manual and ad-hoc data monitoring.

To address this issue, the DE-Carbonise team provided a Smart Factory solution for the company, helping the organisation to install smart sensors across the manufacturing plant and to monitor, in real-time, a series of parameters, such as gas, electricity, water usage, air temperature, humidity, light levels, dust particle levels, and noise. Live operational information is captured through accessible online dashboards that improve operational decision-making process.

Lindhurst Engineering has already observed a reduction of 30% in its electricity use, representing carbon savings of 5.73 tons of CO₂e per year and cost savings estimated at £25,000 per year. In addition, the company has identified some water leaks, potential ways to reduce gas consumption, a better work environment, and observed an increase in general productivity. The Smart Factory project has brought two main benefits to Lindhurst Engineering: measuring the current level of waste; and identifying potential savings or improvements. Better data management is helping the company to turn information into intelligence, helping them reduce inefficiencies, optimise operations and reduce overall carbon emissions.

For more details about the project, please access - <https://www.emc-dnl.co.uk/news/2020/11/10/sustainable-east-midlands-lindhurst-engineering/>

Resource Efficiency in action – Superior Wellness

Superior Wellness is the largest hot tub distributor in Europe. Hot tubs are delivered from manufacturers in China and the United States and then sold in Europe to other distributors.

In 2021, after moving into a new site, Superior Wellness was receiving electricity bills higher than expected. Moreover, the company did not know what the main sources of electricity usage were and had no way of knowing where to start when it came to cutting costs and saving energy. This problem could provide financial risks for the company in the long-term. To address these issues, the DE-Carbonise Project provided a Smart Factory solution for the company, helping the organisation to install smart sensors across the manufacturing plant and to monitor environmental and operational data. The aim was to enhance manufacturing efficiency and to find areas for future optimisation. Working alongside the University of Derby and a Derby-based bespoke electronics developer, the company is now able to monitor gas, and electricity across different areas of the company, air quality, temperature, humidity, and light levels.

Superior Wellness now has real-time energy data at their fingertips via the dashboard provided. A holistic overview of the environmental performance of the business, including the real-time costs and carbon emissions are now clearly visible. The information is being used to find improvements in operational efficiency and potential energy savings. Potential faults and sources of energy wastage can easily be spotted in the data trends, including machine idle time versus utilisation. So far, Superior Wellness has already identified inefficiencies in gas usage and initial findings suggest that the company could save up to 30% on its gas usage.

Action checklist:

- 1 Identify resource efficiency opportunities.
- 2 Define and collect resource use data and classify it according to type and source.
- 3 Establish resource efficiency targets.
- 4 Develop resource consumption measurement systems.
- 5 Assign responsibility for data input and monitoring in your business.
- 6 Measure and analyse resource usage.
- 7 Communicate progress on resource efficiency initiatives to senior management and ensure support and resource allocation long-term.
- 8 Monitor and control resource efficiency.
- 9 Compare the resource efficiency of your business with others in the sector to establish opportunities to introduce new and more resource efficient methods and operational systems.
- 10 Look for additional resource efficiency opportunities.

Helpful resources and support:

[Smart Factory: Smart Manufacturing in the Digital Factory](#)

[Resource Efficiency Roadmap for Businesses](#)

[Resource Efficiency for Business: GIZ Online training series](#)

[Industry 4.0: The Beneficial Trends and Challenges for SMEs](#)

[Resources and waste strategy for England](#)

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HSRC (2019) *Industry 4.0 Technologies | Industry 4.0 Research*.

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Jung, WK., Kim, DR., Lee, H. et al. (2021) *Appropriate Smart Factory for SMEs: Concept, Application, and Perspective*. International Journal of Precision Engineering & Manufacture 22, 201-215.

Made Smarter Review (2017). *An industry-led review exploring how UK manufacturing can maximise benefits from increasing adoption of digital technology through a strong industry and government partnership*.

Glossary

Resource Efficiency means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows us to create more with less and to deliver greater value with less input. [European Commission](#)

Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. [Gartner](#)

Industry 4.0 represents a new industrial revolution—one that combines advanced manufacturing techniques with digital technologies to create manufacturing systems that are not only interconnected, but communicate, analyse, and use the information to drive further intelligent action back in the physical world. [Deloitte](#)

Smart Factory A factory with an interconnected network of machines, communication mechanisms, and computing power. It is a cyber-physical system that uses digital technologies such as artificial intelligence (AI) and machine learning to analyse data, drive automated processes, and learn as it goes. [SAP](#)

Artificial Intelligence refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect. [Oracle](#)

Internet of Things (IoT) is the concept of connecting any device to the Internet and to other connected devices. The IoT is a giant network of connected things and people. [IBM](#)

Machine Learning is a branch of artificial intelligence and computer science that focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. [IBM](#)

Opportunity 4: From Waste to Value Streams

Key facts:

In 2018, the UK generated 222 million tonnes of total waste. 43.9 million tonnes of this was Commercial and Industrial (C&I) waste.

- 64% of SMEs have increased recycling in their business.
- 50% have taken steps to eliminate waste wherever possible.
- 47% are avoiding plastic products if an alternative is available. FSB (2021, p.16)

Opportunity:

Waste minimisation is one of the key priorities of decarbonisation. The UK identifies natural capital as one of our most valuable assets. The air we breathe, the water we drink, the land we live on, and the stock of material resources we use in our daily lives are at the heart of our economy, our society, and our way of life. The overall UK strategy (DEFRA 2018) aims to set out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency, and moving towards a circular economy. At the same time, we will minimise the damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime. It combines actions we will take now with firm commitments for the coming years and gives a clear longer-term policy direction in line with the 25-Year Environment Plan. The plan aims to extend the lives of the materials and goods that we use and move society away from the inefficient 'linear economy' to a 'circular economy'.

Key terms: resource efficiency, waste upcycle, circular economy.

Circular Economy

In recent years, the way companies view waste has shifted dramatically. Rather than focusing on dealing with waste and emission reductions, forward-looking companies look for cost-saving opportunities by eliminating or minimising waste from the outset, recovering valuable resources to re-use in the value chain, as well as identifying end of life opportunities, such as take back schemes for refurbishment.

In the current economic system, we take materials from the Earth, make products from them, and eventually throw them away as waste – the process is linear. In a circular economy, by contrast, we stop waste from being produced in the first place by using the resources to their maximum potential. By shifting our mindset, it is possible to treat waste as a design flaw. In a circular economy, a specification for any design is that materials re-enter the economy at the end of their use. This approach creates new business models, such as take-back initiatives, end of life opportunities and re-design. By doing this, we take the linear take-make-waste system and make it circular. Figure 4.1 represents the difference of a 'linear economy' to a 'circular economy'.

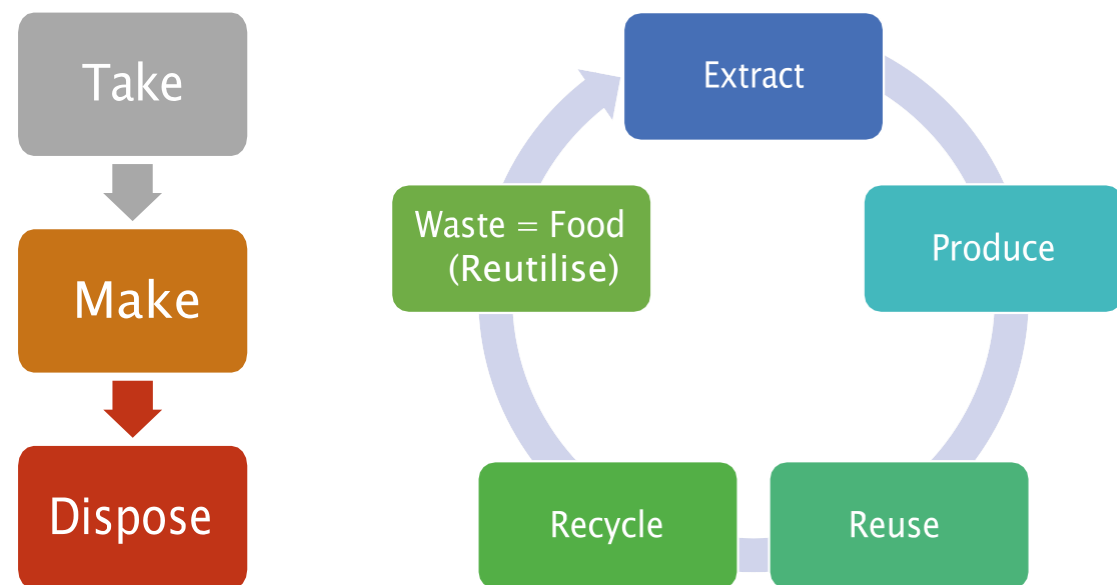


Fig. 4.1 Linear Economy x Circular Economy

Over recent years, businesses have been hugely cost inefficient by failing to capture the value of industrial waste, but applying circular economy strategies, enabled by new technologies, can create significant cost-saving opportunities as well as profitable new revenue streams. Many products could be circulated by being maintained, shared, reused, repaired, refurbished, remanufactured, and as a last resort, recycled. Food and other biological materials that are safe to return to nature can regenerate the land, fuelling the production of new food and materials. The circular economy concept is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution.

The UK has a clear strategy towards waste management. The nation's plan is to become a world leader in using resources efficiently and reducing the amount of waste we create as a society. The plan aims to extend the lives of the materials and goods that we use and move society away from the inefficient 'linear' economic model of 'take, make, dispose' to a more circular economy that focuses on keeping resources in use (at their highest value), as much as possible, and to extract the maximum worth from them, as represented by Figure 4.2. This means recovering and regenerating products and materials whenever we can, giving them a new lease of life and reducing waste levels.

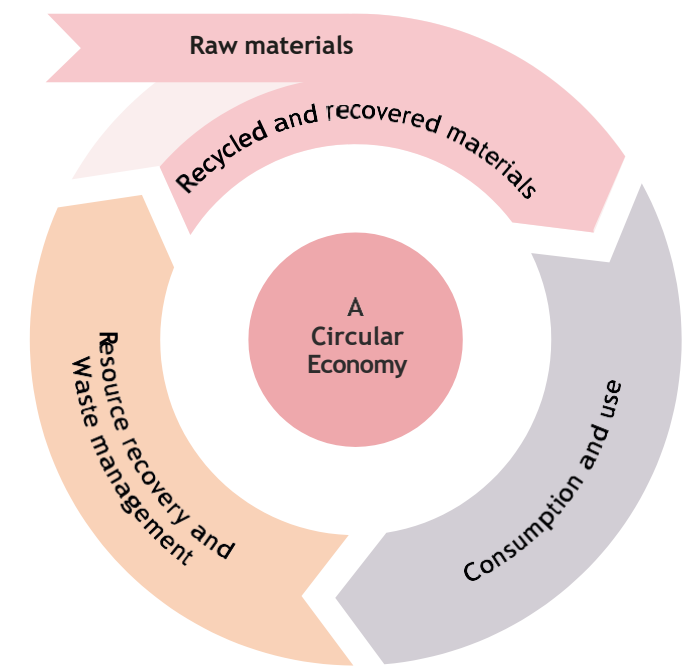


Fig. 4.2 Circular Economy Framework (DEFRA, 2018)

The ReSOLVE Framework

Through research conducted on case studies and expert interviews, the Ellen MacArthur Foundation has identified a set of six actions that businesses can take to transition to a more circular economy: Regenerate, Share, Optimise, Loop, Virtualise, and Exchange – together, the ReSOLVE framework. The ReSOLVE framework (Figure 4.3) offers businesses and governments a tool for generating circular strategies and growth initiatives. In different ways, these actions all increase the utilisation of physical assets, extending their life, and shifting resource use from finite to renewable sources. Each action reinforces and accelerates the performance of the other actions. The **In practice** section below provides examples of business models that are using elements of the ReSOLVE framework.

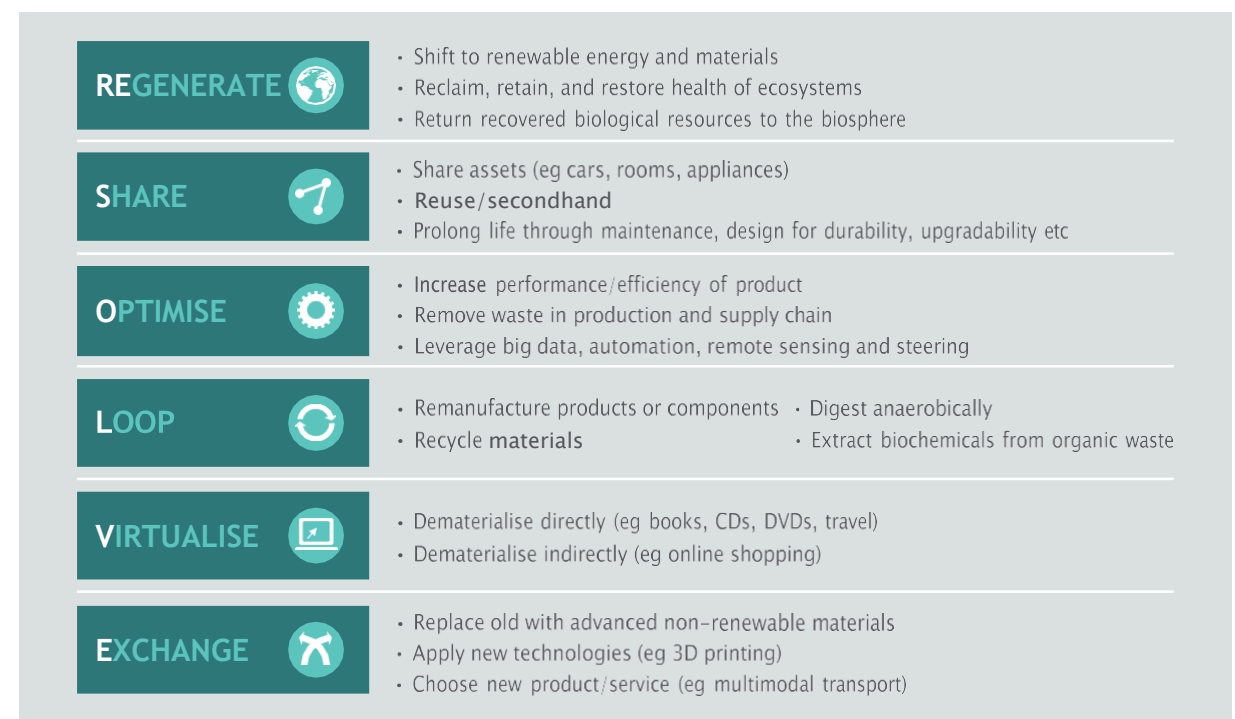


Fig. 4.3 Towards a circular economy: Business rationale for an accelerated transition (Ellen McArthur Foundation, 2015)

In Practice

Waste in fashion

The fashion industry is a significant contributor to textile waste and carbon emissions, and, according to Nature journal, responsible for as much as 10% of all global pollution, making it the second most polluting industry after aviation. In the latest years, Fast Fashion – a business model that increases the number of styles and collections of clothing, along with lower prices – has led to a significant increase in fashion waste. The average consumer is buying more clothes, wearing them less, and creating more waste. Additionally, inefficient manufacturing practices mean that clothing ends up on the cutting room floor, rather than being recycled.

Like many similar retail outlets nationwide, The Amber Room, a Derby-based clothing store, offers an alternative to Fast Fashion in the East Midlands region. The store sells second-hand, high-quality clothing at a fraction of the original price. By shopping second-hand and recycling unwanted clothing, consumers save large amounts of perfectly good, reusable, wearable items from landfills.

For more details, please access:
www.lowcarbonbusiness.net/the-amber-room-opens-a-new-shop-at-intu-derby/



Waste in construction

Westville Limited is a specialist insulation contractor, based in Derbyshire. The company provides energy-saving solutions to homeowners and commercial organisations in the Midlands region and retrofit to existing building stock makes up a large part of their activities.

Westville Limited was interested in understanding the potential of a sustainable option in terms of waste management for the Expanded Polystyrene (EPS) used on-site. To address this challenge, a desktop study was conducted by the DE-Carbonise Project with input from academic literature and various external bodies. Westville build prefabricated units on-site and insulates them using EPS. While the waste is readily used as Refuse Derived Fuels (RDF) there are issues in that there is not the space to collect a skip of just EPS and therefore it goes as general waste to be sorted by the waste contractor. This has several issues: it is a lightweight material but takes up space so Westville is paying for more skips than would be necessary if the space existed on site to have a compactor. The waste must be reported by the waste contractors and the material is used purely as a feedstock for energy from waste. The availability of space on site is an issue that is challenging as the company is on-site for a short period and space is at a premium.

The DE-Carbonise Project outlined several alternative options not only in terms of waste disposal as a replacement for the existing RDF route but also in terms of using a different material. There is a desire for the business to reduce the overall carbon emissions of their operations. A reduction in the emissions associated with the solid waste stream would be a great next step. Currently, the waste is being disposed of and energy is recovered through its use as RDF.

Action checklist:

- 1 Identify resource use data and classify it according to type and source.
- 2 Identify waste generation data and classify it according to type and processing.
- 3 Identify operational areas for resource efficiency interventions and waste recovery opportunities.
- 4 Establish resource efficiency and waste efficiency targets.
- 5 Develop resource consumption measurement systems.
- 6 Assign responsibility for data input and monitoring in your business.
- 7 Communicate progress on initiatives to senior management and ensure support and resource allocation long-term.
- 8 Compare the resource efficiency and waste streams of your business with others in the sector to establish opportunities to introduce new and more resource efficient methods and operational systems.
- 9 Look for support from local councils or local universities and work on customer relationships.
- 10 Making change means changing mindsets, behaviours and management systems as well as processes and technology.

Helpful resources and support:

[Ellen MacArthur Foundation](#)

[EU waste and recycling Policies](#)

[Resources and waste strategy: at a glance](#)

[UK Circular Economy Centres](#)

[The Waste and Resources Action Programme \(WRAP\)](#)

[WRAP Voluntary agreements](#)

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DEFRA (2018) [Our Waste, Our Resources: A Strategy for England](#). HM Government

Ellen McArthur Foundation (2015) [Towards a circular economy: Business rationale for an accelerated transition](#).

FSB (2021) [Accelerating Progress: Empowering small businesses on the journey to net-zero](#)

Glossary

Linear Economy is the current, classical economic system, where we take materials from the Earth, make products from them, and eventually throw them away as waste – the process is linear. [Ellen MacArthur Foundation](#)

Circular economy, by contrast, is an economic model in which we stop waste being produced from the outset by using the resources to their maximum potential. In a circular economy, a specification for any design is that the materials re-enter the economy at the end of their use. By doing this, we take the linear take-make-waste system and make it circular.

[Ellen MacArthur Foundation](#).

Opportunity 5: Low Emission Vehicles

Key facts:

Only 9% of SMEs plan to switch some or all of their fleet to low-emission vehicles by 2030.
Federation of Small Business (2021)

The UK is at the forefront of the global transition to sustainable transport. In July 2021, the government revealed the Transport Decarbonisation Plan (TDP) which sets out how the UK will deliver the net zero target for transport Greenhouse Gas emissions. The UK strategy aims to put the country at the forefront of the design and manufacturing of zero-emission vehicles and batteries and end the sale of new conventional petrol and diesel cars and vans by 2030. However, only a tiny proportion of SMEs are planning for this future. Business transport is a major investment for many businesses, so if you run a fleet of vehicles, it's time to get ready for ultra-low emission transport.

Opportunity:

While more expensive to purchase than similar diesel or petrol vehicles, in the medium to long term, adopting electric vehicles can reduce your firm's costs for fuel and tax, as well as significantly reducing fleet carbon dioxide emissions. Electric vehicles offer savings for companies, including:

- A full charge in a purely electric vehicle will give a typical range of over 200 miles and will cost approximately £8 -12. Driving 200 miles in a petrol or diesel car will cost around £37- 41 in fuel. The cost savings will be most significant when owners charge at home/base and have access to an off-peak overnight electricity tariff.
- There are fewer mechanical components in an electric vehicle compared with conventional vehicles which often results in lower servicing and maintenance costs.
- Pure electric vehicles currently have a zero rate of vehicle excise duty.
- From 25 October 2021, only zero-emission vehicles - those emitting 0g/km CO₂ - qualify for the cleaner vehicle discount. All other vehicles regardless of their emissions status will be required to pay city congestion charges.
- The low or zero emissions of plug-in vehicles mean that they will attract lower charges from clean air zones being implemented around the UK and London's ultra-low emission zone (ULEZ).
- Free parking for electric vehicles is available in some towns and cities.

Supporting other measures to clean the air around us, decarbonising your business transport, will help save lives and improve health. Tyre and brake wear still produce some particulate emissions but the toxic by-products of burning hydrocarbon fuels will be eliminated from the roadside. Zero-emission roads are also noticeably quieter. Reducing vehicle noise and toxic tailpipe pollution will transform streets and communities blighted by traffic pollution. This will support levelling up and help reinvent high streets as enjoyable places to live, work, visit and spend leisure time.

Key terms: green fleet, sustainable transport, electric and hybrid vehicles.

In Practice

Net Zero Accelerator Electric Fleet Transition Scheme

The Electric Fleet Transition Scheme assisted SMEs in Derbyshire and Nottinghamshire to transition to electric vehicles by providing access to specialist knowledge and training. Cenex delivered the scheme as part of the Net Zero Accelerator (NZA) programme which was part-funded by the UK Government through the UK Community Renewal Fund. The Scheme supported 9 organisations that operated commercial vehicle fleets of between 1-50 vehicles. Participating organisations had access to telemetry devices to capture their vehicle usage patterns, specialist support was on-hand to answer any queries, three workshop training sessions on electric vehicles and their implementation were delivered. The participating organisations left the scheme with a tailor-made electric vehicle Transition Plan (covering cost and emission savings available, plus next step actions) for their fleet and the knowledge and the knowhow to implement the vehicles and infrastructure.

Fleet Characteristics - Scheme members had a large variety of operational uses of their vehicles. These included, for example, specific vehicle types such as minibuses and 24 hour on-call vehicles, as well as high mileage vans. There was also a large variation in vehicle numbers from single van users right up to almost 50 vans. Although each operator cited their own specialisms and operational needs, the scheme had sufficient flexibility to allow all members to input their specific requirements, and to successfully produce their own EV Transition Plan.

Level of Knowledge - Similar to the operational characteristics, there was wide variance in the scheme members' level of knowledge around electric vehicles and how they could fit into their business. Some companies were already using electric vehicles and used the scheme to move further and faster towards electrification, whilst others had some understanding following a short trial. Some had no experience of choosing or using an electric vehicle for their organisation. An issue common to most was the level of understanding about installing charging infrastructure. The scheme workshops provided advice and guidance on both choosing and using electric vehicles and infrastructure and helped the firms to develop a bespoke Transition Plan.

Transition Plans - The Transition Plan showed how the companies could make the switch to electric vehicles, albeit in smaller numbers or longer time frames than anticipated. Some fleet operators with very low mileages or large vehicles were unable to show a cost saving but were nonetheless committed to making the transition to electric vehicles due to pro-environmental business values. Key next steps for the scheme members included:

- Assessing the feasibility and costs of siting electric vehicle charging infrastructure for their organisations.
- Undertaking vehicle trials.

For some, the scheme had allowed them to assess their fleet more thoroughly, causing them to consider possibly reducing their current vehicle numbers and to also investigate other emission reducing fuels, and specific electric vehicle routing software.

The fleet Transition Plans showed that most scheme members were able to procure electric vehicles into their fleet by 2025, with 33 vehicles to be in place by then and a further 23 electric vehicles planned to be procured between 2025 and 2033.

Using the information contained in the Transition Plans, the scheme predicts that once transitioning to electric vehicles is complete there could be:

- Overall annual cost savings of £114,000.
- Overall annual tailpipe CO₂ emission savings of 2,100 tonnes.
- Overall annual Well-to-Wheel CO₂ emission savings of 1,800 tonnes.

The Electric Fleet Transition scheme proved to be a valuable mechanism to support small businesses and help accelerate their shift to net-zero. The scheme allowed small businesses, who may otherwise not have the capacity or financial resources, to access specialist information, training and support.

The Low Carbon and Fuel Cells Centre of Excellence (Cenex) is an independent non-profit research and consultancy that helps private and public sector organisations devise low emission transport strategies, helping organisations to identify sustainable, zero tailpipe emission alternatives for business fleets by assessing the current and future economic, operational and environmental impacts. Cenex offers:

- Fuel Saving Opportunity Assessment - Identifying opportunities to reduce fuel through best practice and implementation of cost-effective fuel and emissions saving measures.
- Fleet Review - Identifying the most cost effective and operationally suitable low emission vehicles for your fleet with a low emission fleet replacement strategy.
- Fleet Advice Scheme - Aimed at SMEs with commercial vehicle fleets, one of our experts will provide long term strategic support and advice through a structured programme in your transition to low emission.
- Vehicle Trial Support - Independently verifying alternatively fuelled vehicle trials to enable large scale implementation and ensure fuel, emission and energy savings.
- Zero Emission Vehicle Training - Preparing your organisation to plan for the low emission road ahead.

Lowering your emissions through innovation in transport and energy infrastructure



In partnership with
www.cenex.co.uk

Fleet Transition in action

Carmel Ltd is one of the UK's top 50 mechanical and electrical companies. It provides a complete package of scalable managed building services for a wide range of clients in the UK, including major retailers, national developers, and commercial chains. The firm approached the University of Derby DE-Carbonise project to improve awareness and understanding of options available for meeting the transportation requirements of the business, with a focus on providing an evidence base so that the company gained a full understanding of the impacts of alternative transportation solutions. The following recommendations were provided:

- Monitor travel emissions and report as a key process indicator (KPI) for the business.
- Implement a phased modal shift to rail to offset car emissions.
- Consider a phased transition to electric vehicles (EVs) for shorter journeys, both cars, and small vans, until they reach cost parity with conventional vehicles.
- Outline a vehicle procurement plan for managing the UK government ban on the sale of all new fossil fuel vehicles by 2035.
- Install an affordable, efficient, and reliable charging infrastructure for the business.
- Encourage employee uptake of the cleanest vehicles through government support schemes.
- Use informal rules and organisational culture as routes for implementation as these are often more important, and evident than formal policies around travel.
- Allow employees to be autonomous in the way that they manage their time; with less focus on 'time spent' and more on 'tasks achieved'.

The potential emissions reduction for Carmel Ltd is more than 95%, moving from 374 MgCO₂e to 14 MgCO₂e per annum. Carmel has a continuous improvement culture that runs throughout the company and applies to all aspects of their business. There are added opportunities to link behavioural change, emissions reductions, and customer focus – with emissions reductions used as a marketing differentiator and unique selling point to clients.



www.carmel-group.co.uk

Action checklist:

- 1 Identify your company's needs including fleet size and fleet type (HGVs, vans, cars).
- 2 Understand the current (and future) legislation and how this will affect your business.
- 3 Understand your journey profiles and monitor travel emissions as a KPI for the business.
- 4 Assess the employee uptake of cleaner vehicles.
- 5 Select the vehicle(s) best suited to your needs.
- 6 Run and assess a vehicle trial.
- 7 Search for grants and funding opportunities.
- 8 Install the EV charging infrastructure.
- 9 Proceed with the procurement process.
- 10 Identify ways to grow a green fleet.

Helpful resources and support:

[Types of Electric Vehicles Explained](#) (YouTube video)

[Energy savings trust – Business transport](#)

[An introduction to low carbon transport online training](#)

[Sustainable transport online training](#)

[Cenex](#)

[UK's Electric Vehicles database](#)

[Grants for Low Emission Vehicle](#)

[Vehicle tax rates](#)

[UK's path to net zero set out in landmark strategy](#)

[Decarbonising transport: a better, greener Britain](#)

[Office for Zero Emissions Vehicles – Part of the Department for Business, Energy and Industrial Strategy](#)

References:

Federation of Small Business (2021) Accelerating Progress: Empowering small businesses on the journey to net-zero.

Glossary

Battery-electric vehicles (EVs) are powered only by electricity, also known as a 'pure' or 100% electric car. The vehicle is charged by an external power source, i.e., at a charge point. Most battery-electric cars have a real-world range of 100–300 miles on a single charge. [Energy Savings Trust](#)

Plug-in Hybrid Electric Vehicles (PHEVs) have a battery, electric drive motor and an internal combustion engine (ICE). These vehicles can be driven using the ICE, the electric drive motor, or both, and can be recharged from an external power source. Typical PHEVs will have a pure-electric range of up to 50 miles. Once the electric battery is depleted, journeys can continue in hybrid mode, meaning that there is no range limitation. [Energy Savings Trust](#)

Extended range electric vehicles are a version of plug-in hybrids. This type of vehicle combines a battery, an electric drive motor, and a small petrol or diesel generator. The electric motor always drives the wheels, with the ICE acting as a generator when the battery is depleted. The range of these vehicles can be between 150–300 miles. [Energy Savings Trust](#)

Opportunity 6: Greening your supply chain



Key facts:

- Commonly, **55-85%** of company emissions are found in the supply chain (Carbon Trust, 2011)
- **75%** of the world's largest companies expect to deselect suppliers based on environmental performance. This number is lower for companies further up in the value chain, e.g., energy and mining companies, and higher for companies lower down in the value chain, e.g. retailers (Edie, 2021)

Opportunity:

When companies decide to optimise their supply chains towards net-zero, this increases efficiency, reduces costs and improves overall customer service. It has the potential to improve reputation among consumers who have rising expectations for sustainable business and sustainable products. In addition, it facilitates interest from investors who increasingly demand strong environmental, social and corporate governance.

The [IEMA YouGov poll 2022](#) showed that organisations are investing in systems and methods to monitor and report on their environmental performance and impacts. These methods reveal where environmental improvements are being made, value added and contribute to the business case for green workforce transformation. Procurement teams were identified as early adopters of **social value frameworks** that inform commercial decisions whilst simultaneously creating pro-environmental and pro-social benefits.

Key terms: green supply chain, greening, supplier-buys relations, environmental management.

Taking Action

- **Green supply chain** management is a pro-environmental initiative to enhance product and process performance in accordance with environmental regulations
- reduction or elimination of wastage including emissions of harmful chemicals, energy and solid wastage in supply operations.

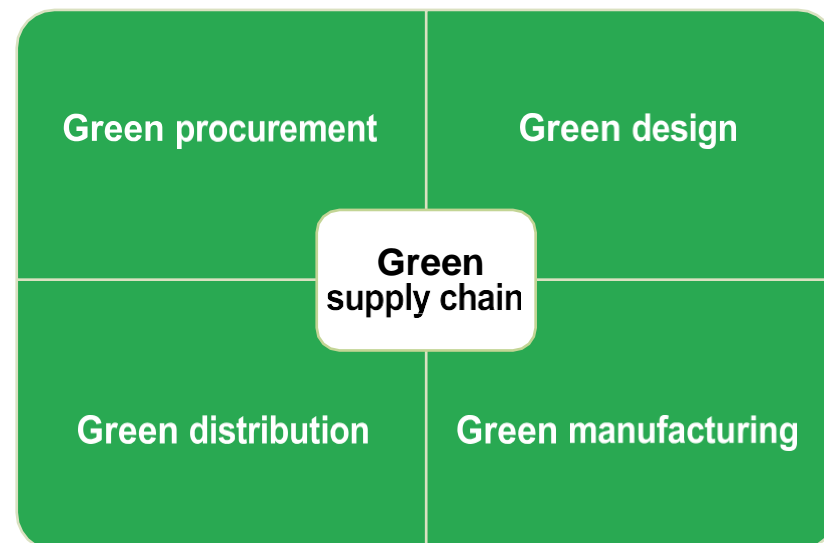


Figure 6.1 Green Supply Chain Management

Increasing numbers of companies are pledging to protect the environment and setting net zero emissions targets. However, delivering on supply chain (scope 3) emissions remains a challenge for most firms. Scope 3 emissions are indirect emissions from activities outside of the organisation, relating to the company's supply chain or from other sources that they do not own or control. Typically, supply chain emissions can be four times that of direct operations, representing as much as 55-85% of total carbon emissions of an individual company. This number is lower for companies further up in the value chain, e.g., energy and mining companies, and higher for companies lower down in the value chain, e.g., retailers.

Although the supply chain appears to be linear, there are many moving parts and complexities that make supply chain management difficult. For this reason, most scholars divide supply chains into two parts: upstream and downstream supply chain.

Upstream supply chain:

The [GHG Protocol](#) identifies the most relevant upstream supply chain activities, including those related to the organisation's suppliers, namely purchased goods and services, business travel, fuel and energy related activities, transportation and distribution and more. Examples of actions to reduce upstream emissions include:

Green Procurement:

- Replace high emissions raw materials with low emissions raw materials.
- Implement sustainable procurement policies.
- Supply materials and services from accredited suppliers (See Opportunity 10: Environmental Accreditation and Green Marketing)

Business travel:

- Reduce the amount of business travel, when possible (e.g. encourage video conferencing and web-based meetings as an alternative to in-person meetings).
- Encourage more efficient and lower-emitting modes of travel (e.g. rail instead of plane - See Opportunity 5: Low Emissions Transport).

Fuel and energy:

- Reduce energy consumption (e.g. search for process inefficiencies - See Opportunity 3: Resource Efficiency).
- Change energy source (e.g. shift toward lower-emitting fuel/energy sources - See Opportunity 2; Energy Efficiency).
- Generate energy on site using renewable sources.

Transportation and distribution:

- Reduce distance between supplier and customer, shortening supply chains.
- Source materials locally, when possible.
- Optimise efficiency of transportation and distribution.
- Replace carbon intensive transportation modes (e.g. air transport) with low-carbon transportation modes (e.g. marine transport) - See Opportunity 5: Low Emission Transport.
- Shift toward lower-emitting fuel sources.

Downstream supply chain:

The downstream supply chain refers to activities post-manufacturing, namely transporting and distributing the product to the final customer, the use of sold products and the end-of-life.

Transportation and distribution:

- Reduce distance between supplier and customer, shortening supply chains.
- Source materials locally, when possible.
- Optimise efficiency of transportation and distribution
- Replace carbon intensive transportation modes (e.g. air transport) with low-carbon transportation modes (e.g. marine transport) -Opportunity 5: Low Emissions Vehicles
- Shift toward lower-emitting fuel sources,

Use of sold products:

- Develop new low- or zero-emitting products.
- Increase the energy efficiency of energy-consuming goods or eliminate the need for energy use, when possible.
- Reduce the quantity of GHGs contained/released by products.

End-of-life:

- Make products repairable, re-useable and recyclable.
- Reduce the usage of packaging in sold products or use low-carbon packaging materials.
- Implement recycling measures that lead to net GHG reductions.
- Promote the circularity of end-of-life products (See Opportunity 4; Waste to Value Streams).

The upstream and downstream emissions are outside of the direct control of companies, yet as the interface between producers and customers, firms can support carbon emissions reductions across the supply chain.

Tools

Sustainability Tool from the Supply Chain Sustainability School: A software application designed to help organisations and supply chains track and measure their sustainability performance.

Footprint measurement and analysis from Carbon Trust: Carbon Trust can help companies to measure and analyse all aspects of a company's carbon and environmental impact, including product, organisation and value chain footprint.

Value chain and supply chain sustainability from Carbon Trust: Carbon Trust can also assess the carbon and environmental impacts and risks across an organisations' value chain. They help companies to set realistic strategies and targets that deliver efficiency and reputational gains, mitigate risks, cut costs and increase revenue.

Small business user guide: Guidance on how to measure and report your greenhouse gas emissions: The guidance explains how organisations can measure and report their GHG emissions as well as set targets to reduce them.

In Practice

Greening the supply chain in action

Unwrap is plastic-free home grocery delivery start-up who initially approached the ERDF DE-Carbonise project seeking support to operationalise their sustainable business model. The project team provided a process design analysis of their suppliers, customers and delivery process, with the objective of making the business model as sustainable and lean as possible.

An initial 6-week pilot project had mixed results. On one hand, the average number of deliveries dropped by one third. However, the average order increased from £51 to £70. Some customers were ordering less frequently or coordinating delivery addresses. It was also observed that a third of the company's customers were very engaged by the change to electric van delivery. The pilot project was extended for an additional 4-week period to work on timings for the right delivery process efficiency.

For Unwrap, the key recommendation for decarbonisation was to make the shift to electric vans. The project team introduced Unwrap to a local carbon neutral and cost-effective delivery service company who could help them transition from a diesel van to zero emission delivery, which is set to reduce their emissions by 2 tonnes of CO₂e each year.

Action checklist:

- 1 Define business goals
- 2 Map end-to-end supply chain
- 3 Identify scope 3 activities
- 4 Collect data
- 5 Set targets
- 6 Move to low-carbon logistics
- 7 Source sustainably
- 8 Track emissions over time
- 9 Report emissions
- 10 Help employees and customers to live low carbon lifestyles

Helpful resources and support:

[Ellen Mac Arthur Foundation](#)

[WRAP](#)

[Carbon Trust](#)

[GHG Protocol](#)

Specific Industry Organisations (e.g. <https://brc.org.uk>)

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Carbon Trust (2011). Cutting carbon from the supply chain: A business critical mission. Available at: www.carbontrust.com/news-and-events/insights/cutting-carbon-from-the-supply-chain-a-business-critical-mission.

Edie (2021). Just one in ten UK SMEs measuring their carbon emissions, survey finds. Available at: www.edie.net/just-one-in-ten-uk-smes-measuring-their-carbon-emissions-survey-finds/.

Glossary

Upstream supply chain is the set of activities related to the organisation's suppliers, namely purchased goods and services, business travel, fuel and energy related activities, transportation and distribution. [GHG Protocol](#)

Downstream supply chain is the set of activities related to the organisation's transportation and distribution of the product to the final customer, the use of sold products and the end-of-life processes. [GHG Protocol](#)

Acknowledgements

Thanks go to the many business leaders who have collaborated with us over the years, only some of whom are represented in this guide.

Appreciation also goes to the many colleagues from the DE-Carbonise team at the University of Derby, Derby City Council and Derbyshire County Council who have contributed insight, information and patience whilst this guide was created.

Finally, we wish to acknowledge the European Regional Development Fund that supported the programme delivery and creation of these legacy materials.

Opportunity 7: Green Funding and Finance



Key facts:

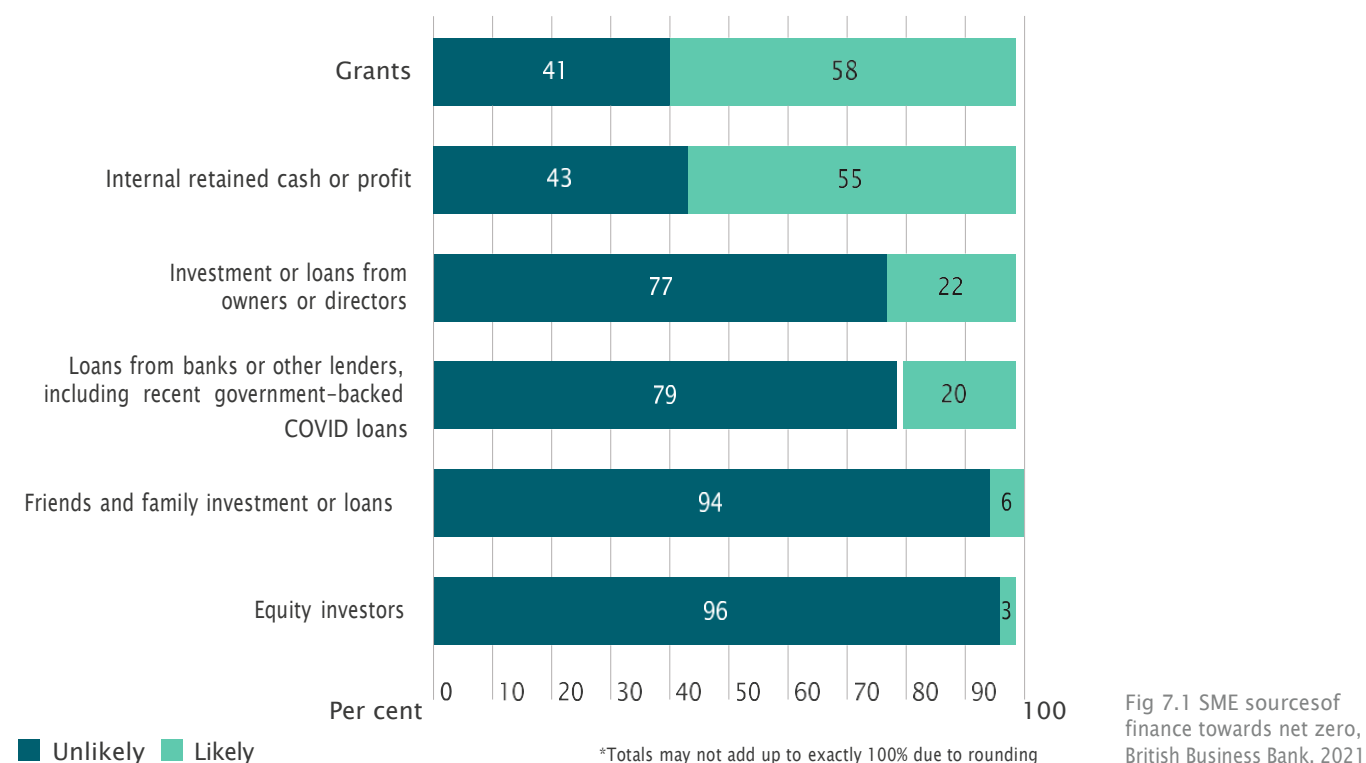
Only 18% of SMEs have invested in generating their own energy. Of those that have not yet taken steps to address their energy usage:

- 22% highlight the lack of capital (reserves) as a reason for not investing.
- 54% of SMEs say grants or low interest loans will help them be more energy efficient. (FSB,2021).

More than 1 in 10 UK SMEs have accessed external finance for net zero actions, and 22% of SMEs are willing to consider external finance to support net zero action. (British Business Bank 2021)

Opportunity:

Green funding and finance are important levers for stimulating green growth and sustainable development, and there are a range of initiatives available for start-ups and small businesses aimed at supporting eco-innovation, carbon reduction and energy-efficient projects. However, these options change frequently in response to current funding streams. Making a choice can be confusing and time consuming and applying for green funding can be a complicated process as many grants and loans have strict eligibility criteria. Despite this, they are likely to remain an important stimulus for small businesses aiming to start or accelerate the decarbonisation journey.



The British Business Bank's Net Zero Survey in 2021 indicated that only 11% of smaller businesses in the UK (equating to around 700,000 firms) have accessed external finance to support net zero actions. The survey also shows that 58% of SMEs who are considering or already doing at least one net zero action said that they would be very or fairly likely to access grant funding to support future net zero actions, ahead of using retained cash/profit (55%), external finance from banks or other lenders (20%) and investments/loans from owners/directors (22%). Fewer than 10% were open to equity or investment/loans from friends and family.

Capital investment is an important mechanism for accelerating the uptake of energy efficiency, eco-innovation, re-engineering business operations, developing new green technology or completely redesigning your business model. However, poor referral networks, a lack of specialist net zero financial advisers and a lack of signposting or accessible information are the main barriers to the uptake of green finance by SMEs.

Key terms: Green funding, green finance, green grants, eligibility criteria, grant proposal

Taking Action

[Zero Carbon Business](#) provide a comprehensive and regularly updated overview of grants and funding opportunities in the UK.

Grant funding:

UK Research and Innovation (UKRI) is a one stop shop for early-stage R&D grants. UKRI convenes, catalyses and invests in close collaboration with others to build a thriving, inclusive research and innovation system. It provides a [search facility](#) that covers many of the large innovation funding bodies.

Grant Finder - Energy Grants & Funding:

Grant Finder have created a [listing of new UK/EU grants and funding opportunities related to energy](#). These funding opportunities are offered by both private and public bodies and may be relevant to those seeking green/renewable energy grants across the UK and further afield. The grants may also be of interest to those seeking investment to innovate in the energy sector with a focus on energy efficiency, renewables and low-carbon technology.

Government funding:

Almost £5 billion of funding is available to help UK businesses become greener as part of the government's commitment to reach net zero emissions by 2050. The latest governmental funding calls can be found at the [Funding to help your business become greener \(BEIS\) website](#).

Regional organisations:

Organisations such as your Local Enterprise Partnership (LEP) or Chamber of Commerce often provide funding search facilities. Getting to know the relevant 'officer' is a great first step in tuning in to current opportunities, although as noted above, there is no guarantee of finding someone with expert knowledge of net zero funding and finance.

[D2N2 Funding Tracker](#)

[Clean Growth UK – Funding search](#) (login required)

[Sustainable East Midlands – Funded Support and Programmes](#)

Finance options:

It is becoming more common for Commercial Banks to offer environmentally focused services and resources to SMEs. For example: [Natwest Climate Accelerator Programme](#), the HSBC Sustainability Hub and [HSBC Green SME Fund](#) provide loans for small businesses and help businesses 'to seize the opportunities and growth potential that sustainability offers'.

There are also a small but growing number of **angel investor** groups that invest in entrepreneurs and early-stage companies whose innovative technology, products or systems provide profitable solutions to climate change and global warming. [Earth Angel Investors](#) and the [Green Angel Syndicate](#) are just two examples.

Eligibility Criteria for grants and loans:

When considering which source of green funding to apply for, you will need to be clear about the purpose of the grant or loan and the terms of the finance. Analyse the eligibility criteria carefully and make early contact with the project team, bank or NGO offering the facility.

Studying eligibility criteria carefully ensures you do not waste time submitting an application that has little chance of being supported. Ensure you understand the terms, conditions and purposes of the funder and that your project matches the aims and mission of the funder. In general, grants are more restrictive than loans. This is often reflected in the eligibility criteria.

Funding proposals:

Most green grants applications require the following:

- A project rationale that includes environmental, social and business benefits.
- Purpose match – does your project match the purpose and mission of the funder.
- Carbon reduction targets, timescale and implementation approach.
- A clear business-case.
- Senior team experience and skills needed to undertake the project.

Innovation focused funding will often be evaluated using Technology Readiness Levels (see Opportunity 8), so ensure that your innovation is at the appropriate level for the funding you are pitching for.

Action checklist:

The following steps will help you secure green funding and finance for your business:

- 1 Be clear on the purpose of the green funding and outcomes to support your decarbonisation projects.
- 2 Research green finance offers, grants and loans widely and take time to select an appropriate source of green funding or finance.
- 3 Read and understand the eligibility criteria carefully.
- 4 Attend briefing events and register interest.
- 5 Approach the funder for preliminary discussion and more research.
- 6 Develop a solid draft proposal for the funding.
- 7 Get partner commitment early.
- 8 Get feedback from an advisor to finalise the proposal before submitting.
- 9 Leave plenty of time for bid writing, review and uploading.
- 10 Consider employing a professional bid writer.
- 11 Prepare a short professional presentation that explains your proposal succinctly.
- 12 Whether you are successful or not, ask for the feedback from the funder.

Helpful resources and support:

The [British Business Bank Finance Hub](#) has a wealth of content designed to help smaller businesses understand the various finance and loan options that can support green growth. This includes a diagnostic that identifies the most appropriate finance options for your circumstances.

[Innovate UK Sustainable Innovation Fund](#)

Carbon Trust - How SMEs can [finance energy efficiency projects](#) to help reduce emissions and drive down business cost.

[Confederation of Small Businesses \(FSB\) Guide to Sustainable Finance](#)

[KTN Financial Planning Resources](#)

[Top Tips from the Dragon's Den](#) - Low Carbon Business Network

References:

British Business Bank (2021) [Smaller businesses and the transition to net-zero](#)

Federation of Small Businesses (2021) [Accelerating Progress: Empowering small businesses on the journey to net-zero](#).

In Practice**Green Entrepreneurs Programme:**

In late 2019 Derbyshire County Council approved a Climate and Carbon Reduction Manifesto, supported by a £4m budget which identified a number of key pledges. The University of Derby has partnered with the Council to deliver a £2 million grant fund for businesses in Derbyshire that are interested in developing and investing in green energy and carbon reduction schemes as well as supporting individuals looking to retrain in the field of alternative energy. The Green Entrepreneurs Programme supports businesses and other organisations to realise green growth through the programme's three strands.

Small Grant Fund**Demonstrator Fund****Scholarship Fund**

For example, the Small Grant Fund is providing £11,000 to support the ambitions of one local cricket club to build a new modern, inclusive community hub for their village. The club began by identifying the opportunities to install technology into the new clubhouse that would reduce their reliance on non-renewable energy sources in the short term. The club are now investing in a solar energy system and expect to identify opportunities to release power back into the grid or for supplying car charging capability at the clubhouse for the community.

Glossary

Green financing: is a loan or investment (from banking, micro-credit, insurance and investment) from the public, private and not-for-profit sectors to sustainable development priorities (UNEP, 2022).

Green funds: are mutual funds or other types of investment vehicles that promote socially and environmentally conscious policies and business practices. Green funds are investment funds whose portfolio is largely based on [Environmental, Social, and Governance \(ESG\)](#) criteria.

Grant funds: are commonly offered as proportion of full project costs, under a strict set of criteria, and provided through national funding streams, such as Shared Prosperity Funding which are administered by local Councils, Local Enterprise Partnerships or other regional agencies.



Opportunity 8: Research, Development and Eco-innovation



Key facts:

47% of UK SMEs rate innovation as their highest business priority, equal with reducing costs and environmental impacts – beaten only by ‘maintaining or increasing sales’ (71%). (British Business Bank, 2021).

In the East Midlands, the percentage of companies delivering low carbon and environmental goods and services (LCEGS) rose from 16% to 45% between 2015–2022, with market entrants being the fastest growing category of firms. (Baranova, Paterson & Gallotta, 2022).

Opportunity:

Eco-innovation can be an idea for a new start-up, a new product or improvements to existing operations. The Eco-innovation observatory describes eco-innovation as the introduction of any new or significantly improved product (goods or services), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole lifecycle (EOI, 2010).

New technology is one focus for eco-innovation, but creating new services and introducing organisational changes are just as important. At its core, eco-innovation is about creating business models that are competitive whilst respecting the environment and reducing the resource intensity of products and services (Eco-Innovate!).

Our own studies of pro-environmental SMEs in the East Midlands over the last seven years, show that green market niches exist in all sectors, offering eco-innovation opportunities in the provision of low carbon and environmental goods and services (LCEGS) to the rising proportion of sustainability conscious consumers.

Key terms: Eco-design, eco-innovation

Taking Action

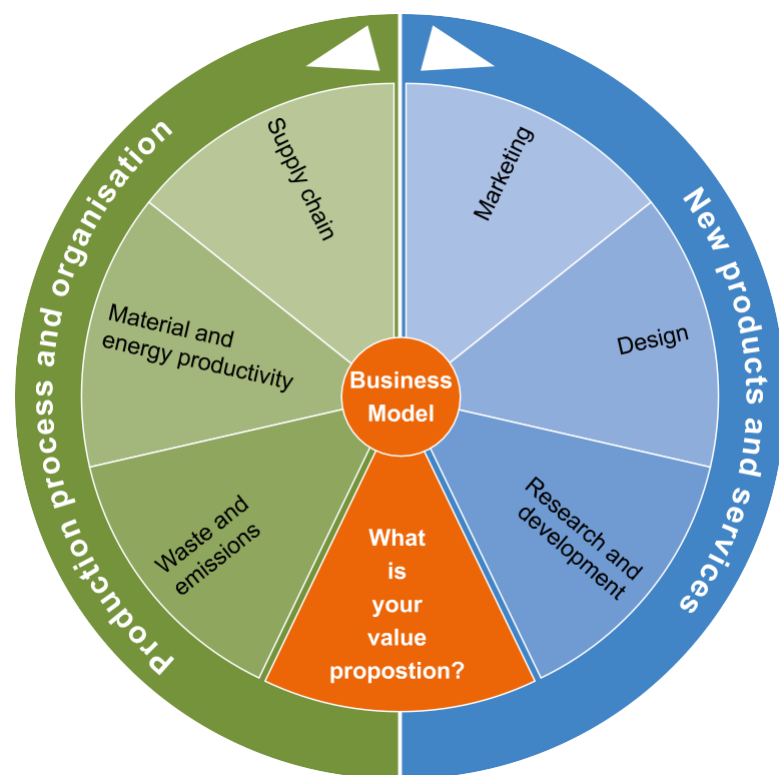


Fig 8.1 Eco-innovate framework

Eco-innovation is based on research and development that helps reduce the environmental impacts in the way products are designed, produced, used, reused and recycled. Incremental eco-innovation focuses on improving existing goods and services, whereas disruptive eco-innovation is about thinking outside of the box and bringing completely novel approaches to market that help regenerate the environment whilst also turning a profit.

The Eco-innovate framework helps firms develop the business case for eco-innovation, revisit their business model and value proposition, look at cost saving and avoidance through pro-environmental production processes and organisational innovation whilst also identifying the opportunities for new products and services.

Building capacity for eco-innovation into research and development (R&D) will help identify new business opportunities. Introducing a circular model or designing durable, repairable, re-usable and recyclable products can, however, require substantial R&D efforts. Eco-innovate! identifies some of the challenges:

- Developing eco-innovative and circular, processes, products and services may mean fundamental changes to existing designs, which may be costly in the short term but beneficial in the long term.
- Evaluating risk, especially long-term costs and benefits may be challenging.
- Understanding the environmental impacts across the life-cycle is essential, especially considering the complexity of upstream and downstream direct and indirect impacts.
- Skills (questioning, observing, experimenting and networking) and information relevant to eco-innovative R&D may not be available internally. Sourcing and impartially evaluating information, perhaps through a specialist R&D organisation, may be needed. Partnership brings the added challenge of conveying R&D ambitions and focus.

Key Questions:

- Does our company have the skills, time and money to pursue relevant R&D?
- Who has the research and technical skills to undertake eco-innovative R&D internally or externally?
- Do R&D staff need to be trained to build internal eco-innovation capacity?
- Is there a possibility to partner with a research organisation or lab in order to implement R&D for new products, technologies or processes?
- How could R&D help identify opportunities?
- Do we have systems in place to monitor eco-innovation trends related to our core business?

Tools

KTN's Innovation Canvas offers a step-by-step framework for innovation that can be used as a:

- Creative platform to sketch the landscape in which you are developing an eco-innovation.
- Diagnostic tool to get a better understanding of an opportunity, to improve an offer or to strengthen the capacity to innovate.

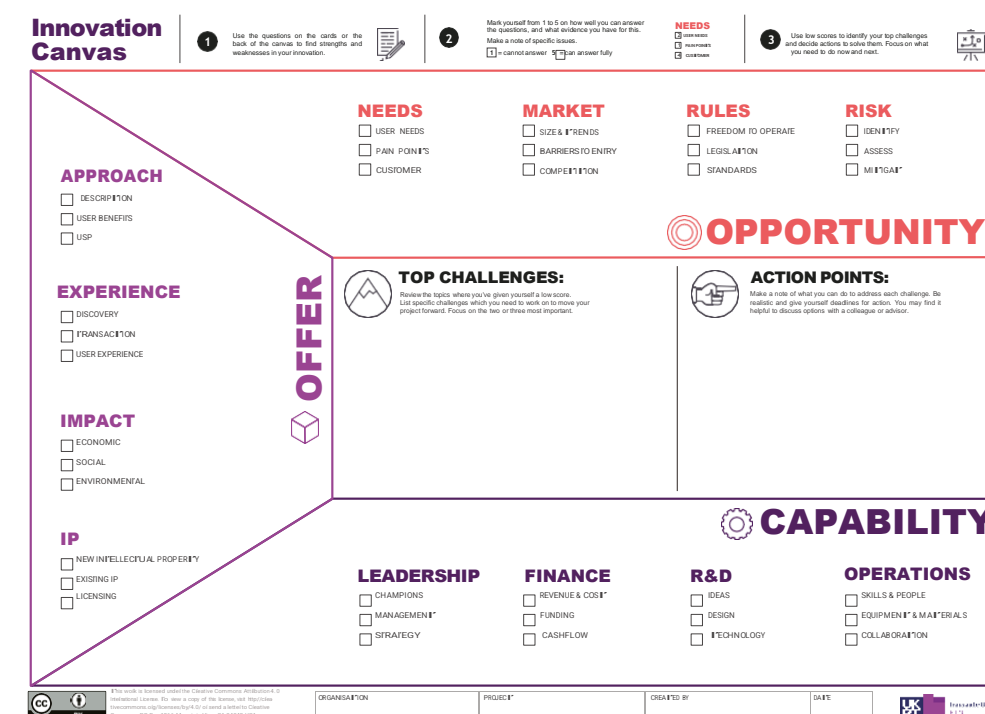


Fig 8.2 Innovation canvas, Innovate UK2022

Tax reliefs for innovation and R&D:

In the UK, HMRC incentivise R&D activity for any company liable for Corporation Tax (PLCs, Limited and Community Interest Companies) through [Tax Credits](#). As an SME you may not conduct formal R&D activity, but you may be eligible if you're working on:

- Solving a technical problem.
- Developing a new or updated product, process or service.
- Software development.

HMRC believes that 75% of companies that could be claiming don't, so it's worth talking with an expert advisor to find out if you are eligible. The average claim from SMEs is worth £57,000 per year.

Technology Readiness Levels (TRLs):

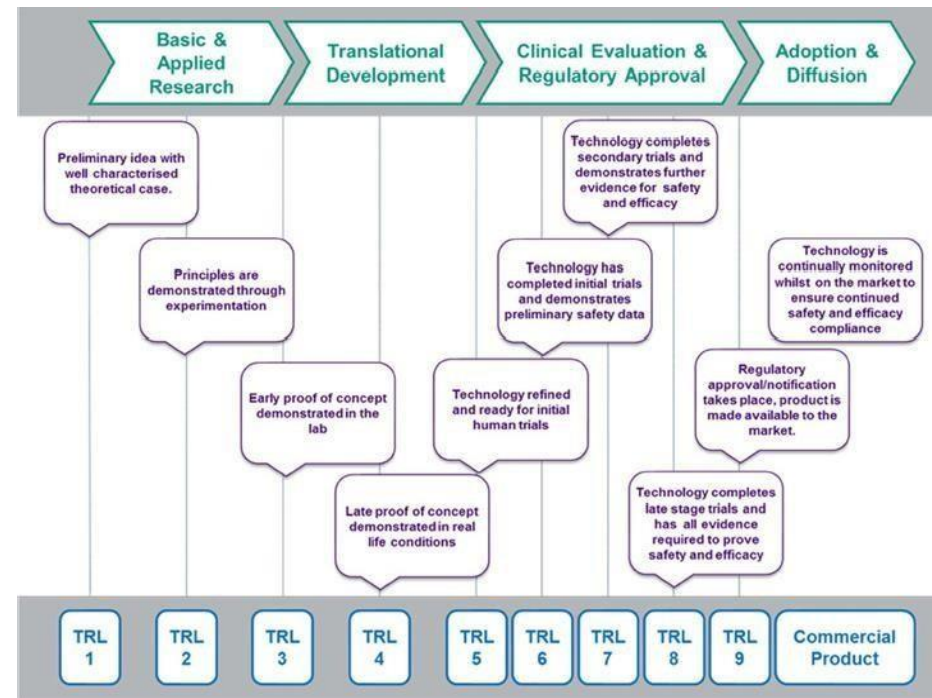


Fig 8.3 UKRI Technology Readiness Levels (TRLs)

The development pathway for new technologies is frequently described in terms of [technology readiness levels \(TRLs\)](#). TRLs give a common reference point when considering the level of development any given technology has achieved. The diagram below shows activity typically associated with each TRL, from an initial idea at one end of the scale through to commercialisation at the other. When pitching for funding, finance or grants to support the development or commercialisation of a new idea, it is important to match your innovation's place on this scale with funders' eligibility criteria. Typically, innovation to the left of this scale will be funded by the National Research Councils and to the right - by large companies and banks. The middle ground can be supported by university Knowledge Transfer Partnerships (KTPs) and specialist grants and funds.

Helpful resources and support:

- [UK Research and Innovation Youtube channel](#)
- [Eco-innovate! A guide to eco-innovation for SMEs and business coaches](#)
- [KTN Innovation Canvas](#)
- [Biomimicry - A portal into nature's design wisdom - Ask Nature](#)
- [Re-Think Global](#)

References:

- EIO 2010: [Eco-innovation Observatory Annual Report 2010. Pathways to a resource-efficient Europe.](#)
- Catherine Weetman (2020) [A Circular Economy Handbook: How to Build a More Resilient, Competitive and Sustainable Business.](#) London Kogan Page.
- Baranova, Paterson & Gallotta (2022) [Green Growth Trends in the East Midlands 2022.](#) University of Derby

In Practice

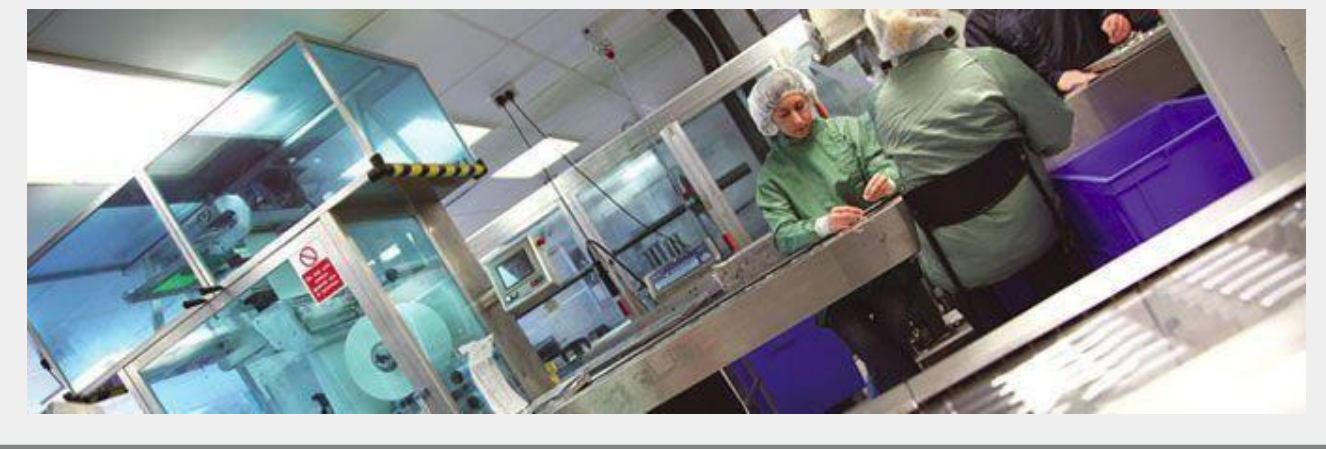
Riverside Medical Packaging:

Riverside Medical Packaging started manufacturing Face Shields to supply the NHS during the COVID-19 pandemic. At the beginning of the COVID-19 pandemic, the local NHS Trust (University Hospital Derby and Buxton) needed PPE such as Face Shields. Riverside Medical Packaging aimed to meet the regulations in place at the time while ensuring a low carbon-dioxide emission.

The University of Derby and Riverside Medical Packaging worked together in assessing the current greenhouse gas emissions, GHG, when using Disposhield (the single-use Face Shield developed by the SME) and possible reusable Face Shields. Various reusable Face Shields were designed and prototypes manufactured using 3D printing. Riverside Medical Packaging obtained a report on the challenges in the design and development of reusable Face Shield for mass manufacture and the GHG emission involved during the various cleaning/disinfection stages. About 5000 single-use Face Shields were used by Royal Derby Hospital and thrown away daily. There was a reduction in the world's supply and an increase in the quantity of plastic being incinerated at elevated temperatures. The hospital was looking to build a local supply chain and find alternative solutions to single-use Face Shields. However, they did not meet the regulations (EU PPE Regulation 2016/425 and BS EN 166:2002/167:2001/168:2001) for CE Marking and hence would not provide the right protection against the virus.

The University of Derby developed testing protocols for such Face Shields, separate from the DE-Carbonise project. Subsequently, the University worked with Riverside Medical Packaging to design and develop a reusable Face Shield and compare the greenhouse gas emission concerning the use of single-use Face Shield through the DE-Carbonise scheme. CAD Software such as Solidworks was used to design various models to be 3D printed as demonstrators. The design was adapted for mass manufacturing via injection moulding, where experts from Riverside Medical provided their insights. A cradle to grave method (ISO 14040:2006) was used for the life cycle analysis of the single-use and reusable Face Shields. In the case of the reusable face masks, a critical number of reuses was calculated concerning the same number of single-use Face Shields being used and different cleaning strategies were compared. Lastly, identified tests (from CE Marking requirements) were performed on the newly developed reusable Face Shield.

The final design accommodated for easy assembly, cleaning and disassembly. Another feature in the reusable Face Shield was the adjustability section which would meet the one-size-fits-all concept. The selected design was an elastic band with a 'toggle' which would not interfere with the wearer's hair, the ease of adjustability and head accessories (if any). The critical number of uses was identified as the minimum number of reuses for the reusable Face Shield to result in less GHG emissions as compared to that number of single-use Face Shields being used.



Glossary

Low Carbon and Environmental Goods and Services (LCEGS): relate to two over-lapping sectors (according to UK Govt. statistics); Low Carbon and Renewable Energy (LCRE) and Environmental Goods and Services (EGS).

Tax relief: refers to any government program or policy designed to help individuals and businesses reduce their tax burdens or resolve their tax-related debts (Investopedia, 2022).

Eco-innovation: is the development of products (goods and services), processes, marketing methods, organisational structure, and new or improved institutional arrangements, which, intentionally or not, contribute to a reduction of environmental impact in comparison with alternative practices (OCED, 2009).

Opportunity 9: Invest in Green Skills



Key facts:

56% of the British public say they have never heard of the term 'green job'.
 64% don't understand the term 'green skills'.
 62% don't understand the difference between green skills and green jobs.
 65% say they don't have access to green skills training through their employer.
[IEMA YouGov Poll 2022](#)

Key terms: green skills, green jobs

Opportunity:

In 'Powering our Net-Zero Future', the UK Government argued that more than 6 million people are in jobs that will be affected by the transition to clean energy. Small and Medium-sized Enterprises (SMEs) account for 60% of UK employment and 52% of private sector turnover. 90% of UK enterprises have less than 10 employees and according to the Carbon Trust, more than 90% of 'low carbon' companies are SMEs (Carbon Trust, 2020). This means that most new green jobs will be in small and micro companies.

However, in its [Sixth Carbon Budget](#), the UK's Climate Change Committee1 (CCC) warned that it is likely to take 10 years or more to secure the appropriate skills, capacity and supply chains in key sectors like building and transport. In addition to the immediate skills gaps in heat pump and energy efficiency installation, the CCC reports that over the next 30 years the low carbon energy sector alone will require 400,000 new jobs; retrofitting buildings will require more than 200,000 new full-time workers; electric vehicle and battery manufacture requires 80,000 new jobs; with 80,000 more jobs needed in manufacturing.

'A blueprint for green workforce transformation' (IEMA/Deloitte) showed that in 2021-2022, green jobs increased by 8% compared to UK employment in general which increased by only 0.5%. This study also highlighted that whilst the largest green talent pools were in environmental services, construction, higher education, renewables & environment and government sectors, the highest percentage growth in roles were in luxury goods, internet, biotech, fashion and investment management. This emphasises the growing demand across the wider economy for green skills - not simply in traditional low carbon sectors such as energy, construction and transport.

Our own study found that suppliers of Low Carbon Goods and Services (LCEGS) exist in every key sector; and concluded that "...pro-environmental **suppliers** and **innovators** should be identified in each priority sector and the current and future skills needs relevant to each sector established" (Paterson, et al., 2018). This trend is reflected in the East Midlands region as a whole, where 45% of businesses were deriving turnover from LCEGS up from 16% in 2015 ([Green Growth Trends research](#), 2022).

Not only is there rapid growth in the number of jobs, the IEMA/Deloitte study also highlighted four key shifts in green roles:



Fig 9.1 Four shifts in green roles, IEMA 2022

Tools

How well prepared is your business to capitalise on the growing green markets? Does your workforce have the skills to deliver the products and services that will be demanded from an increasingly sustainable economy in the coming 5 -10 years? What is your strategy for succeeding along the journey to Net Zero?

IEMA have developed a [Greening your Organisation Toolkit](#) which sets out a framework that will help your business create its own strategy for green jobs and green skills development. A first step is to recognise the difference between green jobs and green skills:

<p>Green skills: An umbrella term for the technical skills, knowledge, behaviours and capabilities required to tackle the environmental challenges we face and to unlock new opportunities for growth. The three core environmental challenges that green skills span are:</p> <ul style="list-style-type: none"> • Nature and biodiversity • Climate change and decarbonisation • Waste and pollution reduction 	<p>Green Jobs: Specialist roles that focus on specific domains or initiatives dedicated to improving environmental outcomes for an organisation or for the economy.</p> <p>Although others might argue that every job should be seen as a 'green job' in a fully sustainable, net-zero economy!</p>
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The toolkit provides a maturity matrix that will help you identify: (a) your company's ability to address green challenges (e.g. climate change, biodiversity loss, pollution and waste); and (b) green capability in internal functions (e.g. HR, IT, finance). The toolkit describes the different job families and potential green skills, the job attributes required in a green economy, how to utilise enablers and navigate the blockers. It also provides a blueprint business model business to help you identify potential gaps and possible next steps in your journey to Net Zero.

In Practice

Every business will need to re-position, re-skill and upskill its workforce as we move to a fully sustainable economy. Some of these skills will be common to all businesses (such as environmental management, sustainable procurement and eco-innovation) and others will be sector and location specific. [Do we have the Green Skills to get the Green Jobs done?](#)

The University of Derby offer a range of opportunities to help businesses develop long term capacity in green skills:

- [The Green Entrepreneurs Scholarship Fund](#) supports individuals by retraining them with the skills needed to enter the field of alternative energy.
- [As part of our Net Zero Accelerator Programme](#), the University offers a series of online pro-environmental modules that you can take any time. One example is [Why the environment matters to your business](#)
- Follow [@CarbonDerby](#) on Twitter to stay in touch with the latest opportunities from partners across our region and beyond.
- There are also academic courses to develop your skills and knowledge even further.
 - [BSc Environmental Sustainability](#)
 - [Sustainable Solutions PG Cert](#)
 - [MSc Sustainability and Environmental Management](#)

In 2023, University of Derby launch the [MSc in Sustainable and Ethical Business Management](#) for progressive business-people who want to reposition their organisation for a better future and learn how to develop more ethical and sustainable business practices.



References:

[A blueprint for green workforce transformation](#) - IEMA/Deloitte (2022)

[Sixth Carbon Budget](#) UK Climate Change Committee (2021)

Paterson et al (2018) [Key skills and training needs of the D2N2 Low Carbon and Environmental Goods & Services Sector](#)
Carbon Trust Report (2020) [Energy efficiency starts here: SME survey results](#), Carbon Trust.

Glossary

Green Jobs: An umbrella term for the technical skills, knowledge, behaviours and capabilities required to tackle the environmental challenges we face and to unlock new opportunities for growth.

Green Skills: Specialist roles that focus on specific domains or initiatives dedicated to improving environmental outcomes for an organisation or for the economy.

Opportunity 10: Environmental Accreditation and Green Marketing



Key facts:

77% of consumers share a desire to make more sustainable choices at home.
49% of consumers say they pay more—an average of 59% more—for products branded as sustainable or socially responsible.
68% of employees are more willing to accept job offers from environmentally sustainable companies

[IBM \(2022\)](#)

Opportunity:

Due to [recent greenwashing accusations](#), half of UK consumers say they do not trust the product-related sustainability claims of corporations. According to [Capgemini](#), more than half of consumers (54%) say they struggle to verify corporate sustainability claims. At the same time, more and more large companies are demanding that suppliers disclose their environmental credentials and by some estimates around 73% of the world biggest companies may de-select suppliers based on their environmental performance, now or in the near future ([CDP, 2019](#)).

Gaining and sustaining your pro-environmental reputation is an important way to signal your values as well as appeal to green consumers, suppliers and other business. Environmental accreditation can add credibility to your green credentials. It is also a great way to focus your business model, identify cost savings and reduce emissions whilst appealing to new customers/markets.

Accreditation is just one way to build your reputation. Green marketing and branding should be part of your business practice including green customer value definition, internal and external communication strategies, use of social media and reputation building.

Key terms: environmental accreditation, green marketing, reputation

Tools

Environmental Management Accreditations:

There are various ISO standards and PAS frameworks that help businesses calculate their carbon footprint and work towards greenhouse gas reduction. Environmental Management Accreditation (EMA) should lead to improved Environmental Management Systems (EMS) over time. EMS help to control the environmental aspects of your business, reduce impacts and ensure legal compliance.

The most high-profile and reputable EMAs include [ISO 14001 Environmental Management Standard](#), [ISO 50001 Energy Management Standard](#) and [PAS 2060 Specification for Carbon Neutrality](#). Whilst the time, cost and expertise required to complete these can be prohibitive, for SMEs that are part of supply chains requiring ISO 14001 certification, the cost may be unavoidable. Fortunately, there are a number of smaller scale and less costly EMAs aimed specifically at SMEs.

For example:

[Investors in the Environment \(IIE\)](#) provide a step-by-step approach through three levels of accreditation that allows firms to set achievable targets and establish a pathway of continual improvement.

[Green Mark](#) was originally developed as an affordable approach to environmental management for SMEs and a useful step towards the more demanding ISO 14001.

[Planet Mark](#) business certification recognises the firm's commitment to continuous improvement by measuring and reducing a business' carbon emissions, energy and water consumption, travel and waste.

The [B corps - SME impact assessment](#) creates a benchmark of the firms environmental and social performance. The snapshot report takes 30mins to complete with the full impact report providing comparison with similar businesses in the same sector.

The [Future-Fit Business Benchmark](#) is a free tool that identifies the environmental and social performance thresholds that companies must reach and a clear way to assess progress towards them. Paying for an audit of the evidence created by a recognised auditor is optional.

In 2021 the [Carbon Disclosure Project](#) launched a [new climate disclosure framework](#), in collaboration with the [SME Climate Hub](#), and created in partnership with the [Exponential Roadmap Initiative](#) and [Normative](#), to empower small and medium-sized enterprises (SMEs) to make strategic and impactful climate commitments, track and report progress against those commitments, and demonstrate climate leadership. Firms must register on the SME Climate Hub to access the tool.

For larger organisations:

[ESG Score Predictor](#). Moody's launched a tool that provides estimates of environmental, social, governance, carbon emissions footprint, transition and physical risk management scores for any company, including SMEs.

[SDG Compass](#) is a tool offered by the United Nation Global Compact that provides guidance for companies on how they can align their strategies as well as measure and manage their contribution to the realization of the Sustainable Development Goals (SDGs).

The [GRI Standards](#) help organisations understand their outward impacts on the economy, environment, and society, including those on human rights. This increases accountability and enhances transparency on their contribution to sustainable development.

Green marketing mix:

As [Sustainable Brands](#) acknowledge, the role of a values driven marketer goes well beyond market research, advertising and sales. Internal and external stakeholders are becoming increasingly sensitive to environmental risk and the market for ethical products and services is growing rapidly. With clear environmental credentials in one hand, your business will need to craft and communicate a clear green value proposition to attract new customers and succeed in new markets with the other. The University of Derby offers a self-service learning module to help you develop a pro-environmental value proposition via the online programme [Winning business with a green value proposition](#).

Product, Price, Place and Promotion are well established elements of the marketing mix for any product or service. However, for a pro-environmental company the marketing mix also reflects the value delivered to a wider set of stakeholders that includes employees, suppliers, the local community and the wider environment as well as customers. The 7Ps outlined in Figure 10.1. and Barbara [Tomasella's blog](#) will help you navigate key environmental issues facing the marketing function of your business.

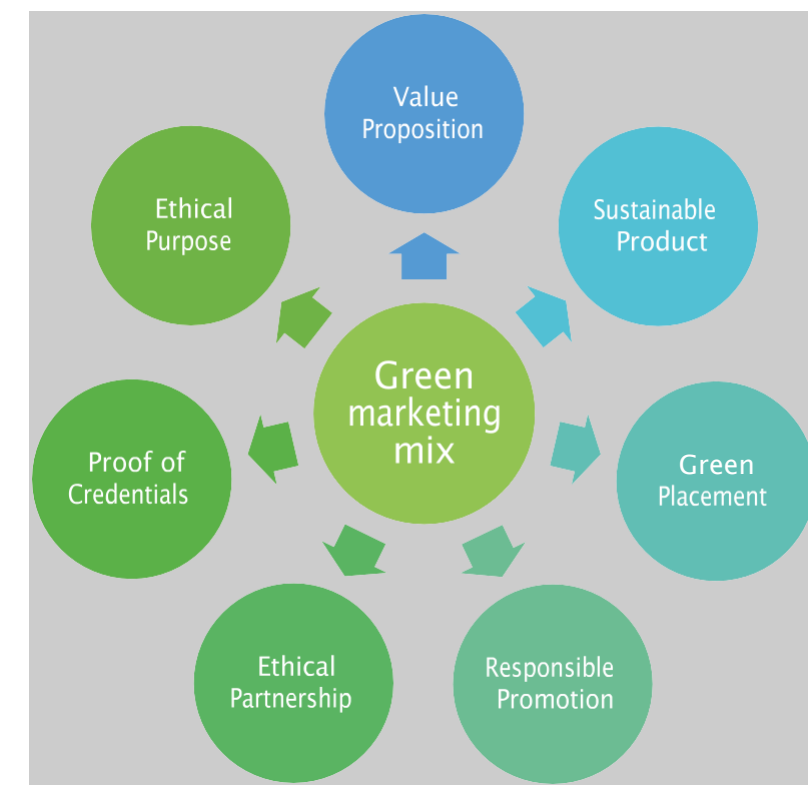


Figure 10.1: Green marketing mix

Helpful resources and support:

[Environmental Accreditation for SMEs](#)

[Winning business with a green value proposition](#)

The Irish Tourism Development Agency: [Green Marketing Toolkit: How to market and communicate your green credentials](#)

[Sustainable Brands Transformation Roadmap](#)

[Federation of Small Businesses. What are the credentials that support net carbon zero?](#)

[Ten Steps to Net Zero: The practical guide to carbon reporting and reduction](#)

References:

IBM (2022) [Balancing Sustainability and Profitability](#)

In Practice

The Amber Room started life as a one room shop on St Peter's St in Derby. Sarah Garlick has expanded her one-woman start-up and recently opened a sustainable clothing store in Derby shopping centre. "I am committed to living consciously and hope The Amber Room can provide a new ethical option for fashion lovers, so we can help the environment, while always having access to new looks."

People are increasingly aware that fast fashion has a huge impact on the environment and the lives of people today. Sarah says fast fashion 'encourages an awful cycle of exploitation, blind consumerism and environmental devastation. By shopping second-hand, you're making sure clothes are getting the wear out of them that they were made for. It saves colossal amounts of clothing from landfill'.

Although very inexperienced at the start of her journey, Sarah had a strong vision and values. She recognised the importance of putting the effort into gaining a green accreditation and using the business vision and environmental credentials to market the company.

With her sustainable business model already in place, Sarah worked with the DE-Carbonise team to sharpen her pitch (winning her place in the city centre shopping centre in Derby) and with our support gained green accreditation via Green Mark which (years later) is still displayed prominently in her shop window.



Read the full article at: https://www.derbytelegraph.co.uk/news/derby-news/chaddesden-woman-opens-sustainable-clothing-3789270?fbclid=IwAR0_f0IwT9RCP-uRhGhXvyT2C5cHda8oqammLQZICBsTp5aeoig_h91cls

Glossary

Environmental Management Accreditation (EMA): is third party certification of your business environmental management practices, processes and strategies.

Environmental Management Systems (EMS): are management processes that enable organisations to continually improve their environmental performance in order to reduce negative impacts on the natural environment.

Green marketing: is a practice that emphasises the environmental benefits of a product or service, which also reflects the values of a particular brand.

Green Brands: products, services and companies that consumers associate with environmental conservation and sustainable business practices.

Greenwash: A green brand can offer a unique selling point and boost corporate image. However, if a company is found or perceived to overstate its green practices, it may be criticised for 'greenwashing'.

Opportunity 11: Sustainable Business Models and Strategy



Key facts:

45% of global emissions can only be tackled by changing the way we make and consume products and food. [WRAP and the Circular Economy](#)

Only 36 per cent of small businesses have a plan to combat climate change and only 30 per cent of those have made any changes to their business as a result of that plan.

FSB (2021)

A business model describes how a company creates, delivers and captures value for its customers, investors and shareholders. **Sustainable business models** go beyond the value created for customers to include the benefits and harms to society and the environment. This reflects a more systemic view of doing business than simply delivering a financial 'bottom line'.

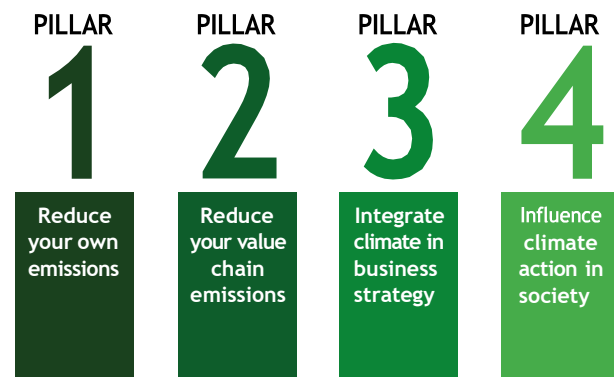
Opportunity:

Developing a sustainable business model helps your firm create significantly more positive effects and/or significantly fewer negative effects for the natural environment and society by changing the way you create, deliver, and capture value. Sustainable business models allow companies to pursue sustainability by deliberately aligning their business interests with those of the natural environment and society. In doing so, firms can attract new customers, enter the growing market for low carbon goods and services, anticipate stricter regulation and leap ahead of competitors.

Key terms: sustainable business models, circularity, biomimicry, closed-loop, cradle to cradle.

Taking Action

The [1.5°C Business Playbook: Building a strategy for exponential climate action towards net-zero emissions](#) acknowledges that to hold global warming below 1.5°C and avoid the worst effects of climate change, every business must aim to halve emissions by 2030. To achieve this, businesses will contribute in several ways. First, by rapidly reducing their own emissions. Second, by reducing emissions in their value chains. Third, and most importantly, by scaling products, services and projects that enable reduction of emissions or even remove carbon from the atmosphere. Finally, by displaying climate leadership and influencing wider action in society. These points form the basis of the four Pillars of the Exponential Roadmap Strategy for Climate Action.



The Playbook states that companies need to form individual business plans to achieve the optimal impact by tailoring their implementation across the four pillars. For example:

- Established companies with large emissions and a conventional business model may start from pillar 1 and 2 and extend to pillars 3 and 4 in a stepwise approach.
- An established company implementing a transformational strategy may start from pillar 3 by rethinking its business model to be aligned with 1.5°C, while addressing pillars 1, 2 and 4 in parallel.
- A disruptive fast-growing start-up company using climate as a business driver may build and accelerate its business from pillar 3, while keeping track of pillars 1, 2 and 4.

Pro-environmental firms figure out how to deliver value to customers in a way that is both profitable and less resource intensive. It's about re-thinking your value proposition and the offer to customers. For example, helping people get from A to B doesn't necessarily rely on investing large sums in vehicle ownership. So, forward looking companies have built business models based on providing customers with low emission car share options that are based on hourly rental.

As we noted in Opportunity 4, the [Ellen MacArthur Foundation](#) work with corporate organisations all over the world that are delivering on one or more aspects of this transformation to sustainable business models - but every business is on a journey. Whilst you may be brilliant at re-cycling and waste reduction, you may have a real challenge shifting to fully renewable energy or ultra-low emission transport. The [Resolve Framework](#) will help focus your business activity.

REGENERATE	<ul style="list-style-type: none"> • Shift to renewable energy and materials • Reclaim, retain, and restore health of ecosystems • Return recovered biological resources to the biosphere 	
SHARE	<ul style="list-style-type: none"> • Share assets (eg cars, rooms, appliances) • Reuse/secondhand • Prolong life through maintenance, design for durability, upgradability etc. 	
OPTIMISE	<ul style="list-style-type: none"> • Increase performance/efficiency of product • Remove waste in production and supply chain • Leverage big data, automation, remote sensing and steering 	
LOOP	<ul style="list-style-type: none"> • Remanufacture products or components • Recycle materials • Digest anaerobically • Extract biochemicals from organic waste 	
VIRTUALISE	<ul style="list-style-type: none"> • Dematerialise directly (eg books, CDs, DVDs, travel) • Dematerialise indirectly (eg online shopping) 	
EXCHANGE	<ul style="list-style-type: none"> • Replace old with advanced non-renewable materials • Apply new technologies (eg 3D printing) • Choose new product/service (eg multimodal transport) 	

Eco-innovative companies are constantly scanning the horizon for emerging trends that can enhance their value proposition and business model in both the long and short term. They are also willing to take risks and integrate ongoing strategic reflection to make the business more resilient. In 'What's a sustainable business model?', Joel Makower notes that many of the new forms of value creation for Pillars 2 and 3 are already well-established.

For example:

- **Decarbonisation** - products and services made and delivered in a way that produce vastly reduced climate pollution. Renewable energy purchases are the obvious example for Pillar 1, but a 2018 [YouGov survey](#) of global corporations participating in the Science Based Targets initiative found that 52% of executives expected at least half of their products and services to be low carbon by 2028. More locally, our own recent analysis of East Midlands [Green Growth Trends](#) showed that 45% of firms were offering low carbon or pro-environmental goods or services.
- **Circularity** - closed-loop, reusable, biobased, zero-waste goods and services all represent business model innovations in which value propositions, delivery mechanisms and market accessibility take centre-stage.
- **Regeneration** - where companies find value through innovations that restore, protect or enhance ecosystems. Biomimicry and other nature-inspired design innovations are approaches that sit in this space.
- **Social Sustainability** - business models that increase access to goods and services to lower-income individuals and communities or that expand job and career opportunities.
- **Localisation** - turning waste streams into sources of value is one aspect of the growing localisation of commerce. Indoor and vertical farming - growing food at or near where it's consumed - as well as additive manufacturing, where goods are produced close to where they're needed are other examples.

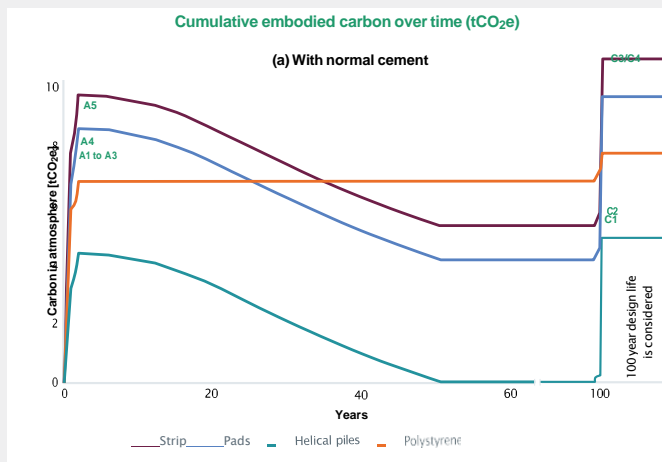
The [Carbon Copy database](#) provides many inspirational examples of these new forms of value creation from both public and private sector organisations to inform your own business innovation.

Key Questions:

- What value do we deliver to our clients or customers?
- Which customer needs are we really helping to satisfy?
- What value are we missing and what value might we be destroying along the way?
- What are the core activities and resources that help us deliver value (skills, resources, strategic partnerships, intellectual property)?
- How far does our business model depend on the use of material and energy?
- Could we find alternative ways to satisfy these needs (such as product service options)?

In Practice

Positive Homes – Continually seeking to improve an already low emission business model



Positive Homes are a small local home builder who build 'A' rated, super energy efficient homes. All the houses they build have solar panels and other features that place them in the top 1% in the country for energy efficiency – which results in much lower bills, and much cleaner air.

To achieve these 'in-use' aims, whilst remaining commercially profitable, these 'Positive Homes' are built in modern, high-tech factories – before being craned into position in a few days. It's precision engineering, with more than 95% of every home completed indoors, in the dry, by highly trained people. This 'modular' method is the only way to guarantee every home is built to the highest standards – both in terms of its energy efficiency and in the quality of finish.

Managing Director, Martin Valentine recognises that the values and mindset of the business is just as crucial as the technical innovation of 'off-site' manufacture and net-zero standards. Martin says, 'we are driven by a commitment to improving the environment and making these energy efficient homes affordable for everyone.'

Positive Homes strive to regenerate surplus and difficult sites and partner with public organisations who share their philosophy, to develop Net Zero homes on publicly owned land. Martin says, 'by working together, we can invest in communities to secure the maximum benefit to the environment'.

When Martin approached the DE-Carbonise team he said 'It's one thing to make all our homes zero carbon in use – but we need to cut the amount of CO2 created in the building process too. So, we are looking to eliminate concrete in our foundations. By cutting out concrete, I'm sure we can make a massive difference – not least from reducing the number of diesel-powered lorries normally required to remove earth and pour concrete into the hole'.

In modular, manufactured buildings, a significant proportion of the residual carbon footprint is found in the foundations – which are commonly made from concrete. Positive Homes worked with the DE-Carbonise team to assess the embodied carbon in four different types of foundation. The study found that helical stainless steel 'screw piles' were the most environmentally positive approach to foundations.

In this example, Positive Homes already had a really strong business model for building practical and affordable net zero homes. But just as the Exponential Roadmap Strategy notes (see p.4), for every pro-environmental business that is on the journey to Net Zero, continuous review and improvement will be part of their approach. Positive Homes are also a great example of a disruptive fast-growing start-up company using climate as a business driver, that are focused on Pillar 3 of the Exponential Roadmap Strategy whilst keeping a weather eye on Pillars 1, 2 and 4.

Tools

There are some really accessible approaches that set out the steps to developing your own sustainable business model. In our DE-Carbonise programme we use a Value Mapping Tool to help businesses shift towards a more earth friendly business model. Threebility have also created a helpful framework that builds upon the well-regarded Business Model Canvas and an interactive game that can help your senior team shift their mindset and make business decisions with environmental and social needs in mind.

Positive Impact (Maximise) <small>What are positive 2nd and 3rd order effects of your product on planet, society, the economy or your organisation (e.g. brands)? How can these impacts be maximised along the complete product life cycle?</small>			Negative Impact (Minimise) <small>What are negative 1st, 2nd and 3rd order effects, and how can these be minimised? Is harmful waste generated that requires expensive disposal? Are there rebound & induction effects or new technological risks?</small>	
Sustainable Partners <small>Who are possible partners in becoming more sustainable? How can we make the whole supply chain sustainable, transparent and circular? Can we cooperate with partners from other industries to form an industrial symbiosis? Can we shape anticipated environmental regulations by partnering and cooperating with relevant regulatory bodies?</small>	Sustainable Value Creation <small>Which are our key activities? How can we adjust them (e.g. manufacturing) to ensure sustainability? Which enabling sustainable technologies can be used?</small>	Sustainable Value Proposition <small>Which problem do we solve which value do we create? What are function & form of our product or service? Can we solve our customers' problems more sustainably? Can we transform sustainability into customer value?</small>	Sustainable Customer Relation <small>Which customer relationships satisfy customer expectations and are sustainable? How can we make current relationships more sustainable?</small>	Responsible customers <small>Who are our customers? How can we enable them to act sustainably? Which target customers may help to promote our sustainable solution?</small>
	Sustainable Tech & Resources <small>Which 1) natural, 2) energy and 3) technical resources do we need? Can we substitute any for more sustainable resources?</small>	Sust. Channels <small>How can we make our distribution channel more sustainable and circular? How do we best communicate the sustainable aspect of our product / service?</small>	End of Life <small>What happens at the end of the product life cycle? Can the product be profitably recycled, upcycled, reused, refurbished?</small>	
Cost Structure & Additional Costs <small>What are the required costs and investments for my endeavour? Which resources / activities are the least sustainable? Do sustainable alternatives exist? Is switching economically reasonable?</small>		Subsidisation <small>Do tax bonuses & subsidies or 3rd party funding exist for my endeavour?</small>	Revenue & Sustainability Premium <small>Which are existing and possible revenue sources? Are customers willing to pay a premium for sustainability? Can we create a unique advantage due to sustainable proposition elements? Do price structures exist that incentivize sustainable customer behaviour?</small>	

Helpful resources and support:

The University of Derby Net Zero Pathways for SMEs web pages include links to the sustainable business canvas, amongst a range of other tools and resources to support your journey to Net Zero.

The University of Derby also offers a self-service learning module to help you develop a pro-environmental value proposition via the online Winning business with a green value proposition.

WRAP and the Circular Economy provides case studies of how circular business models are being applied in the Food, Plastics, Fashion and Textile sectors.

30 Ideas to kickstart your circular business – Knowledge Transfer Network

Circulytics – Ellen MacArthur Foundation have developed Circulytics which supports a company's transition towards the circular economy, regardless of industry, complexity, and size – to reveal the extent to which a company has achieved circularity across its entire operations.

1.5°C Business Playbook: Building a strategy for exponential climate action towards net-zero emissions. Published by the United Nations Race to Zero initiative, this accessible booklet describes 4 pillars of a strategic roadmap to halving emissions before 2030, integrating climate in business strategy and influencing climate action in society.

Value Mapping Tool – Nancy Bocken has developed a framework and process that assists in 'sustainable business modelling' – the process of inventing new sustainable business model ideas. For a whole suite of resources exploring green business models check out Nancy Bocken's website.

Sustainable Business Model Innovation Game – Threebility have developed a card game aimed at senior management teams to support sustainable business model innovation.

For larger companies, the SDG compass provides guidance on how to align corporate business and environmental strategies whilst monitoring their contribution to the UN Sustainable Development Goals.

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Opportunity 12: National support and local networks



Key facts:

Nationally, only 37% of SMEs say they want to do more to achieve Net Zero. In the East Midlands, this falls to 24%, but... 74% do not fully understand how 'Net Zero' applies to their business.

44% of SME leaders do not know where to get information regarding reducing carbon emissions.

Opportunity:

In 2020, 90% of UK enterprises had less than 10 employees with only 0.4% employing more than 250 people. This means support for clean growth, green skills, low carbon jobs and the wider journey to Net Zero needs to engage micro businesses in general and the growing number of pro-environmental SMEs specifically. Academic studies have shown that business support provision tends to treat Small and Medium-sized Enterprises (SMEs) as a homogenous group and that much more targeted support is needed to support clean growth amongst this category of firms.

Recent studies into SME readiness for the net-zero transition by British Business Bank (2021), the Federation of Small Businesses (2012), Sustainability West Midlands (2021) and University of Derby pro-environmental business trends research (Paterson et al., 2020) provide an increasingly sophisticated picture of business needs in the 'race to zero'. We know that the East Midlands has the highest emissions per capita of all the UK regions, as well as some of the poorest air quality, due to the high proportion of manufacturing and engineering companies in our region. This should provide real impetus to businesses and their supporting agencies to improve environmental performance. However, according to an FSB survey in 2021, the East Midlands has the lowest appetite for net-zero change (24% - compared to 46% in the Southwest). On the other hand, our region also has the highest desire for more information and support of ALL English regions (37% vs 17% in the Northwest).

This highlights the imperative for local and national support provision to respond to the enormously varied needs of smaller businesses and the imperative to inspire all businesses to raise their awareness of their environmental and social responsibilities in meeting national and international Net Zero ambitions.

National support

For many years there was little focus on the needs and interests of smaller businesses on the journey to Net Zero. Over the last few years, a confusing plethora of resources, advice, information, workshops, guidance documents, websites and social media have emerged to service these interests. So much, that it has become confusing, even for those of us whose main role is to engage with this arena. There are now signs that partnership and collaboration amongst key players in various sectors of the Net Zero for SME landscape are beginning to pull together the growing insight into how SMEs can productively and efficiently invest time and money in accelerating their Net Zero journey. A few examples are provided below.

Zero Carbon Business is a platform for advice on Net Zero for SMEs. It is a shared endeavour of the UK's main business organisations, energy networks, high street banks and professional bodies.

The SME Climate Hub is a global initiative with over 3,000 SME members, that aims to mainstream climate action in the small to medium sized business community and enable SMEs to build resilient businesses for the future. The SME Climate Commitment is the official pathway for SMEs to join the United Nations global Race to Zero campaign.

The SME Climate Hub is an initiative founded by the We Mean Business Coalition, Exponential Roadmap Initiative and the United Nations Race to Zero campaign in collaboration with Oxford University and Normative. A host of corporate partners include BT, IKEA, Unilever and the Carbon Disclosure Project.

Sector support

Dedicated support for the journey to Net Zero is emerging in various sectors. For example, [Manufacturing](#); [Food & Drink](#); [Supply Chain](#); [Farming](#); [Logistics](#); [Financial Services](#) and many others.

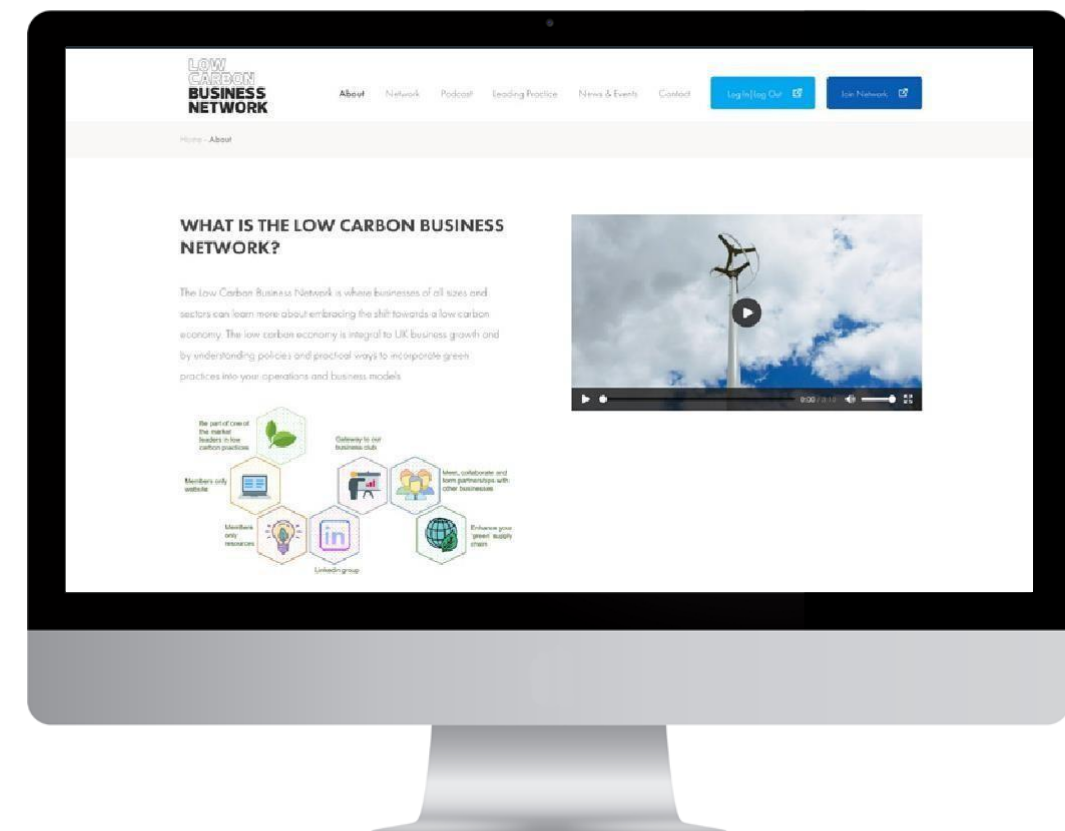
In construction, the [Supply Chain Sustainability School](#) launched in 2012, with support from dozens of industry stakeholders. The school provides a free learning environment to upskill those working within, or aspiring to work with in, the built environment sector. Free membership provides access to thousands of learning resources and CPD-accredited content, plus training and networking activities.

Sector bodies provide a brilliant starting point for your Net Zero journey. And if your sector body does not offer support and guidance, it's an opportunity for you to lobby for the help you need.

Local Networks

Access to local networks that support low carbon, Net Zero and clean growth innovation is highly prized, and UK SMEs are well served by organised networks. For example, [The Princes Responsible Business Ambassadors](#), [FSB Sustainability Hub](#); the [West Midlands Green Business Clubs](#) and the University of Derby's Low Carbon Business Network is described 'In practice' below. Our research (Paterson et al, 2023) shows the many benefits of university facilitated networking activity for SMEs:

- Better knowledge of energy and resource efficiency measures.
- Greater confidence in implementing these measures in the workplace.
- Raised awareness of pro-environmental business opportunities especially in green market niches.
- Raised awareness about the support available for pro-environmental businesses in the region.
- A platform for building relationships that connects SMEs with other 'like-minded' business leaders, as well as with business support agencies, such as local councils, university, LEPs and NGOs.
- Pro-environmental capability building. For micro firms in particular, university-facilitated networks provide access to expertise that normally exists in the R&D, marketing, human relations or finance departments of larger firms.
- SMEs note the reputational benefits of network membership.
- The stimulus to set up new business collaborations that create real value, as a result of the network activity.



In Practice

The Low Carbon Business Network

Alongside programmes, such as DE-Carbonise and the Net Zero Accelerator, University of Derby launched the Low Carbon Business Network (LCBN) in 2018. Network members are predominantly SME leaders, but membership also includes stakeholders from local government, corporate business and the civic community.

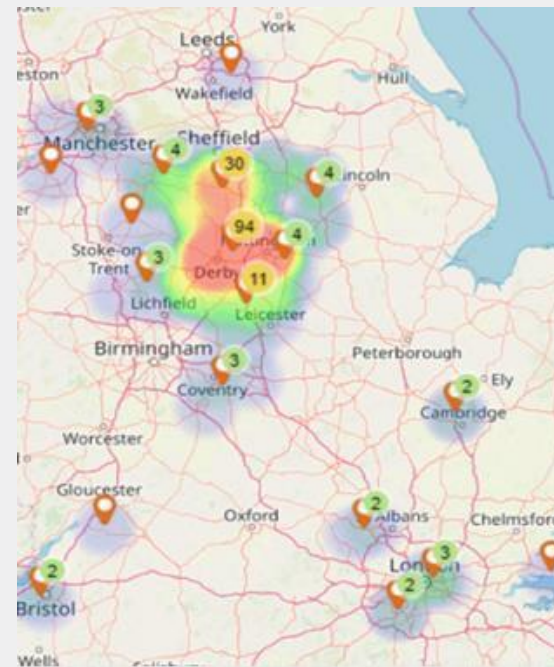
The LCBN provides dedicated business support to SMEs across the East Midlands, that has included specialist support for environmental accreditation, business value mapping, strategic marketing as well as 'Green Growth Accelerator' workshops and a 'Dragon's Den' experience that allows business leaders to rehearse their business pitch with procurement managers from larger demand side organisations, such as public and commercial sector buyers.

The Network regularly hosts regional conferences, market-place events, workshops, quarterly networking sessions, social media communications, a podcast, website and online learning resources. Each year the Network collaborates with the East Midlands Chamber of Commerce to host a Sustainability Summit which draws together corporate, civic and small business perspectives on the challenges and opportunities presented by the journey to Net Zero. As part of these larger, face to face events the LCBN often hosts Marketplaces which provide a platform to leading green businesses and sustainability support agencies. Another centre piece of the Network's communication strategy is provision of a searchable network map that allows Network members to connect with one another and with larger organisations in the region.

A survey of Network members in 2020 indicated that, of the range of face to face and online activities, regular networking events were the most popular activity (59% of respondents); followed by conference-style events including sustainability summits and shift leadership events, attracting 41% of the survey responses.

Our own research (Paterson et al 2023) shows that the degree to which a network develops value for members depends on four key factors:

1. Leadership of the network – the clarity of its purposes and how well it is organised.
2. The culture that develops between members of the network at all levels.
3. Helping members to build and sustain collaborative actions and the skills and systems needed to achieve this (for example, introducing collaborative business models and sustainable supply chain methodologies).
4. Creating the infrastructure that supports pro-environmental innovation (such as access to a map of Network members and opportunities to rehearse green business pitches).



Helpful resources and support:

[Business Climate Hub](#)

[Zero Carbon Business](#)

[Low Carbon Business Network](#)

[West Midlands Green Business Clubs](#)

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