

MedClean Propre Limpio



No. 115 Technological & environmental improvement of products

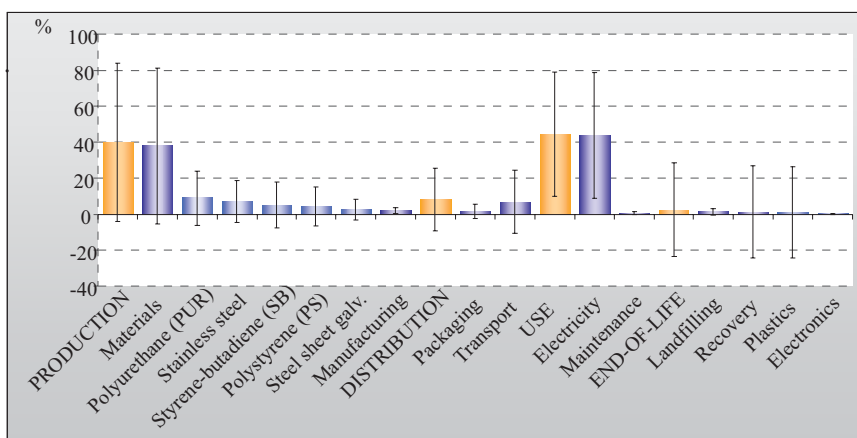
Eco-design of a domestic no-frost fridge-freezer of the INNOVA series

Company	FAGOR ELECTRODOMÉSTICOS S. Coop., Arrasate (Spain)
Industrial sector	Manufacture of domestic appliances ISIC Rev 4 n° 2750 (<i>International Standard Industrial Classification of all Economic Activities</i>)
Environmental considerations	Increasing public awareness about environmental matters, particularly energy saving & efficiency and climate change, the need to remain competitive in a global market and the appearance of the ErP (Energy-related Products) Eco-Design Directive 2009/125 EC (former EuP - Energy-using Products Directive (2005/32/EC), led the company FAGOR to become involved in this eco-design project.
Company background	FAGOR decided to take part through this case study in an eco-design pilot project addressed to the electrical and electronic sector, which was supported by Ihobe. This project was carried out between February and July 2009 and it concluded with the publication of an Electrical and Electronic Eco-design Guide by Ihobe in April 2010. The product assessed and eco-designed was a domestic fridge-freezer of the INNOVA series. It is a no-frost model, four stars, A class fridge, with R600a refrigerant gas, a total weight of 66.19 kg, 241/69 litres capacity (fridge/freezer) and with an electricity consumption of 365 kWh per year.

Summary of actions

To identify the main environmental aspects of the product, an environmental assessment - streamlined LCA - was carried out considering the whole product lifecycle (manufacturing, distribution, use and end-of-life) using the software tool EuPmanager®, nowadays updated to a free cost version named EuPeco-profiler® under the LiMaS project (www.limas-eup.eu). This software tool uses the MEEuP methodology developed by VHK for the European Commission for assessing Energy-using Products.

The graph below shows the environmental profile of the complete life cycle of this fridge-freezer assuming a product lifetime of 15 years. As can be observed, 40% of its overall environmental impact corresponds to the manufacturing stage, 8% to distribution, 44% to actual use and 2% to the end-of-life stage. A more detailed analysis reveals the most significant aspects and thus the priority processes and materials for improvement efforts.



Original fridge-freezer of the INNOVA series

Summary of actions (cont.)

After identifying the most significant aspects of the product and considering the main company's motivations, there were identified and evaluated potential eco-design strategies for improving the product. Not all the strategies initially drawn up were implemented in the final improved design, as some proved unviable due to technical and/or economical reasons.

The eco-design measures finally applied are summarised below:

Lighter weight

Design of a new product structure: new product structure and thickness reduction of different plastic and metal parts, allowing significant savings on material (5.4% reduction in the total weight of the product).

Lower energy consumption

Better distribution of the insulation material: better and more efficient distribution of the insulation material in the product, increasing the thickness in those areas with higher energy losses.
Replacement of the compressor by a new model with higher COP, but with same capacity and similar characteristics (fixed speed).

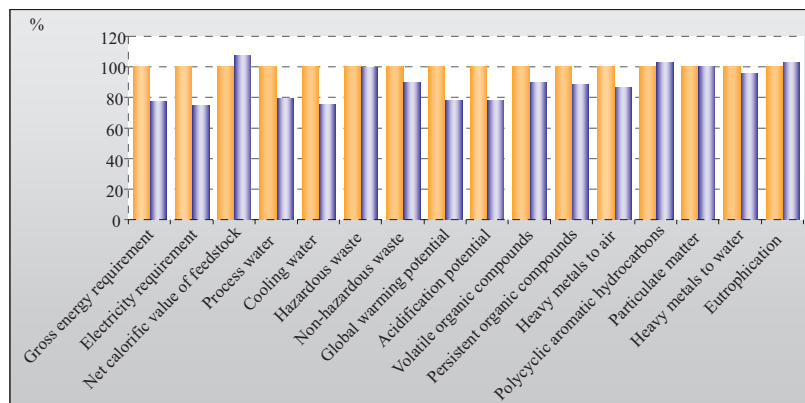
Efficient design of the heat exchangers: new design of the heat exchangers for increasing their thermal performance, by improving air circulation and their surface area. The new heat exchangers are more efficient and less noisy.

New control software: the control software was improved for an efficient management of the product energy consumption (e.g. intelligent no-frost control depending on operation conditions and outside temperature).

Efficient electronics: the whole printed circuit board was redesigned and electronic components with less energy losses were selected for minimising energy consumption.

Balances

The graph below shows the improvements in percentage terms achieved in each of the 16 environmental impact indicators considered, after the implementation of the eco-design measures described above. The average environmental improvement achieved in the new model of the ASTRA series is 10.9%. A 26.0% reduction in energy consumption during the useful lifetime was achieved. The new design implies energy savings of 95 kWh per year (approx. 13.3 €/year) compared with the previous model.



Improved fridge freezer of the ASTRA series

Conclusions

The main benefits achieved in this eco-design project were the following:

Improvements in the product:

- 10.9% reduction in overall environmental impact
- 26.0% reduction in energy consumption during the useful lifetime
- 5.4% reduction in the total weight of the product

Improvements in the company:

- Alignment with the future requirements of the ErP Directive (2009/125/EC)
- A greater capability for innovation through eco-design
- Market position improvement

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.



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