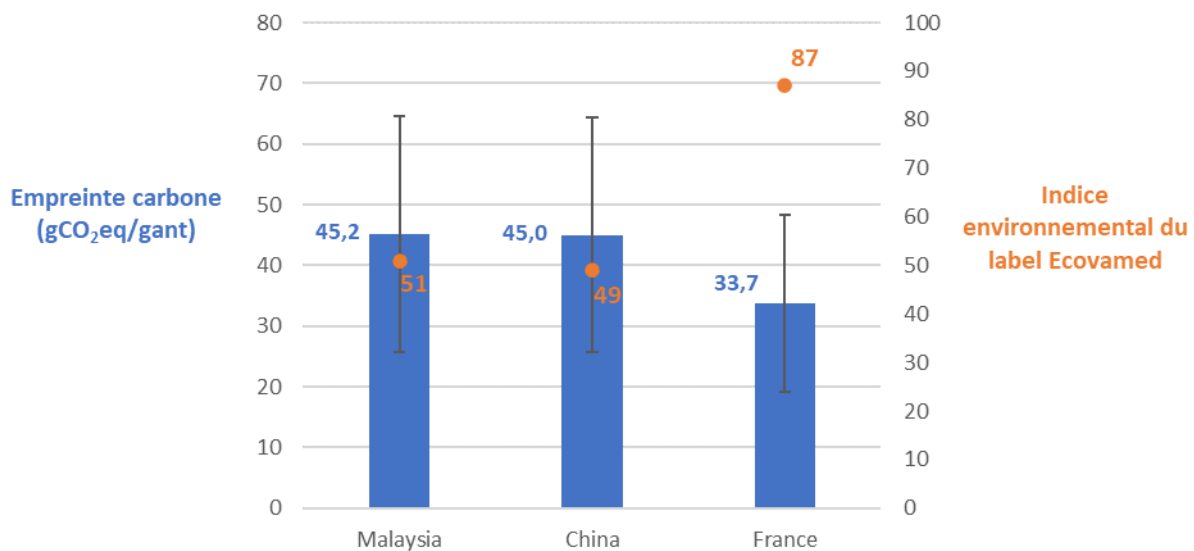


Ecovamed publishes a first comparative study on the carbon footprint of nitrile gloves depending on the production country, and the correlation with its Environmental Label of Origin

The health sector is a major contributor to greenhouse gas emissions in Europe, accounting for 4 to 8% of national emissions depending on the country. The manufacture and distribution of medical devices account for a significant share of these emissions, and it can be estimated that on average they account for 1.5% of European greenhouse gas emissions⁽¹⁾, including emissions from devices produced outside Europe and imported. This carbon footprint is highly dependent on the country of production, and the actions taken since the beginning of the pandemic to relocate the production of some health products should not only strengthen the health security of European countries, but also reduce the environmental footprint of their manufacture. Ecovamed, a company dedicated to carbon footprint evaluations and assessment of the origin of health products, will publish in the coming months a series of comparative studies on the carbon footprint of health products (medical devices and active pharmaceutical ingredients) according to their place of production. For this first study, nitrile gloves have been selected due to the large volume they represent, but also due the construction of a new manufacturing plant in France⁽²⁾.

A life cycle assessment (LCA) was carried out using data published in the literature⁽³⁾ to compare the carbon footprint of nitrile glove production in three countries: Malaysia, which accounts today for most of the world's nitrile glove production, China and France. This is a cradle-to-gate assessment, taking into account all greenhouse gas emissions from the extraction of raw materials to the storage of gloves in a warehouse in Europe. The use phase and the end of life were not taken into account in this study, as they are similar regardless of the origin of the gloves. It was considered a glove of 3.34 grams, whose manufacturing process and energy intensity are similar from one country to another. The results are given in the graph below, in gCO₂eq per glove. For gloves made in Asia, sea freight transport to Europe was also included, and this transport represents 6-8% of the total glove footprint.



Graph: Carbon footprint (blue) and environmental index (orange) by country of production. The environmental index ranges from 100 (best performance) to 0 (worst performance).

The carbon footprint of nitrile gloves produced in Malaysia and China are very similar, but the footprint of gloves made in France has been evaluated to be 25% lower. We can highlight that the environmental index of the Ecovamed label correlates well with the result of the Life Cycle Assessment, since the best score (87/100) is obtained for the least carbon emitting glove. This index is based on all production steps of a product, by weighting the carbon intensity of energy in the countries in which each manufacturing step takes place.

A comparison was also made with latex gloves, made from natural rubber. These gloves are essentially made in Thailand and Malaysia, and although the latex glove has a footprint comparable to the nitrile glove in these countries, a nitrile glove made of France has still a lower carbon footprint than a latex glove made in Malaysia. The higher weight of natural rubber gloves as compared to nitrile gloves offsets the better carbon footprint of plant-based raw materials.

The two main sources of CO₂ emissions during the production of nitrile gloves are:

- Emissions during the production of the nitrile resin, which makes the weight of the glove and the resin production country key parameters for the final footprint of a glove. The energy performance of the resin manufacturer (type of used energy and unit consumption per kg) also plays a crucial role.
- The energy used to manufacture the glove. Favouring low-carbon electricity and carbon-free steam are therefore key factors to improve its footprint.

As the glove production capacity in Europe is not high enough to supply the European demand, it is important to maintain some importation of Asian gloves, but it would be interesting to be able to arbitrate these supplies according to the environmental performance of each manufacturing site.

Indeed, the energy mix (coal, oil, gas, biomass) of Asian glove factories and of their chemical suppliers can make big differences on the glove carbon footprint from one site to another.

For users such as hospitals, the improvement of their environmental footprint can therefore be achieved by a local purchase, but also by the choice of gloves whose unit weight is as low as possible. The end of life of the gloves should also be reconsidered. Incineration, which is often the only end-of-life option for gloves used in hospitals, will add emissions of around 12 gCO₂eq per glove. Setting up new options for their end-of-life, as well as for all hospital plastic consumables, while respecting the safety concern related to potential contamination by pathogens, is therefore an important challenge to reduce the carbon footprint of the health sector. For instance, the *RightCycle* initiative in North America aims to collect these gloves and recycle them into plant pots or plastic shelves. An intermediate solution would be to maximize energy recovery within hospital waste incinerators, which would also reduce the energy bill of healthcare facilities if they can use the generated steam.

About Ecovamed

We are an innovative company, created in 2020, with the ambition to contribute to a sustainable access to health products. By relying on an improved process, Ecovamed allows the healthcare industry and the chemical and biotechnology industries to assess the carbon footprint of their products at a lower cost, which is the first step before setting greenhouse gases emission reduction plans. The Ecovamed platform also offers a solution to label the origin of production of health products (label "Made in Europe") and integrate an environmental performance index. For more information on Ecovamed, visit www.ecovamed.com or contact us at contact@ecovamed.com.

⁽¹⁾ Sources: Decarbonizing Health for Sustainable Care, Shift Project, November 2021; P.-P. Pichler *et al.*, 2019, Environ. Res. Lett., **14**, 064004; NHS England Carbon Emissions Carbon Footprinting Report, August 2009

⁽²⁾ The company Kolmi-Hoppen, through its subsidiary ManiKHeir, finalizes the construction of a nitrile glove manufacturing plant in Sarthe. Usine Nouvelle, April 2022.

⁽³⁾ Sources: G. K. X. Poh *et al.* Chem. Eng. Technol. 2019, **42**, 1771; P. Usubharatana *et al.* Appl. Ecol. Approximately. Res. 2018, **16**, 1639; C. Rizan *et al.* Journal of the Royal Society of Medicine; 2021, **114**(5) 250–263; S. Patrawoot *et al.* SPE Polymers. 2021, **2**, 179-190.

Conflict of interest

Ecovamed provides services to the healthcare industry, including carbon footprint assessment of their products and support to reduce their greenhouse gas emissions. As of today, Ecovamed did not provide any services to companies involved in the manufacture of nitrile or latex gloves.