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

Energy impacts

There is little doubt that energy costs will rise dramatically for the foreseeable future. Estimating carbon impacts is an excellent way of determining how much energy is used across the life-cycle of the product, and where the 'hot-spots' are.

Transport accounts for a significant proportion of a country's carbon footprint (about 25%). However, the transport associated with manufacture and sale of consumer products typically involves lorries and ships that carry thousands of units for each journey. To put this in perspective, the carbon emissions associated with a consumer travelling 1 mile in a typical passenger car is equivalent to a 1kg product travelling halfway around the world (13,000 miles) in a ship, or 1,300 miles in a lorry.

Data source The Carbon trust provide Footprint expert, which can quantify carbon impacts. From this tool, average container shipping causes 15.4 gCO2 per tonne carried per km travelled, the equivalent value for a lorry is 150, and an average diesel car causes 198 gCO2 per km travelled. **End of notes on data source**.

The biggest carbon impacts are likely to occur in making the product, in-use energy consumption, and at end of life. Consumer returns are another likely hotspot, because of the consumer car miles involved. See the Impact map for more detail on identifying carbon hotspots.

What is the bottom line for my business?

Given that developed societies have committed to significant carbon reductions, it is highly likely that energy is going to get a lot more expensive. Given that the cost of energy determines the cost of getting materials out of the ground, transporting them and processing them, and the cost of producing food, the knock-on effect will be that all resources are going to become more expensive.

Carbon footprinting provides a useful proxy for determining which aspects of your business and your products rely on energy intensive activities. In order to remain profitable in our future world, businesses will need to outperform their competitors with respect to the ratio of customer value generated compared to energy and resources used.

Why do we need to reduce carbon emissions?

As soon as society determined how to convert heat energy into movement, explosive growth became possible by harvesting millions of years of accumulated energy storage in coal, oil and gas. Unfortunately, society is beginning to realise that releasing millions of years worth of accumulated carbon in a few hundred years will cause dramatic and irreversible climate changes.

In geological and evolutionary timescales, 100 years is an extremely short period of time. The exact nature and timescales of the changes that large-scale carbon emissions will cause are uncertain. However, any large-scale change over an evolutionary short time period can cause irreversible mass extinctions. Given the complex and unknown interactions between everything in the world ecosystem, the knock-on effects of these extinctions may significantly reduce the range of natural resources available for humans to exploit.

What about solar panels?

There are some limited opportunities where cost-effective renewable energy can be supplied with minimal environmental impact, solar panels on the roofs of buildings being a classic example. However, the amount of energy that the world uses to heat buildings, transport vehicles and produce electricity is several orders of magnitude greater than the amount of renewable energy that could be supplied by putting solar panels on roofs. Once these quick wins are exhausted, developing renewable energy from land will generally come at the compromise of its natural capital. For example, using farmland for solar panels or biofuels means that farm can no longer produce food.

Generating renewable energy requires enormous amount of land, and land in developed countries is expensive. (100 m² of land tends to deliver approximately 1 kW of energy on average, meeting all of the U.K.'s current energy needs entirely through renewables would dedicating roughly 60% of the U.K.'s land area solely to energy production, figures from Sustainable energy without the hot air).

What about nuclear?

Aside from the technical risks or benefits of nuclear power, these stations take about 10 years to get running, current political and social opinion is against them, and nuclear power stations are only possible as large-scale projects with political backing. Therefore, it is unlikely that the proportion of the world's energy generated by nuclear power will change much in the near future.

What about carbon capture and storage?

Aside from the debate regarding the feasibility, safety and cost-effectiveness of permanently storing carbon dioxide, carbon capture and storage approximately doubles the cost of coal-based energy, and still doesn't address issues of loss of natural capital caused by coal mining.

What about hydrogen fuel cells

Hydrogen is potentially useful as an energy storage medium, but doesn't actually generate any energy.

What do I need to know about power supply units?

- The ITU-T L.1000 recommendation for global Universal Charging Solution for mobile devices was agreed (first-stage approval) on 25th October 2012.
- ITU-T L.1001 will also benefit countries not equipped with reliable AC power grids, as it will be compatible with standalone AC produced by renewable energy sources including the 5V and 12V power interfaces of small photovoltaic systems.
- Globally, Recommendation ITU-T L.1001 will reduce the number of power adapters that need to be manufactured by widening the range of compatible devices, facilitating adapter reuse and recycling, and increasing build-quality and resilience to overvoltages. Designed to promote an adapter lifespan of at least ten years, the new ITU standard will drive substantial reductions in energy consumption used in ICT equipment manufacture, limit device duplication, reduce strain on raw materials and enable enormous reductions in e-waste.
- A study carried out by the University of Genoa, commissioned by ITU and the Global e-Sustainability Initiative (GeSI), estimates that the widespread adoption of an energy-efficient UPA solution will eliminate an estimated 300,000 tonnes of e-waste annually. In addition, the study shows it could reduce the energy consumption and greenhouse gas (GHG) emissions of external power supplies by between 25 and 50 per cent.
- The UPA makes use of the micro-USB connector and USB connector cable, and country-specific USB-to-mains plug. However in usability terms, the micro-USB connection is poor. Unlike Apple’s recent bespoke power socket, micro-USB is sided and too small for a growing proportion of the global population to see which way round it should be inserted, resulting in damaged connectors. This can result in the product (eg Smartphone) being rendered useless with a damaged power socket, negating all the energy/waste saving benefits.

- In the industrial and UI design community, the considered solution to this is colour coding the micro-USB side as a two-part shot moulding, matching the device. For example yellow side matching yellow side of socket, and (for UK) RNIB approved bumps on one side. I can find no agreed standard for this yet.
- There are some USB addressing, node, data and distance limitations too. Single port power is generally negotiated to a maximum of 500mA. However with USB3.0 Battery Charging Specification (released Dec 2010), 1.5A can be negotiated on a charging circuit and comms, with a maximum limit of 5A for single cable via USB hub.

See this ITU press release for more details. Also, this press release describes why O2 have decided to supply mobiles without charges from 2015.
