

GROWTH POTENTIAL: INDUSTRIAL MANUFACTURING



Key circular economy strategies

- Use recycled or regeneratively sourced, renewable materials in production
- Design waste out of production processes, and reuse or valorise by-products of production
- Design and manufacture products to be durable, repairable, and easy to disassemble
- Keep products in use through disassembly and demanufacturing, remanufacturing of parts, products and machinery, and production of spare parts to repair and upgrade products, machinery and infrastructure
- Keep materials in use through recycling end-of-life parts, products, and machinery to recover the materials as secondary inputs for manufacturing processes

Drivers of circular economy growth potential

- **High** potential for growth in the short-medium term
- **Increasing** potential for growth in the short-medium term
- **Emerging or limited** potential for growth in the short-medium term

Innovation and corporate action	
Demand for finite resources	<ul style="list-style-type: none">• Manufacturing firms in the EU spend on average ~40% on materials
Innovation	<ul style="list-style-type: none">• Manufacturers continue to innovate in advanced manufacturing and digital technologies, such as AI, cloud computing, advanced analytics, robotics, additive manufacturing, and 3D printing to the value chain to reduce waste in production• Transition to renewable energy sources to power production

Policies and regulation

Increasing policies and regulation

- Increasing regulation, (e.g. new EU circular economy Action Plan, EU Industrial Strategy, EPR policies, landfill taxes)
- REACH regulation also covers by-products from production, with additional compliance requirements in place for by-products considered to be harmful to human health and the environment

Customer preferences and macrotrends

Changing preferences and behaviour

- Growing awareness of negative impacts of waste and pollution

Resilience to global shocks

- Covid-19 crisis has created significant disruption to trade flows and manufacturing, supply chains, with some reshoring of manufacturing expected and increased instances of repair and remanufacture (e.g. of ventilators)

Types of circular economy opportunity areas



Circular design and innovation



Circular business models



Reuse, repurpose, and redistribute



Repair, remanufacture, and refurbish



Collect, sort, and recycle



Regenerative and renewable practices and materials



Enabling digital technologies

Current circular economy opportunity areas



Additive manufacturing of components, products, and spare parts



Disassembly, demanufacturing, and component and material reuse



Circular business models offering products-as-a-service



Remanufacturing of components, vehicles, and machinery

Examples: Large corporates

Caterpillar's

Cat Reman programme, produces same-as-new quality components and replacement parts for a fraction of the cost of a new part

Rolls Royce's

'Power-by-the-Hour' engine maintenance management approach (e.g. TotalCare programme) uses predictive analytics for lifecycle engine maintenance, and enables up to 95% of used engine parts to be recovered or recycled

Siemens Mobility

3D printing of train and rail parts cuts manufacturing times by 95%

IBM

has demanufacturing and asset recovery centres to demanufacture used electronics and harvest parts for reuse or resale

Neptuno Pumps

remanufactures industrial pumps and reuses or recycles end-of-life parts to manufacture new pumps and spare parts

Jaguar Land Rover

recycles aluminium from end-of-life vehicles back into high-quality aluminium for the manufacture of new vehicle bodies

Examples: Innovators

3YOURMIND

has developed additive manufacturing software for 3D printing of spare parts, enabling **Deutsche Bahn** to create a 'digital spare parts warehouse' for maintenance of vehicles and **Bosch** to produce industrial plastic parts in small quantities, and 3D printing of parts for hospitals and medical centres in response to the Covid-19 crisis

Novo Nordisk

and eight other private and public companies, have a commercially successful industrial symbiotic partnership in Kalundborg, exchanging 25 different resource streams creating cost savings and socio-economic benefits

Warner Babcock Institute has developed an additive to help recycle old asphalt into new

Urban Mining Company

has developed a technology to reprocess rare earth magnets from end-of-use products (e.g. electronics) into new magnets

**READ MORE
ABOUT THIS
IN OUR REPORT**



Financing the circular economy

Capturing the opportunity

