



# ENVIRONMENTAL BRIEFING

A CONTRIBUTION TOWARDS SUSTAINABLE DEVELOPMENT FROM THE EUROPEAN PRODUCERS OF STEEL FOR PACKAGING

*“We must preserve both the industry that is our living and the environment that supports our life” - Hubert Reeves*

February 2006

In this issue of Environmental Briefing, APEAL makes a new contribution to the debate on sustainability by taking a closer look at the eco-efficiency of various packed vegetable systems available in Europe. A recent study carried out by respected Dutch environment and food institute TNO<sup>1</sup>, shows that preserved canned food using steel as a packaging material performs outstandingly well and delivers real value to society.

## *Research demonstrates canned food is a sustainable top performer*

### PLACING THE CONSUMER CENTRALLY

As part of its continued focus on sustainability<sup>2</sup>, APEAL, the Association of European Steel for Packaging Producers, wanted to assess the sustainability performance of packaging from the consumer's perspective. Today's society offers consumers an ever increasing range and choice of products and APEAL was especially interested to gain insight into the eco-efficiency performance of the different packed product systems for vegetables.

The consumer is central in any such assessment. It is the consumer that buys the product, the consumer that uses the product to feed his or her family and finally the consumer that has in many countries a key role in sorting the empty packaging so that it can ultimately be recycled. This approach, placing the consumer and society at the centre, enables APEAL to benchmark canned food packaging systems against other systems from a sustainability viewpoint. APEAL has now substantiated, independent evidence of the value that canned food brings to society at an environmental, economic and nutritional level.

### EXECUTIVE SUMMARY

*Commenting on the conclusions of the study Toon Ansems, project leader at TNO, said “In today's open market where the supply of foods is secured throughout the year, amongst the systems analysed in our study, the canned food packaging system is a top performer in terms of eco-efficiency”.*

*When considering economic and environmental aspects, vegetables sold in a steel food can, frozen in a plastic bag, or fresh peeled, performed well, having comparable above average eco-efficiency, while vegetables in a food pouch, laminate carton or frozen in a carton performed less well.*

1. TNO - Environment, Energy and Process Innovation

2. See also the Environmental Briefing of April 2005 that analyses the eco-efficiency of various collection systems for used packaging.



## STUDY BOUNDARIES AND FUNCTIONAL UNIT

Placing the consumer at the centre also dictated the choice of functional unit used in the research. TNO chose the daily quantity of vegetables of an average Dutch household of three people, aged between 12 and 70, as recommended by the Dutch Centre for Nutrition to provide a healthy diet. The functional unit was therefore 600 grams of carrots prepared and consumed at home.

Carrots were chosen as an example of a well-defined food product because they are available in a wide range of processing and packaging combinations.

Firstly the study looked at carrots grown, packed and distributed in The Netherlands then, again placing the consumer at the centre, the study analysed carrots available on the Dutch market throughout the year, including imported carrots.

Carrots are either sold as fresh products - bunched, or peeled and packed in a plastic bag, or they are sold as frozen products - either packed in cartons, or in plastic bags. Preserved carrots are sold in steel food cans and in carton laminates. While carrots in pouches do not currently exist on the Dutch market, the food pouch solution was included in the analysis as a possible future packaging for preserved carrots.

The scope of the study goes from the cultivation of the carrots in the field to the storage, preparation and eating of the carrots at home by the consumer. The study also includes the waste flow generated by the consumer, taking into account not only the used packaging, but also the food that is lost in the process, or left uneaten in the pan or on the plate.

All products analysed were bought in large Dutch supermarket chain, Albert Heijn.

In the case of carton laminates and frozen products, the package not only contained carrots but also other vegetables.

For the environmental and economic assessments it was assumed that the packaging only contained carrots.

The study reveals that eco-efficiency assessment is key to the overall sustainability performance evaluation of canned food.

## METHODOLOGY

The environmental impact of each step in the chain was defined according to 6 environmental themes<sup>3</sup> that were chosen in accordance with their importance on the political agenda. These impacts were measured for each of the 7 systems analysed. The lifecycle analysis (LCA) data used for the purpose of this study comes mainly from BUWAL 250 and JUNGBLUTH.

In a second stage these impacts were aggregated in order to get a global impact per environmental theme for each of the systems.

The cost analysis included the retail price of the product, costs of transportation, storage, preparation and cooking. The cost of the product itself was the price at the supermarket and other costs were calculated from average consumer prices for car usage, consumption of electricity and gas, drinking water and the average Dutch costs for waste treatment.

There was a large spread in product prices, indicating that not all price differences between the different products are of significance.

To aggregate the cost impact as a single indicator was not difficult as all costs were in Euro. To aggregate the environmental impact to a single indicator, shadow prices<sup>4</sup> were used. A variety of methods were nevertheless tested, but showed no significant differences in the results.

The eco-efficiency combining the costs and environmental impact of each solution was first determined for the Dutch products.

In a second stage the eco-efficiency was determined for the Dutch market, this time taking into account the environmental and cost impact of the imported packed products in order to reflect the choice the consumer has throughout the year.

3. These themes are defined as follows : Global Warming Potential (GWP), Ozone Depletion Potential (ODP), Human Toxicity Potential (HTP), Fresh Water Aquatic Eco-Toxicity Potential (FAETP), Terrestrial Eco-Toxicity Potential (TETP) and Photochemical Ozone Creation Potential (POCP).

4. Shadow prices are based on the costs needed to abate the impact of each single environmental impact. For instance, the costs to reduce 1 kg CO<sub>2</sub>-equivalent using the most expensive Best Available Technique (BAT) is 0.05€. Global Warming Potential is expressed in CO<sub>2</sub> equivalent, other environmental themes have other measurement units, and therefore also other shadow prices.

# ENVIRONMENTAL BRIEFING

## ECO-EFFICIENCY ANALYSIS

### *Eco-efficiency of Dutch products (see Figure 1)*

Canned carrots had average shadow costs. Their environmental impact was close to one. The least performing system, in relation to environmental impact, was frozen carrots packed in a carton. These had shadow costs of over 1.5 times the average. It is however a relatively cheap product for the consumer.

The carrots sold in a steel food can, the fresh peeled carrots and the frozen carrots sold in a bag had a comparable, and slightly above average eco-efficiency. Indeed, they are all positioned slightly above the diagonal in Figure 1.

The fresh bunched carrots performed best, with below average cost and environmental impact scores.

The least performing alternatives were the frozen carrots sold in a carton, the carrots in a food pouch and the carrots sold in a carton laminate.

### *Eco-efficiency of the products on the Dutch market (see Figure n°2)*

It has been assumed that the imported products do not differ in price but the increased transportation of the imported products will be reflected in the environmental impact. Products are largely imported to provide consumers with a choice of fresh products all year round. The import of packed carrots leads to an increased environmental impact. But at the same time, the relative differences between the systems analysed decreased (see Figure n°2). The alternatives are less spread over the environmental axis and lie, as a consequence, closer together compared to their respective positions in Figure n°1.

Canned carrots in this case are the best performing product in terms of eco-efficiency.

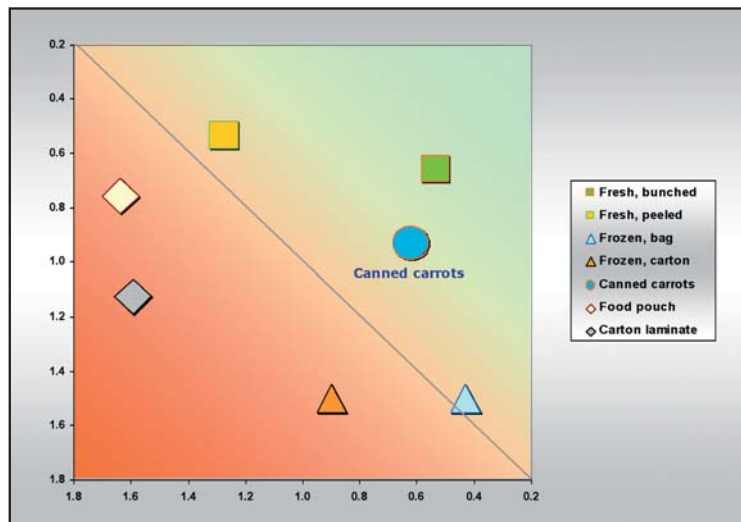


FIGURE 1. Eco-efficiency of Dutch products using the shadow prices for each impact category. Both the axes are scaled around the average impact (=1).

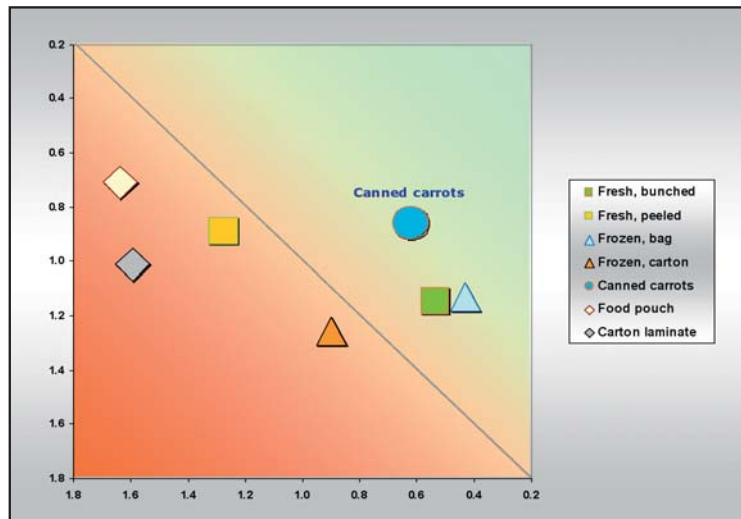


FIGURE 2. Eco-efficiency for products on the Dutch market using the set of shadow prices





# APEAL

## ENVIRONMENTAL BRIEFING

February 2006

### SENSITIVITY ANALYSIS

A sensitivity analysis was performed on the 3 different key drivers that could have had an influence on the final results:

- The LCI data from IISI<sup>5</sup> for steel for packaging instead of the BUWAL 250 data
- The use of more recent (lower) home fridge and freezer electricity consumption figures
- The use of higher food losses

The first two drivers have had little significance in the final results presented in Figures 1 & 2. The increased food losses have had an influence on the environmental burden of each solution, but the relative position of each product does not change.

### THE VALUE OF CANNED FOOD TO SOCIETY

Canned carrots, fresh bunched carrots and frozen carrots sold in a bag have a comparable and slightly above average eco-efficiency. In a real market situation where consumers are confronted with a number of choices, in all seasons,

canned food clearly stands out as one of the best performing packaging solutions. It offers consumers a good product they can rely upon and trust, while also offering society the optimum solution in terms of sustainability.

In sum, European consumers and society benefit from the 25 billion steel food cans in the EU marketplace each year. Going back in time when the first retorted food cans were brought onto the market, value was brought to society because food wastage had been cut down. This value still exists and can be evaluated at 465 million euros per year in Europe by measuring the reduced environmental impact cans have achieved as compared to what existed before.

The study provides substantiated, independent evidence of the value that steel packaging brings to society, and specifically to the food sector, at an environmental, economic and nutritional level.

---

5. IISI : International Iron and Steel Institute.



The Association of European Producers  
of Steel for Packaging  
Avenue Louise 89, BE – 1050 Brussels  
Tel. +32/2/537 91 51 Fax +32/2/537 86 49  
e-mail: [info@apeal.be](mailto:info@apeal.be)  
[www.apeal.org](http://www.apeal.org)

Director of Publication - Philippe Wolper - APEAL  
Chief Editor - John May - Corus Packaging Plus

### REFERENCES

- (1) TNO report R 2005/101. September 2005. Eco-efficiency and nutritional aspects of different product-packaging systems: an integrated approach towards sustainability. Available on the APEAL website.
- (2) APEAL website [www.apeal.org](http://www.apeal.org)