

# Bio-based plastics

## Case study

### B-Pack S.p.A.



**B-Pack S.p.A. is an Italian company specialized in the field of coextruded flexible multilayer barrier films becoming an international benchmark in the design and production of oxygen high-barrier structures with EVOH and PVOH. B-Pack has decided to use the LCA to go to improve their knowledge about LCA and the impact of different materials in order to search for strategies for environmental improvement of their current barrier film portfolio.**

Because of their interest on such analysis, B-Pack decided to join the training and case study programme of LCA to go with the support of ITENE. The main driver to join this training was basically their interest on further learning on the breakdown of the impacts of current bio-based barrier films as a part of the corporate product development & improvement strategy.

|                 | PLA PVOH film  | PLA PVOH film                                  |
|-----------------|----------------|--|
| INDICATOR       | Global Warming | Cumulative Energy Demand (CED) - non-renewable |
| UNITS           | kg CO2 eq      | MJ   |
| TOTAL           | 100%           | 100%   |
| MATERIALS       | 80%            | 90%  |
| - Raw materials | 80%            | 90%  |
| PLA             | 19%            | 20%  |
| PVOH            | 61%            | 70%  |
| - Compounding   | 0%             | 0%   |
| TRANSPORT       | 6%             | 3%   |
| PROCESSING      | 11%            | 5%   |
| - Processes     | 11%            | 5%   |
| - Transport     | 0%             | 0%   |
| DISTRIBUTION    | 3%             | 2%   |
| - Packaging     | 3%             | 2%   |
| - Transport     | 0%             | 0%   |
| END-OF-LIFE     | 0%             | 0%   |
| - Landfill      | 0%             | 0%   |
| - Incineration  | 0%             | 0%   |
| - Composting    | 0%             | 0%   |
| - Recycling     | 0%             | 0%   |
| - Transport     | 0%             | 0%   |

Figure 1. Global Warming and CED results for PLA PVOH film

The bio-based plastics LCA to go tool was used to carry out a non-comparative cradle-to-gate LCA of two different types of barrier films produced by B-Pack: (a) PLA/PVOH/PLA and (b) LDPE/EVOH/LDPE. A first screening with the tool revealed that in both films a great part of the impacts in almost all impact categories are caused by the raw materials used, while the impacts of converting, supply of raw materials and packaging materials for the distribution of the final product have less relevance to the impact in both cases.

An analysis on the raw materials stage of PLA/PVOH/PLA film suggested that environmental improvement strategies should be focused on PVOH use while keeping the barrier properties for the film made of PLA/PVOH/PLA. Based on the analyses carried out with the bio-based plastics LCA to go tool, it was found out that in terms of carbon

footprint, around 61% of the impact is caused by PVOH, while PLA only contributed around 19%. Similar results were observed in the case of non-renewable Cumulative Energy Demand (CED), where PVOH accounts almost a 70% of the contribution to this impact, while PLA has around 20% of the total impact to this category. This energy demand mostly influencing the carbon footprint results shown.

In the case of the LDPE/EVOH/LDPE film it was found that the environmental improvement strategies should be focused to an optimisation of the amount of LDPE used in the outer layers.

Sara Granvillano, Laboratory technician at B-Pack S.p.A. pointed out that *“work with LCA to go tool has been a great opportunity to improve our knowledge about LCA and the impact of different materials”*.