THE SOLENT CLUSTER

HOW TO...

DECARBONISE MANUFACTURING PROCESSES

Decarbonising manufacturing processes is a complex but achievable goal. It can improve efficiency, reduce costs savings can be passed to the customer. This guide outlines practical steps to reduce carbon emissions in manufacturing, advanced technologies. Jonathan Wilkins from Enoflex shares their experience: "We are in the process of implementing the improvements on our production line. The result will be a manufacturing process with a lower environmental footprint and a cost-optimised product for the customer."

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STEP-BY-STEP GUIDE

1. CONDUCT A CARBON FOOTPRINT ASSESSMENT

- **Identify Emission Sources:**
  Map out all sources of carbon emissions within the manufacturing process, including direct emissions (Scope 1), indirect emissions from energy use (Scope 2), and other indirect emissions (Scope 3).
- **Measure Emissions**
  Use tools and methodologies such as the Greenhouse Gas Protocol to quantify emissions from each source in consistent units of CO2e.
- **Set Baseline and Targets**
  Establish a baseline for current emissions and set realistic, science-based targets for reduction.
  Jonathan says "We are a young but rapidly growing manufacturing business. We thought about our future emissions as well as our current profile so that we know when the various parts of the process need tackling to give the most effective impact now and for tomorrow."

2. IMPROVE ENERGY EFFICIENCY

- **Energy Audits**
  Conduct regular energy audits to identify inefficiencies and areas for improvement. Jonathan says "We started by reviewing our energy consumption during the various manufacturing stages for our product, including our incoming materials from suppliers."
- **Process Optimisation**
  Implement lean manufacturing principles to reduce waste and improve process efficiency. This can be done by upgrading the control system for the production line, whilst leaving the majority of the hardware in place. Jonathan says "improvements in our factory control system will reduce the time required for the most energy intensive operations, resulting in less power consumption. We can do this without having to replace our existing manufacturing hardware and this reduces our CapEx outlay. "
- **Upgrade Equipment**
  Replace outdated machinery with energy-efficient alternatives. Consider using variable speed drives, high-efficiency motors, and advanced control systems. Jonathan notes you might need to refer to the experts: "It is important to understand what we can do ourselves, and when to bring in external support. Preliminary improvement investigations and experiments were done 'off-line' on benchtop test rigs that can simulate important aspects of our production line without the disruption and expense of running trials on the real thing."
- **Consider Electrification**
  Using electricity from renewable sources is more carbon efficient compared to hydrocarbons such as natural gas or oil.

3. SWITCH TO RENEWABLE ENERGY

- **On-site Generation**
  Install renewable energy systems such as solar panels, wind turbines, or biomass boilers to generate clean energy on-site.
- **Green Energy Procurement**
  Purchase renewable energy from certified green energy suppliers to power manufacturing operations. Consider a Power Purchase Agreement whereby a third-party development installs, owns and operates an energy system on your premises. You purchase the energy created and can negotiate favourable rates compared to commercial supply.
- **Energy Storage**
  Invest in energy storage solutions like batteries to store excess renewable energy for use during peak demand.

4. ADOPT LOW-CARBON TECHNOLOGIES

- **Hydrogen Fuel**
  Use green hydrogen as a low-carbon alternative to fossil fuels in high-temperature processes.
- **Electrification**
  Electrify processes where feasible, using electricity from renewable sources.
- **Alternative Fuels**
  Explore the use of biofuels and other low-carbon fuels to replace traditional fossil fuels

5. ENHANCE SUPPLY CHAIN SUSTAINABILITY

- **Supplier Engagement**
  Work with suppliers to reduce emissions throughout the supply chain. Encourage the adoption of sustainable practices and renewable energy.
- **Sustainable Materials**
  Source materials with lower carbon footprints, such as recycled or sustainably produced raw materials.
- **Logistics Optimisation**
  Optimize logistics and transportation to reduce emissions, including the use of electric or hydrogen-powered vehicles.

6. MONITOR, REPORT, AND IMPROVE

- **Continuous Monitoring**
  Implement monitoring systems to track emissions and energy use in real-time.
- **Regular Reporting**
  Report progress to stakeholders, including compliance with UK regulations and progress towards targets.
- **Continuous Improvement**
  Use data and feedback to continuously improve processes and reduce emissions further.

7. IMPLEMENT CARBON CAPTURE AND STORAGE (CCS)

- **Capture Technologies**
  Explore carbon capture technologies that can be integrated into existing processes to capture CO_2 emissions before they are released into the atmosphere.
- **Storage Solutions**
  Identify suitable storage solutions, such as utilisation in industrial processes, to safely store captured carbon.

LINKS AND FURTHER INFORMATION

The Solent Cluster Working towards a lower carbon future

Innovate UK UKRI

Enoflex Home

GOV.UK Government conversion factors for company reporting of greenhouse gas emissions