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IMPACT ON DESIGN

Of all the recently adopted EU legislation, the Ecodesign of Energy using Products (EuP) Directive (2005/32/EC) is likely to have the most significant impact on the design engineer. This is a framework directive which means that it does not impose requirements on manufacturers, or their designers, but sets up a mechanism for introducing "implementing measures" that will impose specified design requirements. EuP has a very broad scope including any product that consumes, generates or controls energy (excluding transport).

The main aim of the directive is to reduce the energy consumption of electrical equipment, especially while in use. However, any environmental impact such as the use of hazardous substances and ease of recycling could also be legislated.

The directive itself sets a list of criteria that need to be met if an implementing measure is to be permitted. In order for the directive to apply, there have to be at least 200,000 units sold per year of a given product, although the directive does not specify whether this is of individual product types or broad categories.

There must be significant potential for environmental improvement but without serious cost to industry or consumers. It is the responsibility of the European Commission to carry out studies to determine if implementing measures are required and to then recommend targets, such as energy consumption reductions, that must be reached. So far there have been over 20 studies into different product types and many more will be carried out in the future.

Studies underway include:

1. External power supplies and battery chargers (now completed);
2. Stand-by and off-mode power losses;
3. Personal computers;
4. Consumer electronics – televisions;
5. Office lighting;
6. Street lighting (now completed);
7. Set top boxes;
8. Electric motors 1 – 150kW.

The first two of these are generic and cover a wide variety of product types whereas the others target specific products or components. The recommendations from the two studies that are complete are useful to illustrate the type of requirements that will be required for all products, although it should be noted that the aim of the studies is to provide options, not to make specific recommendations.

This study identified the best available technology that is in current use as well as developments that will be available in the near future. It is likely that implementing measures will force designers to utilise new low energy technologies. These include:

- Switch-mode power conversion;
- Integrated ICs;
- Efficient transistors such as MOSFETs;
- Resonant switching;
- Synchronous power rectification.

Designs will also need to have low power consumption when not

under load. Nokia for example, plans to develop a battery charger that tells the user to unplug it when not in use.

The approach that the European Commission and Parliament will use is to legislate if voluntary eco-design improvements are not already in place and seen to be effective. It is, therefore, in the interest of manufacturers and their design engineers to plan ahead by designing all new products with the environment in mind. This will help provide products that comply with future voluntary or compulsory requirements. It will be well worthwhile businesses considering eco-design and in particular energy efficiency, as a high priority in their future product designs. There are many things that designers can do to reduce energy consumption of products and equipment while in use, as well as developing innovative approaches such as the Nokia battery charger.

Some ideas include:

- Design equipment with good ventilation and low power dissipation components to avoid the need for fans, as fans consume significant amounts of power.
- The power consumption of ICs and other components (motors, motor controllers, transformers, etc) varies considerably although the information is often hidden in lengthy datasheets. Choose low power consumption components.
- Use lower voltages. Power consumption is directly proportional to voltage and so halving voltage halves power consumption.
- Use active power management to switch off systems and functions that are not in use. Battery life of mobile phones and laptop computers has been greatly increased by taking this approach.
- Minimise the number of supply rails in a product as well as using low voltages.
- Use LCD instead of CRT displays. LCDs also use less power than LED indicators or filament lamps.
- Use switched mode power supplies instead of linear power supplies.

Low power designs can have other benefits, for example, reliability tends to be better and the life of components such as electrolytic capacitors will be longer if the operating temperature of a piece of equipment is lower.

Eco-design is not only about energy consumption. Although this is the current priority, all aspects of design should be addressed. For example avoiding hazardous substances whenever possible and not using difficult to recycle materials (also encouraged by the WEEE directive) are very important considerations. Also avoiding rare metals such as gold that use huge amounts of energy in their extraction and very toxic substances (such as cyanide) in refinement processes is always advisable.

So, in summary, the key impacts of the EuP directive on the design engineer are:

- May need to comply with implementing measures;
- Should pre-empt future measures in new designs;
- Forces consideration of energy consumption in new designs as higher priority than previously;
- Encourages avoidance of use of hazardous substances where possible;
- Compliance documentation may be required for some products. ■