

HNC/HND Engineering



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The world is currently facing many global challenges which can have local, national, and international impacts. These impacts can be grouped into what are commonly referred to as 'the three pillars of sustainability'.

One pillar represents environmental stewardship, reflecting the need for responsible and conscientious management of Earth's natural resources and for the protection of the environment.

Another pillar represents social sustainability, referring to the ability of a society to maintain and enhance the well-being and quality of life. This involves creating an equitable and just society that promotes social cohesion, protects human rights, and ensures that everyone has access to basic needs and opportunities.

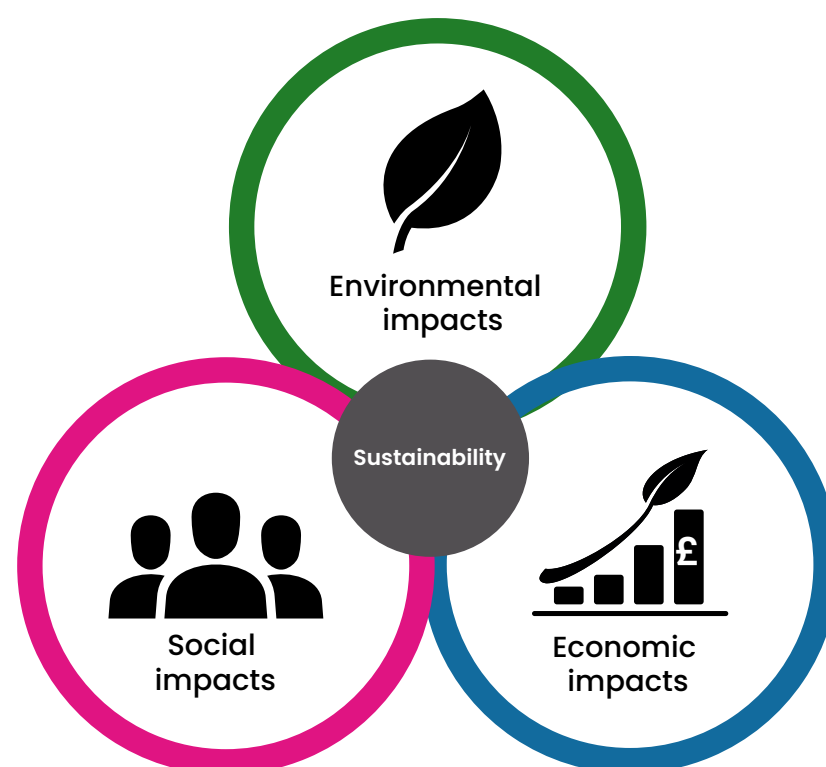
The final pillar represents economic sustainability, which involves balancing economic development with the preservation of natural resources, social well-being, and the needs of future generations.

All three pillars are of equal importance. Achieving sustainability requires collective action from individuals, businesses, governments, and organisations at local, national, and international levels. It involves making conscious choices and adopting practices that minimise negative impacts on the environment, promote social equity, and contribute to long-term economic sustainability.

To address global challenges and promote sustainability, the United Nations established the [2030 Agenda for Sustainable Development](#), a shared blueprint for people, planet, prosperity, peace, and partnership. At its heart is a set of 17 goals ([Sustainable Development Goals or SDGs](#)), which aim to stimulate action by 2030 in areas of critical importance for humanity and the planet. Behind each goal is a set of specific targets against which progress towards the individual goals can be monitored.

Consideration of sustainability in engineering education is crucial for preparing future generations to design and implement solutions that address environmental, social, and economic challenges. The infographic below displays a driver, its impacts and some of the sustainable development goals associated with one aspect of engineering: the increasing demand for materials and manufacturing to be sustainable.

Sustainable materials and manufacturing are critical components of engineering, as they minimise environmental impacts while maintaining efficiency and functionality. These practices are essential in addressing global challenges such as resource depletion, waste management, and climate change.



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Driver	Primary impact	Secondary impact	Associated SDGs
 <p>Increasing requirement for sustainable materials and manufacturing</p>	 <p>Sustainable materials</p>	<p>Material types eg biodegradable, recycled/recyclable, renewable, low-impact metals, composite materials</p> 	<p>12 – responsible consumption and production 13 – climate action</p>
	 <p>Sustainable manufacturing</p>	<p>Selection criteria eg energy use in production, carbon footprint, durability, resource availability, end-of-life options</p> 	<p>7 – affordable and clean energy 12 – responsible consumption and production 13 – climate action 14 – life below water 15 – life on land</p>
		<p>Green manufacturing processes eg additive manufacturing (3D), closed-loop, energy-efficient, lean manufacturing, water-saving technologies</p> 	<p>7 – affordable and clean energy 9 – industry, innovation and infrastructure 12 – responsible consumption and production 13 – climate action</p>
		<p>Sustainable manufacturing techniques eg life cycle analysis, design for environment</p> 	<p>14 – life below water 15 – life on land</p>
		<p>Emerging technologies eg graphene, nanomaterials, aerogels, self-healing polymers and composites</p> 	<p>9 – industry, innovation and infrastructure 12 – responsible consumption and production</p>
		<p>Sustainable practices eg regulatory compliance, fair labour, ethical sourcing, supply chain transparency, corporate social responsibility, cultural sensitivity, consumer health & safety</p> 	<p>5 – gender equality 8 – decent work and economic growth 9 – industry, innovation and infrastructure 10 – reduced inequalities 11 – sustainable cities and communities 12 – responsible consumption and production 16 – peace, justice and strong institutions</p>
<p>Overarching 17 – partnerships for the goals</p>			