Understand it

Apply it

Generate quick win ideas

Check an existing concept

More detail …

- Design wheel
- Explore
- Create
- Evaluate
- Manage
- Impact map
- Performance dashboard
- Role-based guidance
- **Topic-based guidance**

See examples

Material impacts & options

What key issues exist for my business?

Resource security is a growing concern. Nearly a third of profit warnings issued by FTSE 350 companies in 2011 were attributed to rising resource prices.

Demand for several elements, including helium, phosphorus, indium and gallium is predicted to exceed supply in the near future.

The west relies on China to supply 97 percent of rare earths, but as China's domestic demand grows, alternatives are desperately required.

Recycling and alternative sources are being explored, but they may not arrive quickly enough to plug the short term demand gap, and cease the toxic side effects in mining.

Simply pushing suppliers to reduce costs without careful attention to other key factors such as source of materials and use of 'at risk' elements fails to address longer term business resilience, or recognise indirect costs that occur elsewhere in product lifecycles. These costs can occur in terms of compliance or brand impacts, further downstream.

Materials and energy interact across the supply chain in quite complex ways, so materials costs tend to rise together with the cost of energy.

More is being discovered about the damage to our environment and food chain certain materials and processes can create, and businesses need to keep ahead of these discoveries.

Examples of economic and environmental success stories for materials repurposing can be found in the Value from waste section within See examples

Why is this an issue for my business?

Potential brand implications from association with negative social impacts of waste and resource conflicts are a very real business threat, with at least one household name falling foul of this every quarter. Brand association with severe environmental social impacts can destroy decades of brand building. Baotou and Bayan Obo are two towns in Inner Mongolia that process two-thirds of China's rare earth minerals, and China accounts for 97 percent of global output for these minerals. Locals have been inhaling solvent vapours and eating thorium enriched crops and livestock since the 1960s with terrible consequences.

When we ignore the complete supply chain of our products, we ignore these aspects. When we talk about 'cost' and 'aggressive margins' we do not include the costs of sulphuric acid vapours and coal dust clouds on local families, livestock and crops. Use of ubiquitous smart phone cameras are being used to link companies to such practices in their supply chain.

In June 2012, Beijing, which controls more than 90 percent of the reserves of these essential elements, warned that its supplies were diminishing, despite quotas to limit exports. After more than 50 years of excessive mining, China's rare earth reserves have kept declining and the years of guaranteed rare-earth supply have been reducing.

As improved standards of living are being more openly demanded in China, this is pushing up the manufacturing price and exposing unethical but cheap manufacturing and mining practices.

What steps can I take to address this?

- Materials and energy are used across the supply chain in quite complex ways, so it is necessary to use a simplified model to try and capture key impacts in a manageable way. Proxies can be useful for this purpose, for example carbon emissions can be used as a proxy for energy use. Similarly classes of materials can each be represented by a proxy material.
- Use a **People, Profit, Planet** representation to capture overall impacts, beyond purely financial, and use this to inform decision making and investments.
- Understand your supply chain risks, beyond the first tier of immediate suppliers.
- It's no longer advisable to leave materials supply risk to someone else in the supply chain, even with thorough Performance Bonds or Title and Risk contract terms. This is especially true when considering the recovery of EoL product, and a means of returning some of this material back into one's own manufacturing chain. New business relationships will need to be developed.
- A materials strategy is required, both to roadmap the risks of supply on the horizon and the phasing in of more secure materials and processes as the technology and costs evolve.
- Secure access to key materials in ones supply chain may also start to focus on waste streams rather than just the commodities markets and mining operations.
- New relationships may need to develop with your existing waste handlers – and end users.
- Considering how your waste might be repurposed into a useful resource can provide stimulus for innovation within concept design.
- Recycling typically requires less energy than making the same material from scratch. Recycling materials also saves on industrial use of water and mitigates adverse health effects associated with material production.
- In order to reap the benefits from recycling, the end of life processing must be considered at the manufacturing stage, because many manufacturing techniques make future recycling inviable.

Further reading

The impact on businesses can be considerable when materials start to be stolen in use due to market pressures. Considerable pressure was applied on the UK government to act on the UK scrap metal trade in 2012 for this very reason.

There is now more indium and gallium in use than in proven possible reserves, and more gold in a tonne of waste mobile smart phones than in typical ore mined for it.

In 2006 the DTI produced an outline UK Materials Strategy which included a key section on 'materials for sustainable production and consumption' and had invested nearly £0.5bn in collaborative R&D for materials from 2004-2006. In 2008 the TSB released its Advanced Materials Key Technology Area strategy 2008-2011 and in March 2012 DEFRA released 'A Review of National Resource Strategies and Research. This report makes reference to the Circular Economy and the University of Cambridge's department of Materials Sciences and Metallurgy.

This last report describes the European Resource Strategy and supporting reports including:

- The Raw Materials Initiative
- The EU14 Critical Materials
- EU Strategy on Raw Materials
- Critical Materials in Strategic Energy Technologies (SET)

And a number of other international reports on the same threats. Other references:

- High-value plastics from complex waste streams
- UK Government website on Environmental Regulations.
- Full product transparency, an e-book by Ramon Arratia of InterfaceFLOR.
- The Ecodesign Directive 2009/125/EC has been transposed in the UK by the Eco-design for Energy-related Products Regulations 2010 (SI 2010 No.2617). It aims to improve the environmental performance of products throughout the life-cycle, by integration of environmental aspects at a very early stage in product design. The original Directive was recast in 2009 and was previously known as the Energy-Using Products (EuP) Directive 2005/32/EC. This was transposed into UK law under Statutory Instrument (SI 2007 No.2037) which is now revoked.
- PAS 141: 2011 for reuse of UEEE and WEEE (2012 Recast)
- WRI's Greening the supply chain
- Eco Design For Packaging & Packaging Waste Directive (94/62/EC)
- BS 8887-1:2006 Design for manufacture, assembly, disassembly and end-of-life processing (MADE). General concepts, process and requirements.
- BS PAS 2060 (carbon neutrality)
- BS 8887-2:2009 Design for manufacture, assembly, disassembly and end-of-life processing (MADE). Terms and definitions.
