January 2023

COVEME
THE VALUE OF INNOVATION

LCA STUDY AND CARBON FOOTPRINT OF A FILM BACKSHEET FOR SOLAR PANELS

Coveme once again proves to be a pioneer in the PV sector by promoting the study of the carbon footprint through the LCA analysis (life cycle assessment) of its backsheet for pv module protection. For this purpose the greenhouse gas emissions (GHG) generated in the production of the dyMat® HDPYE SPV L backsheet were measured.

This analysis was performed by the Milan Polytechnic and by Gesteco, a company that develops integrated solutions for the environment.

PURPOSE

The main purpose of the analysis is to **define the criticalities of the entire life cycle of the dyMat® HDPYE SPV L** backsheet with respect to greenhouse gas emissions and to **identify solutions capable of reducing greenhouse gas (GHG) emissions**.

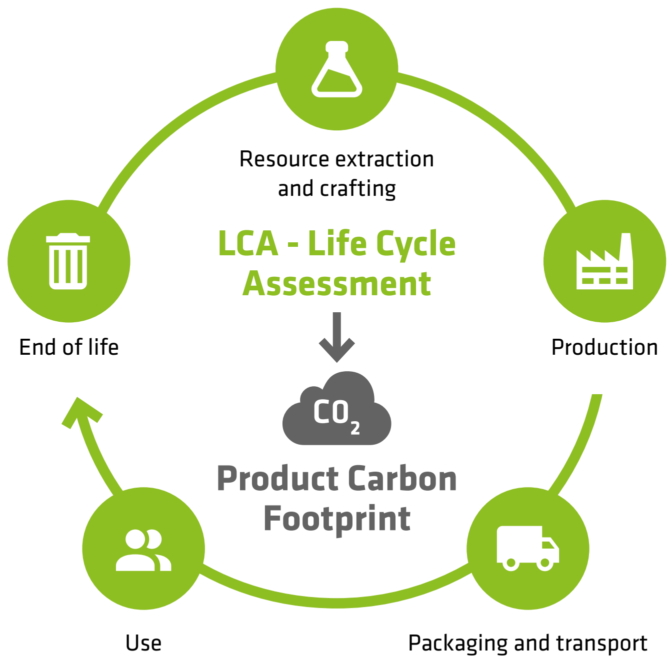
METHODOLOGY WITH WHICH THE ANALYSIS WAS CONDUCTED: LCA AND CARBON FOOTPRINT

The methodology used to quantify the GHG emissions of the dyMat® HDPYE SPV L backsheet is that of the Life Cycle Assessment (LCA). **LCA**, according to the ISO 14040 definition, is a technique for assessing environmental aspects and potential impacts throughout the life cycle of a product or service. **The carbon footprint**, which measures the impact of human activities on the global climate by measuring the climate-altering gases (or greenhouse gases) generated, **represents a subset of the data deriving from a Life Cycle Assessment (LCA) study. The carbon footprint highlights only the emissions that have an effect on the phenomenon of climate change**.

The main advantages of a carbon footprint analysis, compared to a complete LCA study, are **the ease of communication and understanding of the results by the public**, and the possibility of being directly linked to one of the environmental priorities (the greenhouse effect). universally recognized.

The reference standards used in the assessment of greenhouse gas (GHG) emissions are:

- ✓ **ISO 14040**
  Environmental management
  Life cycle assessment
- ✓ **ISO 14044**
  Environmental management
  Life cycle assessment
- ✓ **ISO 14067**
  Greenhouse gases
  Environmental impact of products
  (Product carbon footprint)



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ANALYSIS PROCEDURE

WHY DYMAT® HDPYE SPV L WAS CHOSEN:

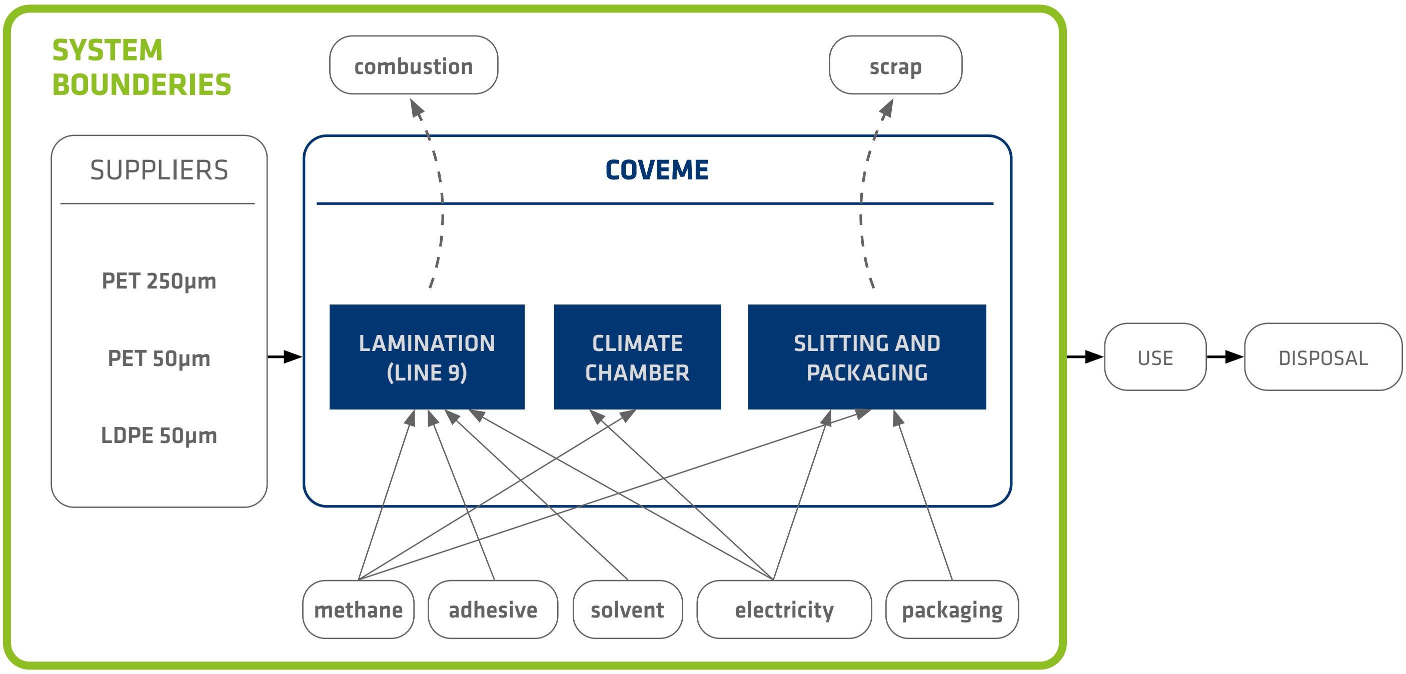
The aim was to calculate the carbon footprint of the emissions generated during the production of 1 sqm of dyMat® HDPYE SPV L backsheet. Coveme decided to carry out this LCA analysis on its dyMat® HDPYE SPV L product because it is the best-selling backsheet and is representative of the company's entire range of PET-based backsheets.

DETAILS OF THE ANALYSIS:

The Carbon Footprint analysis was carried out on 1 sqm of laminated film (DyMat® HDPYE SPV L) and was performed in 3 distinct phases of the production process:

1. **Pre-production of raw materials**: purchase of raw materials from suppliers
2. **Film treatment and lamination production processes** (Coveme production processes)
3. Film **slitting and packaging processes** (Coveme slitting department)

Given the high variability of the conditions, the steps transport, use and disposal of the film, have been excluded from the analysis, and the evaluation focused on the "cradle to gate" phases in which it is possible for Coveme to intervene, which are the 3 phases listed above and summarized below:



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SCOPE OF THE ANALYSIS

1. **Quantify the CO2eq emissions generated by the Film dyMat® HDPYE SPV L** in the 3 phases to determine which are the solutions in terms of processes, raw materials used and logistics that generate the greatest greenhouse gas emissions.
2. **Identify technical solutions for reducing the production of CO2eq**, associated with the Film dyMat® HDPYE SPV L. and, consequently, identify the conditions for a progressive reduction of emissions.
3. **Optimization of industrial processes to reduce the GHG emissions** generated by the dyMat® HDPYE SPV L Film.
4. With reference to the production of the dyMat® HDPYE SPV L Film, there are the conditions for **hypothesizing that an improvement in the GHG emissions of the product also has a positive effect on costs**.
5. Develop a culture and a production practice capable of facing the transition towards **greater production sustainability** in a rapidly evolving market
6. Communicate and promote to the many business interlocutors the path of **attention to environmental sustainability undertaken by the company**.

ANALYSIS RESULTS

For the environmental impact assessment (LCIA - Life Cycle Impact Assessment) the “carbon footprint” (related to the greenhouse effect) expressed as kg of CO_2 equivalent was used as an indicator.

CO_2eq is the unit of measurement used to measure global warming potential (GWP - Global Warming Potential of greenhouse gases).

The results reported in the following paragraphs refer to the greenhouse gas emissions in the entire life cycle for the production of 1 sqm of dyMat® HDPYE SPV L film:

CO_2eq generated per 1sqm of Film (dyMat® HDPYE SPV L)

CO_2eq= global warming meter (GWP)

LIMITS OF THE ANALYSIS

Some limitations related to the analysis methodology are reported:

- The constraints and choices that the application of the LCA methodology requires can influence the results and therefore the evaluation, even if accurate and complete, can present margins of error, even if not relevant.
- It should be noted that a significant limitation derives from the focus of the analysis on a single environmental impact indicator (that of the greenhouse effect). In fact, using a single indicator (kgCO_2eq) the results cannot represent the overall environmental impact of the product.
- Given the high variability of the conditions of use, the phases of transport, use and disposal of the film were excluded from the analysis, the evaluation concentrated on the “cradle to gate” phases in which it is possible for Coveme to intervene.

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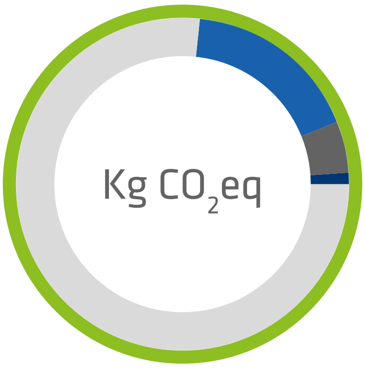
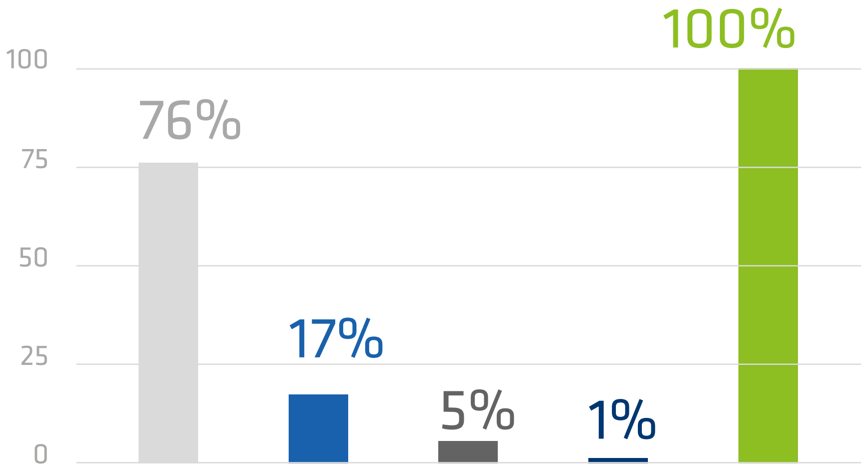
CARBON FOOTPRINT 1 SQM HDPYE FILM





76%	17%	5%	1%	100%
raw material	Coveme production	Coveme slitting	packaging	TOTAL

INTERPRETATION OF RESULTS AND CONCLUSIONS

FROM THE INTERPRETATION OF THE RESULTS, IT EMERGED THAT:

1.

THE PURCHASE OF RAW MATERIALS, PRE-PRODUCTION, HAVE AN IMPACT OF 76%

The processes for obtaining the polymer granule and subsequent extrusion confirm the results of previous studies relating to the production of polymeric films which have shown that these phases are responsible for most of the climate-altering emissions (V. Siracusa et al., 2014).

2.

THE SPECIFIC CONVERSIONS PERFORMED BY COVEME HAVE AN IMPACT OF 17%

The greatest contribution derives from the methane combustion processes, from the use of the adhesive for coupling the various layers of film and from the solvents necessary for production.

3.

ACTIVITIES RELATED TO THE SLITTIN PHASE HAVE A 5% IMPACT

In the slitting activity, waste and energy consumption are the main causes of the environmental impact.

4.

PACKAGING HAS A 1% IMPACT

The consumption of paper and plastic film are the most critical points.

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POSSIBLE IMPROVEMENT ACTIONS

On the basis of the results generated by the LCA study, some possible improvement actions have been identified which will be subject to evaluations in order to identify those that can be pursued:

1. Encourage the use of recycled raw material: Coveme already offers the possibility of ordering ECO products with a recycled PET component inside (rPET).
2. Introduction of sustainability parameters for supplier selection.
3. Further optimizations in production to reduce waste in order to limit the impact on the Carbon Footprint.
4. Encourage the production or purchase of electricity from renewable sources.
5. Encourage the production of heat from renewable sources.
6. Where possible, increase the use of recycled material in packaging and optimize packaging and packaging management from an eco-sustainable perspective.

For further details of the LCA analysis performed, it is possible to request additional information.

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