Information Sheet - Reducing Energy Embedded in Products

Introduction

Every manufactured item has energy embedded in it. Energy derived from fossil fuels creates carbon emissions which create global warming and climate change. At this stage in our low-carbon future virtually all of the energy used by commerce comes from fossil fuels. Energy sourced from renewable sources like the sun and wind will not create carbon emissions. There is however a proviso – there will be energy involved in the manufacture of the infra-structure of for example a wind turbine. Unless this has in turn come from a renewable source there will be a payback before the energy supply can be considered carbon neutral. In the case of a wind turbine this carbon payback period is approximately 6-8 months.

Embedded carbon is classed as indirect carbon emissions for your operation. Reducing energy/carbon embedded in your products (or the amount of infrastructure you use for manufacture) will reduce your indirect carbon footprint and thereby your organisation's overall carbon footprint.

Product Lifecycle

Every product has a product lifecycle and at each stage of this energy will be involved and therefore carbon emissions. A typical computer contains: precious metals such as gold and copper as well as lead, silica, aluminium, iron, zinc, tin as well as trace amounts of manganese, mercury, indium, niobium, titanium, cobalt, selenium, beryllium, tantalum, vanadium and europium. This surprisingly long list from the periodic table (some of which appear so obscure as to have been made up) are all ores found somewhere on the planet. They need to be mined and transported to foundries where they are refined and smelted. This is before the raw materials are manufactured into the original components that make up the circuit board and electronics inside the plastic box which is derived from oil and once again requires energy.

The product is then packaged and transported to distributors before it is purchased, used and eventually disposed of, which due to European regulations is increasingly by recycling rather than landfill. It could be argued that a proportion of energy in each product would involve the overall energy overheads of running the manufacturing plant, sales and marketing network and transportation.

Manufacturers

Given the above, manufacturers obviously can play a part in reducing the energy embedded in their products by careful design. This has been recognised by recent environmental legislation: The WEEE regulations (which stands for Waste Electrical and Electronic Equipment) place responsibility on producers and distributors to reduce landfill. The RoHS (Restriction of Hazardous Substances) is designed to reduce hazardous substances in electric and electronic equipment to make recycling easier. Recycled 'raw' material has a lot less energy embedded in it as the initial extraction, transport and refining processes are by-passed. In the case of a recycled aluminium can the amount of embedded energy is approximately 90% less than to produce the can in the first place. Basically products should be designed so that component parts can be reused or recycled.

Many companies employ CAD/CAM manufacture techniques which allow the maximum amount of components to be for example pressed out of a sheet of metal. Reducing waste at each stage of the design and manufacturing stage will reduce embedded energy in the product, as will increasing the amount of material that can

be recycled. These are effectively raw materials that now command a price as commodities increase, as demand increases and supply reduces. Computer-aided design can also allow the designer to, for example, reduce the size or thickness of a product, reducing embedded energy. If the envelope has to retain the pressure of a fluid this must comply with engineering standards for safety.

There is a fledgling market in carbon. This will act as an incentive to reduce the amount of commodities and raw materials when they each have a carbon price as well as the energy used in all aspects of manufacture.

If a company factors products rather than manufacturing them or if their product range comprises a combination of manufactured and factored items, they can endeavour to source (and badge) products that have been designed with low embedded energy. As energy is now expensive (oil doubled in price in 2007) these products may well be cheaper which may allow a greater mark-up in order that your list price is in keeping with accepted market values.

Distributors

As a customer who sells products you can also try and source stock on this criteria. In a crowded marketplace this practise can pay dividends as it allows you to differentiate your range and create competitive advantage. There is a definite incentive to lead the market and be an 'early-adopter' as those companies who recognise this will be best placed to maximise profit. Those that follow when further regulation necessitates this change will obviously be good for the planet but perhaps be at a disadvantage compared to those early entries.

There is an increasing demand for 'green' products which is being led by consumers. As a customer in the first instance you can also influence the marketplace by insisting (or at least encouraging) your suppliers to reduce embedded energy and create a demand for greater recycled produce. Suppliers can also:

- Specify that manufacturers reduce produce packaging. (There was a recent campaign by a national newspaper that highlighted a turnip that was sold in a supermarket in shrink-wrapped plastic which seems strange given that its skin provides perfectly adequate protection).
- Re-use the containers that convey the produce to you or specify that the manufacturer designs re-usable ones.

More General Action for all Businesses

- Switch your electricity supplier to one that offers a truly renewable tariff. Vision 21 has reviewed this complicated subject. Please see Vision 21 business information sheet – *Energy Supplies*.
- If you use water in your process then reducing this use will reduce the energy associated with mains water supply.
- Reduce the amount of energy involved with all aspects of your company's transportation. Please see the Vision 21 business information sheet - *Transport*.
- Reduce on-site energy consumption. Please see Vision 21 business information sheet – *Energy Management*.
- Implement a company carbon audit and action. Please see Vision 21 business information sheet – *Carbon Footprint*.
- Reduce your organisation's waste. Please see Vision 21 business information sheets – *Waste Reduction* and *Waste Recycling*.