



Executive summary

Assessing the environmental and economic impacts
of a switch to reusable packaging for UHT milk

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1 Rationale

The proposed EU Packaging & Packaging Waste Regulation (“PPWR”) sets targets for reusable packaging. In this context, a study has been carried out with the purpose of providing a broader perspective on impact measurement related to different types of packaging. The study assesses the environmental and economic impacts of a switch to reusable packaging for UHT milk.

The study expands the scope of the EU Commission’s environmental impact assessment¹ in two ways:

1. Inclusion of the packaged product in the analysis to analyse the effects of different types of packaging on food waste, which embodies a considerably larger environmental footprint than that of the packaging itself;
2. Consideration of both environmental *and* economic impacts.

2 Scope

2.1 Packaging types

The packaging types included in the assessment are: i) single-use aseptic carton; ii) reusable aseptic glass; iii) reusable aseptic PET; and iv) reusable non-aseptic PET. While single-use carton and reusable glass will ensure long-shelf life (6-9 months) through ambient distribution, it is unsure whether reusable PET would resist the high temperatures involved with UHT processing. Therefore, the study assesses impacts for two reusable PET bottles: one that allows for aseptic packaging and long-shelf life, and one which requires chilled distribution and has a shelf life of 1 month.

2.2 Countries

Italy, Spain, Germany, France, Poland and the Netherlands are the European countries considered in the study. These markets account for approximately 70% of milk production and more than 80% UHT milk consumption within the EU-27².

2.3 Data sources

Environmental impacts were taken from a series of publicly available LCAs. Economic data was collected through interviews with market, product, and packaging experts within Tetra Pak, as well as interviews with external stakeholders, such as milk producers.

3 Results

3.1 Environmental impacts

For each packaging type, environmental impacts of a 1L packaged UHT milk are quantified. These consider footprints resulting from: i) the production of 1L UHT milk; ii) the manufacturing of packaging; and ii) the

¹ Carried out by the EU commission in preparation of the PPWR

² Eurostat (2023)

expected food waste. The effect of packaging on food waste (e.g. because of different shelf life) is the main determinant of environmental impacts. This is because agricultural production results in environmental impacts of at least one order of magnitude larger than those of packaging manufacturing. This study assumes that non-aseptic packaging solutions result in twice as much food waste than aseptic packaging³. In addition to this, glass is expected to generate slightly more food waste due to breakage during distribution.

- **Climate footprint: 1L UHT milk packaged in single-use carton has the smallest climate footprint.** Compared to carton, reusable aseptic PET, reusable glass and reusable non-aseptic PET result in higher GHG emissions, respectively 0.3%, 3% and 11% more. At current consumption levels, this translates to additional annual 52 thousand tons of CO₂ equivalent for reusable aseptic PET, 567 thousand tons of CO₂ equivalent for reusable glass and 2,479 thousand tons of CO₂ equivalent for reusable non-aseptic PET.
- **Land use footprint: 1L UHT milk packaged in single-use carton has a slightly larger land use footprint than other aseptic packaging.** Reusable glass and reusable aseptic PET have a somewhat lower land use than carton (approx. 1% and 2% less, respectively) due to lower impacts of packaging manufacturing and comparable shares of food waste. On the other hand, reusable non-aseptic PET results in 13% more land use than carton due to the higher expected food waste. Overall, at current consumption levels, reusable non-aseptic PET would require additional 28,500 hectares, while reusable glass and reusable aseptic PET would use 9,300 hectares and 16,300 hectares less, respectively.

3.2 Economic impacts

Economic impacts are driven by changes in the retail selling price (RSP) of a 1L packaged UHT milk. The PPWR is expected to increase costs for the retailers and bottlers due to several factors, such as heavier and/or bulkier packaging, required one-off capital investments and recurring reuse-system related costs. The study assumes that these additional costs will be fully borne by consumers because of higher prices.

Compared to carton, the RSP for a 1L UHT milk is expected to increase by 14% (reusable aseptic PET), 17% (reusable non-aseptic PET) and 26% (reusable glass). The estimated impacts on consumers and producers will be proportionate to the RSP increase. As a result, reusable PET would lead to lower adverse impacts than reusable glass. Because a market for reusable glass already exists, the impacts referring to this type of packaging are summarised below. If packaging innovation will allow for reusable PET for UHT milk, economic impacts would be some 40% (reusable aseptic PET) or 30% (reusable non-aseptic PET) lower.

A switch to reusable glass for UHT milk is expected to impact economic actors in different ways, resulting in winners and losers in the entire value chain:

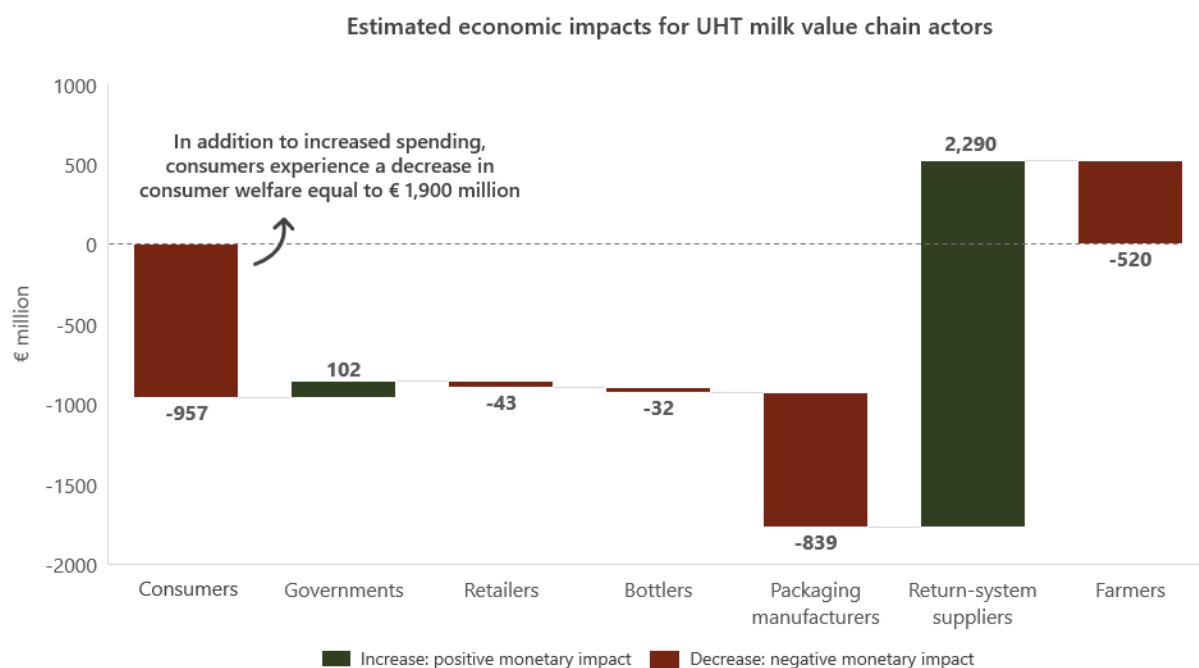
- **Consumers: reduced consumption and lower consumer welfare.** The expected RSP increase for reusable glass will lead to a 13% lower consumption of UHT milk, or some 1,300 million litres across the six markets in scope. Reusable glass will cause consumers to spend around € 957 million more on milk. This will negatively impact consumption of other products and services, but that is outside the scope of this study. In addition to the increased spending on milk, the RSP increase causes consumers to experience a loss in consumer welfare of about € 1,900 million because of foregone consumption due to the price increase and maintained consumption at higher prices.
- **Governments: increased tax revenues due to higher total spending on milk.** The value added tax collected by governments changes proportionally to aggregate consumer spending. For demand-inelastic

³ Bain study carried out for Tetra Pak in 2021

UHT milk, consumers will increase annual spending by 10%, resulting in an aggregate increase in total VAT of € 102 million⁴.

- **Retailers and bottlers: lower annual earnings due to lower consumption.** Retailers and bottlers are assumed to maintain absolute margins per unit sold. Because consumption volumes will decrease, annual earnings for retailers and bottlers will decrease as well, respectively by € 43 million and € 32 million.
- **Packaging manufacturers: lower annual earnings due to the reusable nature of the packaging.** Based on publicly available LCAs, the study assumes that a reusable glass bottle for milk can be used 20 times. While with single-use packaging manufacturers sell one package per litre sold, under full application of PPWR they will sell one package per 20 litres respectively, resulting in a € 839 million loss in earnings.
- **Reusable-system suppliers: new suppliers will enter the milk value chain to deliver products and services required for the reusable packaging system to work.** These are suppliers which were not part of the value chain before the introduction of the reuse system, such as the suppliers of reuse-system machinery and services. If we assume a full market shift towards reusable packaging, these actors will perform € 2,290 million additional economic activity.
- **Farmers: lower annual earnings in the short-run due to lower consumption, with the risk of forcing a portion of dairy farmers out of the market in the long-run.** 100% of UHT milk consumed in Europe is locally produced. In aggregate terms, farmers in the dairy industry will lose some € 520 million in earnings. This could lead to 6,225 farmers (in FTE) in the dairy industry being at risk of leaving the market.

The graph below summarises the above-described monetary impacts for the different actors across the value chain following a full market shift from single-use carton to reusable glass for UHT milk. The lower consumption of UHT milk causes reduced earnings for all current actors in the value chain, which are balanced out by increased earnings for goods and services suppliers in the re-use system.



⁴ Note that in Poland and Spain VAT on milk is equal to 0%.

4 Conclusion

A complete switch to reusable glass packaging in the UHT milk value chain will cause:

- Additional 567 thousand tons of CO₂ equivalent emitted annually (+3%);
- A decrease in land use, around 9,300 hectares less (-1%);
- Negative economic impacts for all actors in the current value chain: consumers (€ -957 million), retailers (€ -43 million), bottlers (€ -32 million), packaging manufacturers (€ -839 million) and farmers (€ -520 million). However, a large market (€ 2,290 million) for providers of reusable packaging systems and services would be created.

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