

WHY YOU SHOULD CHOOSE PAPER BEFORE PLASTIC

Climatic impact: A factual comparison between paper and plastic packaging with Product Life Cycle Calculation

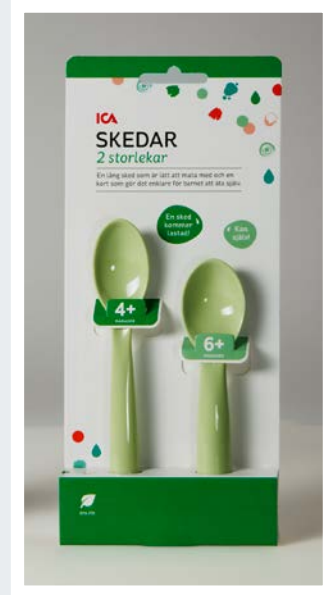
HOLMEN
IGGESUND

Introduction

IVL Swedish Environmental Research Institute was commissioned by Holmen Iggesund to conduct a study, including Product Life Cycle Calculation, into the way different packaging materials impact on the climate. The study looks at various everyday products that are packed in paperboard and plastic respectively:

Pasta
Baby spoons
Hearing protectors
Textiles
Light bulbs

These products are only a few examples of where it is possible to make the switch – from plastic to paperboard.



Key findings

The results of the study clearly show that there are great climate gains to be made by choosing climate-smart packaging for different products. Paperboard is superior to plastic, particularly considering the entire life cycle of the packaging, i.e. from raw material to end-of-life.



1

In a direct comparison between paperboard and plastic packagings, the study shows that paperboard has superior properties as regards to lower climate impact.

2

This is primarily because the raw material is renewable.

3

Furthermore, paperboard can be produced with biobased energy in climate neutral processes.

4

There is a well-established, functioning recycling system for paper, and more than 70 percent of paper products in Europe are recycled.

5

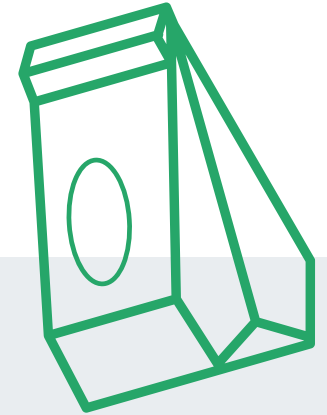
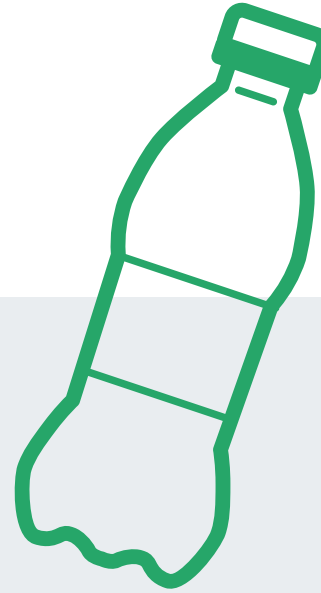
In some cases a paperboard packaging might weigh more than an equivalent plastic one, but this is balanced out by the huge environmental gains based in part on the potential for making new packaging.

6

Some products do entail more of a challenge to pack in paperboard, such as foods that require a moisture barrier, but here too there are great benefits to be found.

Plastic vs. paperboard packaging

Efforts and initiatives on many fronts are required if the climate goals of the international Paris Agreement are to be achieved. The increasing use of plastics worldwide will make it harder to achieve those goals.



The plastic that is used comes primarily from fossil raw material, thereby causing high levels of carbon dioxide emission throughout its life cycle – from production to end-of-life. Moreover, a lot of plastic ends up in nature, where it causes massive problems.

New laws regulate the use of plastics. In the EU, for example, many single-use plastic items will be banned from 2021. But initiatives from industry players are also required.

This is where paperboard packaging provides a readily available alternative. It is possible to make attractive, flexible paperboard packaging which replace plastic equivalents both in terms of design and function.

While it is easy to see that plastic and paperboard differ in terms of climate impact, it is important to be able to measure and quantify the difference. The study conducted by IVL Swedish Environmental Research Institute helps to achieve precisely this, and clearly shows how the choice of packaging material of everyday products affects the climate.

Close-up comparison

The study compares equivalent products packed in plastic and paperboard respectively, and is based on facts, information and measurements from European environmental databases. It provides a comprehensive picture of how the two types of packaging material affect the climate.



For future generations? The hearing protectors/earmuffs are packed in hard plastic, which has a high climate impact.

1

The study is based on existing consumer packagings of equivalent functionality, for virtually identical products.

2

The product types covered in the study are pasta, baby spoons, hearing protectors, textiles and light bulbs.

3

One packaging for each type is made of paperboard, the other of some kind of plastic.

4

The comparisons are based on measurements and factual data, combined with European databases in the areas of energy use in packaging production, and waste management and recycling.

5

Assessment of the end-of-life phase is based on German waste statistics. Different nations deal with waste very differently, and the nation used as a reference has a obvious bearing on the results. In Europe, the goal is for more countries to be more like Germany with respect to waste management.

6

The study takes account of the major parts of the life cycle of the packagings, i.e. from the sourcing or production of the raw materials to recycling or incineration of the used packaging.

7

The results are presented as a Climate Impact Index. For ease of comparison, the climate impact of a paperboard packaging solution for each product is given as index level 1.

Pasta

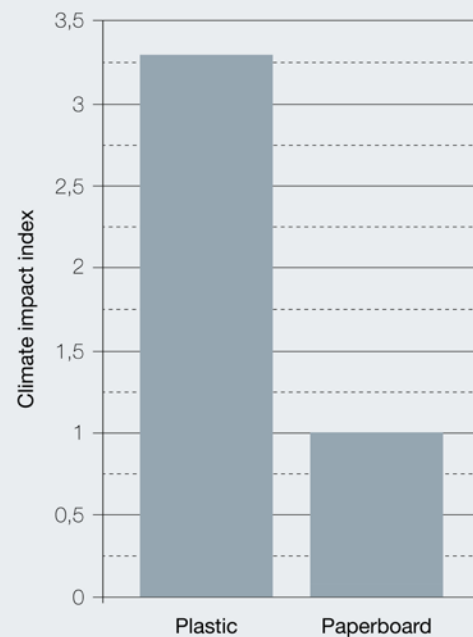
Soft plastic bag

Packaging weight 9 grams

Paperboard box

Packaging weight 58 grams

The additional climate impact of plastic packaging



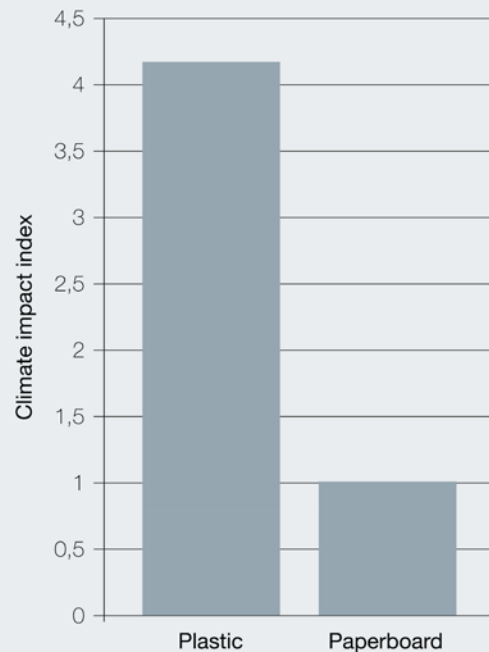
In this case, the paperboard solution weighs more than the soft plastic packaging, but ultimately there is still a big difference in climate impact – in favour of paperboard. This is primarily related to the final stage of the life cycle: the paperboard can be used to make new paperboard, and incineration of the plastic generates fossil carbon dioxide emissions.

Baby spoons

Plastic blister pack with
paperboard backing
Packaging weight 14 grams

**Double folded open
paperboard** packaging
Packaging weight 19 grams

The additional climate impact of plastic packaging



Once again, it is evident that the slightly heavier paperboard packaging offers substantial environmental benefits compared to the plastic one. Furthermore, this is a product where there are no obvious benefits of plastic over paperboard; blister is a very common packaging type that could easily be phased out using smarter packaging design.

Hearing protectors

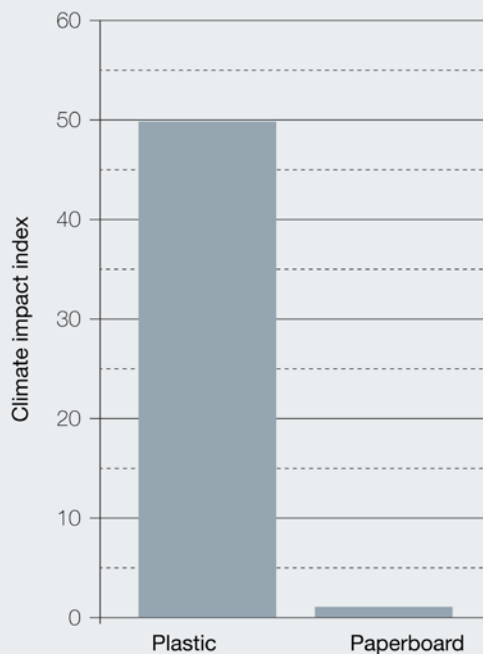
Hard plastic clamshell

Packaging weight 56 grams

Paperboard box with hanger

Packaging weight 64 grams

The additional climate impact of plastic packaging



Hard plastic can be molded to a desired form, but it has a very high climate impact, and it cannot be recycled as efficiently as paperboard.

Textiles

White and red:

Plastic sleeve on paperboard tray

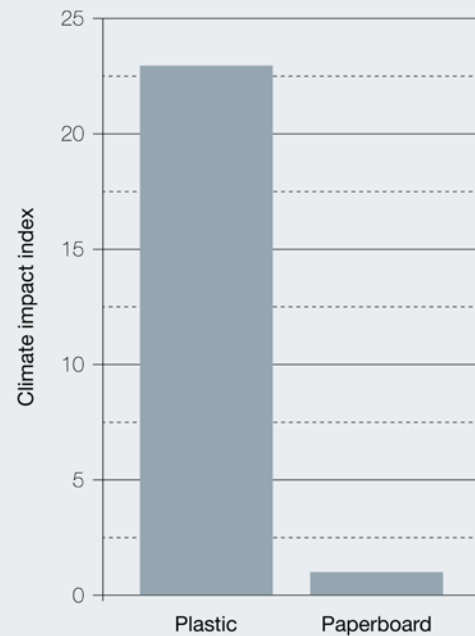
Total packaging weight 98 grams

Black and green:

Paperboard sleeve on paperboard tray

Total packaging weight 113 grams

The additional climate impact of plastic packaging



The white and red packaging used in the study is a combination of plastic and paperboard, but the plastic involved adds zero benefit to the product. It does, however, contribute to a very high climate impact.

Light bulbs

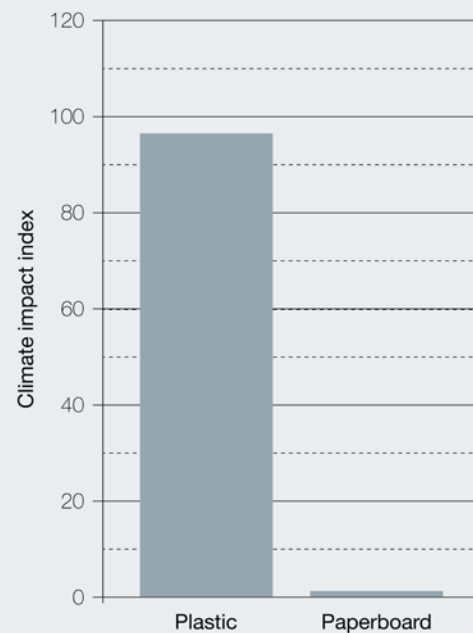
Hard plastic blister pack

Packaging weight 28 grams

Paperboard box

Packaging weight 18 grams

The additional climate impact of plastic packaging



The fact that many light bulbs are sold in hard plastic packaging, which is considerably heavier than the paperboard equivalent, is likely due to a lack of knowledge. With the right packaging design, it is simple to incorporate paperboard protection also for sensitive products like light bulbs.

Pros and cons

Paperboard packagings offer several benefits over packaging made from other materials. There are, however, some drawbacks.

To the right is a table summarising the most important properties of plastic and paperboard.

Plastic

Paperboard

Climate impact

- Almost all plastics used today are made from fossil oil.
- Plastics that end up in household waste is often incinerated, resulting in fossil CO₂ emissions into the atmosphere.

- + It is possible to produce paperboard with very low climate impact, provided that environmentally sound energy is used.
- + The raw material is renewable, when forests are replanted to maintain its important carbon capturing properties, and to prevent deforestation.
- Papermaking requires a high use of water and energy. Paper manufacture should therefore be located in places with good access to water and the ability to use environmentally sound energy.

Packaging function

- + Good mechanical properties make it possible to keep the packaging weight down.
- + Plastic packaging can be molded in a way that optimizes transport and protect the goods at the same time.
- + Plastic can be used in air- and liquid tight packaging for food and other goods.

- + The combination of low weight and good protection makes paperboard very suitable for many consumer product packaging applications
- + Modern printing and finishing techniques make it possible to produce creative and functional packaging in a material with low climate impact.
- Paperboard needs additional barrier in order to fulfill the demands of many food stuff packaging applications.

End-of-life-function

- Plastics does not degrade naturally, which causes major problems in nature, both on land and in our seas.
- Bio-based plastic is very hard to recycle at present.
- It is impossible to recycle different plastic materials together, they need to be carefully sorted prior to recycling.
- Quality losses as a direct result of insufficient sorting are common.

- + It is easy to recycle paperboard; it is the most well-developed recycling system in the world. The raw material is biodegradable – paperboard degrades quickly in nature.
- Quality losses (downcycling) in recycling. Fresh fibre is needed to maintain the material's properties.
- Some products, primarily foods, may need a plastic (and possibly an aluminium) barrier, which can make recycling slightly more difficult in specific countries.

Wrapping up

In conclusion, the study shows that there are good opportunities for producers of everyday products to reduce climate impact by choosing the right type of packaging material.

The potential to make such a big difference for the climate does not come along often. For the sake of clarity, let's equate this potential with driving a car: *if you drive 15,000 kilometres a year, to reduce your climate impact 95 times, you would have to cut that down to less than 160 (!) kilometres. The other 14,840 kilometres you would have to walk or cycle.*

The IVL Swedish Environmental Research Institute's independent study of different packaging materials shows us, in black and white, just how much the choice of packaging material means for ongoing global climate efforts. With these results available it is striking – not to say provocative – that so many everyday products still have plastic packaging, often completely unnecessarily.

There are many products where there are no relevant benefits to using plastic packaging, such as the light bulb and the base layers/textiles featured in the IVL study. Replacing all the unnecessary plastic packaging with paperboard alternatives will take millions of tonnes of plastic off the market, while also vastly reducing carbon dioxide emissions. So in the case of the children's hearing protectors, for instance, it is somewhat ironic that a product for our future generation is packed in plastic.

But this is not about trying to ban or eliminate all the plastic packaging on the market. For example, some foods require an airtight barrier, and to date these have been made of plastic, usually combined with a paperboard frame. Although this kind of packaging does

Changing a packaging material from plastic to paperboard can make a major contribution to lower environmental impact. Take the light bulb for instance, where the plastic packaging has more than 95 times the climate impact of an equivalent paperboard packaging.

have some plastic content, it still offers considerable environmental gains. Medicines and household chemicals are other products that require plastic solutions for various reasons, so clearly there will be a need for plastic-based packagings also in the foreseeable future. Therefore, I think we should 'reserve' plastic for the areas where it's really needed.

Beyond that I see no reason to delay: simply change to a less harmful alternative immediately. It's simple, and it has proven climate benefits.

What's more, paperboard is a renewable material. Well-developed sustainable forestry ensures ongoing access to new trees which can be used for future packaging, and that the forest maintains its biodiversity.

We can help you find the right paperboard packaging solution for your needs – please get in touch, and let us tell you how.

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Holmen Iggesund is the premium paperboard company for purposeful solutions. We invite our customers and partners to be part of creating the next generation of sustainable packaging solutions and graphical applications together with us.

We are part of the Holmen Group, relying on our own sustainably managed forests to ensure a renewable material for centuries to come.

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