Steps towards carbon footprint, and its reduction – focusing on frozen products

É. Erdélyi[1], V. Losó[2]

[1]Department of Methodology for Business Analyses, Budapest Business School, Budapest, H-1054, Hungary
[2]MIRELITE MIRSA Co. Ltd.., Albertirsa, H-2730, Hungary
Keywords: carbon footprint, deep frozen, food, product, reduction
SzaboneErdelyi.Eva@uni-bge.hu

The term 'product carbon footprint' refers to the Greenhouse Gas emissions of a product across its life cycle, from raw materials through production (or service provision), distribution, consumer use and disposal/recycling. Quantifying the carbon emission sources will help to understand what impact a company, a product or an organization is having on climate change. It helps manage the carbon emissions and make reductions over time, furthermore it helps find and identify areas for reducing emissions, which will often result in cost savings, as well. The food system has been identified as one of the major attendants to climate change (Röös, 2014). Thinking of sustainability, beside the nutritive values it is good to know the differences between using frozen or canned raw materials in cases when fresh fruits or vegetables are not available on the market. Research of the effects of production on the environment is a very complex challenge. Calculations need huge data and information claim, so cooperation with producers is very important. In this study we analysed the food print measurement of deep-frozen products at the company MIRELITE MIRSA Co., Ltd. When choosing a product for footprint calculation we consider the goals of the project, so we identify which products best meet criteria of the company's GHG reduction strategy; for example, comparisons across product specifications, manufacturing processes, packaging options, distribution methods. We used the standard of PAS 2050 (How to assess the carbon footprint of goods and services) and cooperate with Hungarian companies producing food. Mostly PAS 2050 guidelines can be followed, and ISO 14000 standards can be used. ISO 14067 (Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication) standard is based on the standards of lifecycle analyses and assessment, eco-labelling and environmental reporting (www.iso.org).

MIRELITE MIRSA Co., Ltd. is a responsible company founded in 1945, has been specialized in manufacturing and distributing a wide range of deep-frozen fruits, vegetables and pastry products in an outstanding quality. These fruits and vegetables can be used after defrosting, don't need cooking. This Company has four factories today and is run by the same family. They are in co-operation with local orchards, eg. Domoszló factory is located in the heart of berry producing area of Hungary. The factories process practically every vegetable and fruit type produced in Hungary. A farm to fork tracking system assures the quality. The excellent, fresh raw materials used by the Company are purchased from local, neighbouring farmers controlled by the Company's experts during the whole growing process starting from sowing to harvesting. Half of the annual production is sold to export markets, everywhere except Australia. We made calculations for different products, in this study we intend to show details for deep-frozen products in general, based on the steps given in Figure 1. We made the calculation containing the average market of deep-frozen products.

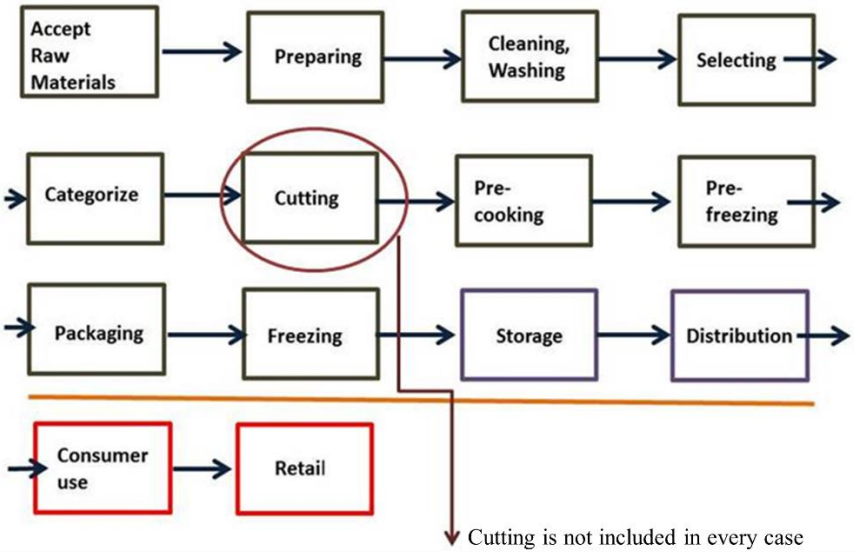

Figure 1. General Lifecycle of a frozen product

First step or calculation is building a Process Map, identifying all materials, activities and processes which have effects on the chosen product's life cycle. The process starts by breaking down the selected product to its functional units and focusing on the most significant inputs first, then identifying their respective inputs, manufacturing processes, storage conditions and transport requirements following the stages of the products life cycle: processes related to raw materials, manufacture, distribution, consumer, disposal, retail use. Two types of data are necessary for calculating the carbon footprint: activity data and emission factors. Activity data refers to all the material and energy amounts involved in the product's life cycle. Emission factors provide the link that converts these quantities into the resulting GHG emissions: the amount of greenhouse gases emitted per 'unit' of activity data (e.g. kg GHGs per kg input or per kWh energy used). Activity data and emissions factors can come from either primary or secondary sources. Data collection templates are useful for formalising the data collection process, helping to structure an interview with a supplier, ensure completeness, thereby minimising the number of interviews required, and prioritise the likeliest/largest carbon reduction opportunities.

The quantification of the total amount of all materials in and out of a process is referred to as 'mass balance'. This step provides confirmation that all materials have been fully accounted for and no streams are missing. Collecting data is the most difficult part of the process and needs a very important cooperation with producers. It depends on interviews and focuses on the most significant inputs first, and identifies their respective inputs, manufacturing processes, storage conditions and transport requirements. As many factors were taken into considerations as possible. Important elements of product carbon footprint are packaging and transportation. For example, package materials for deep-frozen corn: Polypropylene bag comes from Tatabánya, which is 121 kilometers far from Albertirsa, the location of Mirelite Mirsa Co., Ltd., paperboard packaging comes from Nyíregyháza, which is 264 kilometers far, and the plastic inside the box comes from Sümeg, which is 237 kilometers far from the company's location. For this product calculations result emission given in Figure 2. If we avoid empty journeys on the way back, it also helps reduce charging the environment.

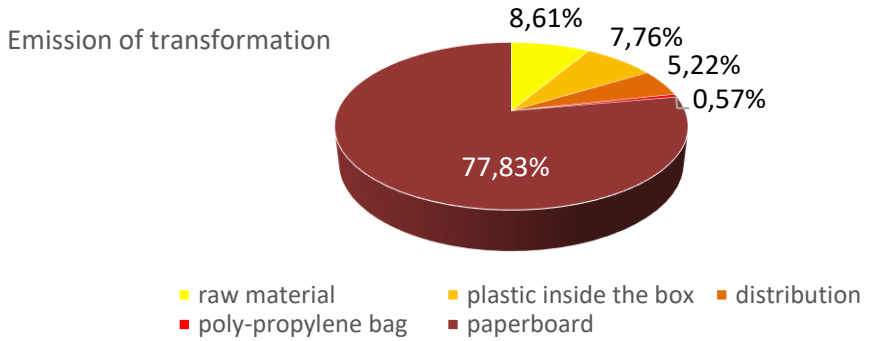

Figure 2. Emission of transportation from different materials (1 ton product corn/CO_2 kg)

One of the limitations for calculations is considering consumer usage. We can give advices by education. It helps reducing carbon footprint with reducing the time of storage. We can really reduce carbon emission of these products only by letting the frozen food to melt without using microwave oven or stove for cooking. We made calculations to see the differences in the measurement using different treatments. According to the consumer phase Virtanen (2011) said that accounted for between 8 and 47% of the climate change impacts for homemade portions. We also think that it is the place where we can spare the amount of carbon, only by changing our philosophy and habits in order to take care of the environment. There are many commercial benefits of product carbon footprint calculation. It highlights the opportunities for more effective energy usage, reduced waste, streamlined logistics, and other efficiencies. It is critical to help cutting the costs, as well.

References:

1. Röös Elin (2014): Carbon Footprint of Food Products: Assessment of Carbon Footprint in Different Industrial Sectors, Volume 1, Part of the series Eco Production, pp 85-112
2. PAS 2050 - Assessing the life cycle greenhouse gas emissions of goods and services, http://shop.bsigroup.com/en/Browse-by-Sector/Energy--Utilities/PAS-20502050/
3. Virtanen Yrjö, Sirpa Kurppa, Merija Saarinen et al. (2011). "Carbon Footprint of Food: Approaches from National Input-Output Statistics and a LCA of a Food Portion. "Journal of Cleaner Production, 19(16): 1849-1856.