Congenius

5-minute guide to:

Sustainability in plastics manufacturing

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By Michael Gradonski

The central challenge faced with sustainability is its sheer complexity.

It's a vast, and often divisive topic, and many medical device companies find defining actionable strategies and managing market perception a challenge.

A key disconnect often arises between public perception and industrial reality.

Sustainability in plastics is often viewed through the narrow lens of "circular recycling“ - recycling a product back into the same product.

However, in the highly regulated MedTech industry, recycling a medical device back into its original form is often unfeasible. As such, evaluating alternative strategies at different stages of the product lifecycle is critical for those companies who wish to establish a robust approach to sustainable manufacture.

In this 5-minute guide, our Industrialisation Project Manager Michael Gradonski highlights some key areas worth exploring to encourage sustainable practices within plastic manufacturing for medical devices…

First, some context...

The manufacture of all plastics accounts for 8% of global oil production, with oil used both as a feedstock and a fuel in the manufacturing process.

Plastics have been estimated to account for 30% of all healthcare waste, and around one-third of waste in intensive care or anaesthetics.

The US produces around 5.9 million tonnes of medical waste per year, suggesting that around 1.7 million tonnes of this will be plastics.

One typical adenotonsillectomy operation generates 101 single-use pieces of plastic.

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So in response, how can companies facilitate sustainable practices within their plastic manufacturing for medical devices?

Responsibly select & source materials

- Choose **mass-balance materials** (certified by the ISCC PLUS standard) to lower carbon emissions and dependence on fossil fuels without compromising device quality or safety
- Consider using **recycled and recyclable plastic** (e.g., PET) for logistical or patient-facing **packaging**
- Utilise **certified renewable energy sources** to power your polymer production
- Implement **chemical recycling** to help reduce landfill and incineration, lower greenhouse gas emissions, decrease reliance on fossil fuels, and produce high-quality recycled materials that enable a circular economy

Implement tactical product design

- Incorporate the principles of **“Design for Recycling”** and **“Design for Disassembly”**:
    - Integrate sustainability early in the design process, such as **designing for mono-material use** to simplify recycling and supply chain logistics
    - Develop products with **fewer parts**, **optimised dimensions**, and **high durability** for extended lifespan and easier end-of-life processing

Reduce your manufacturing footprint

- Optimise your manufacturing process by measuring and reducing the CO_2 footprint, lowering energy consumption, minimising waste, and establishing efficient in-house recycling or downcycling systems:
    - Implement advanced manufacturing approaches such as precision automation and lean assembly lines that use less material
    - Explore VHP as a low-energy sterilisation technique – saving energy by using a low-temperature, dry-vapour process with hydrogen peroxide to sterilise your device

Design for improved end-of-life logistics

- Design for **reprocessing**, **refurbishment**, or **recycling** - where regulatory requirements allow, to extend medical device life or recover materials

- Establish **closed-loop programs with healthcare providers** to collect single-use or expired devices for reprocessing or energy recovery, diverting waste from landfill

Real-world inspiration

SABIC's LNP ELCRIN CRX certified renewable copolymer resin, which lowers carbon emissions by over 40% compared to its fossil-based equivalent, is used for surgical devices and sterilisation trays.

Bornewables from Borealis, are polyolefins made using a mix of traditional and more sustainable feedstocks, such as waste and residue oils, and are tracked and certified by ISCC PLUS.

3M's Steri-Drape Surgical Drapes are made from bio-based materials instead of traditional plastics, reducing environmental impact while maintaining performance.

Onanon's sustainable connectors for single-use medical devices reduce material use by simplifying assembly and lowering energy consumption throughout the manufacturing process.

Cardinal Health's Sustainable Technologies™ division runs a zero waste-to-landfill facility that collects, reprocesses, or energy-recovers almost all components of single-use medical devices, achieving a 99.9% landfill diversion rate.

Addressing the financial barrier

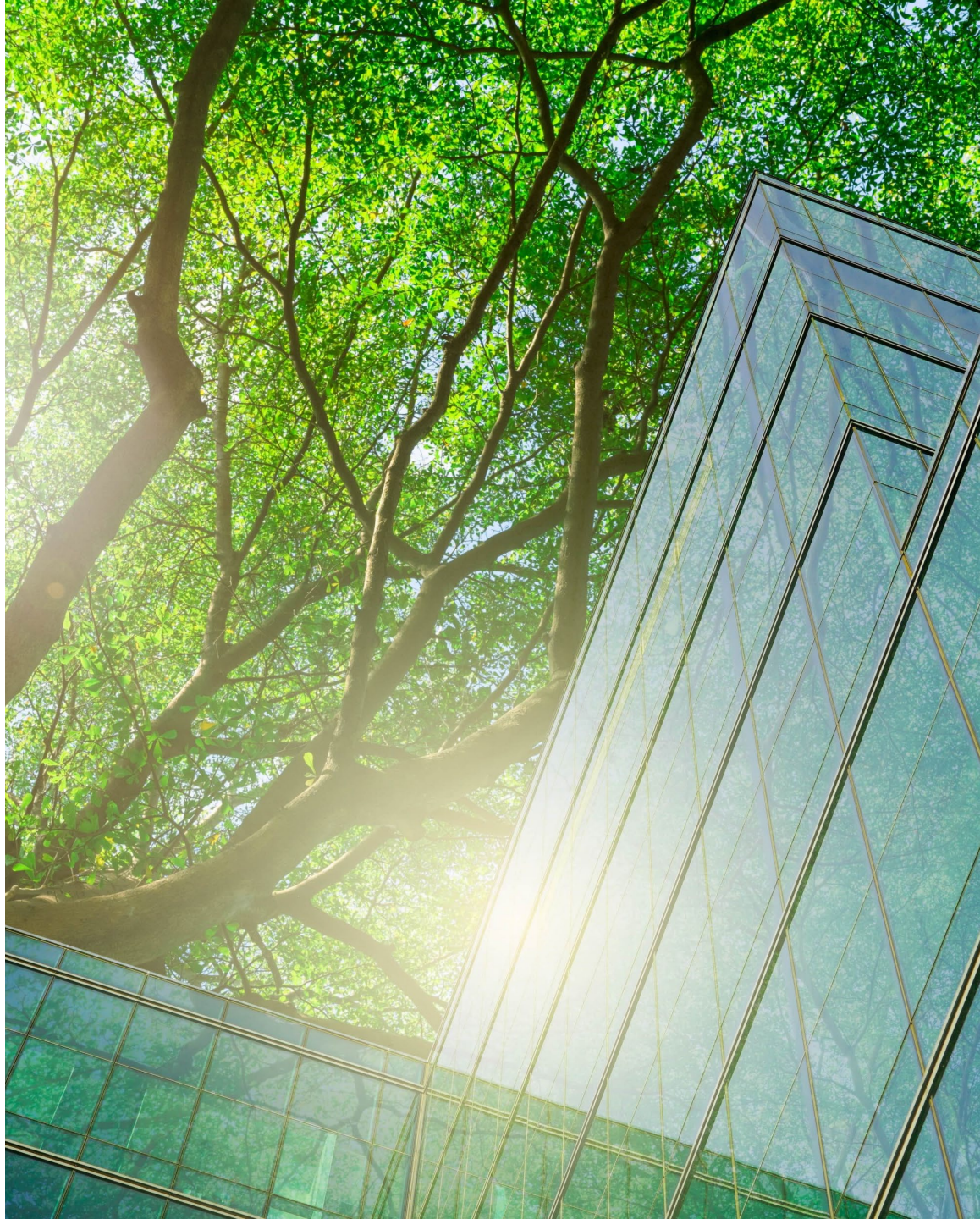
These best practices not only reduce the environmental impact of medical devices but can also align with evolving healthcare and regulatory requirements for sustainability.

But the required financial investment is a common barrier to these initiatives. Upgrading equipment, switching to more expensive sustainable materials, or implementing advanced cleaning systems all represent significant capital expenditures.

Be a progress pioneer

This financial reality highlights a critical point: the most substantial sustainability gains come from bold, capital-intensive investments with measurable returns.

True progress is demonstrated by facts. Companies who strategically invest in practical and compliant solutions that, despite their cost, substantially reduce overall ecological footprint, will help to steer the industry toward a more sustainable future.



Our Operations experts are standing by to help with your sustainability strategy and implementation. Get in touch to start the conversation...

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