

Fortum Circo® Life Cycle Assessment Study

It's time to replace virgin plastic
with a sustainable alternative



Not all plastics are made equal

The aim of the Life Cycle Assessment study was to evaluate the environmental performance of Fortum's plastic refinery process and to discover the potential environmental benefits of Fortum Circo® recyclates made from post-consumer plastic waste.

Fortum Circo® HDPE, LDPE and PP plastic granulates were assessed using the LCA method and comparing them to virgin granulates.

The results showed **Fortum Circo® is more sustainable in all studied aspects**, significantly lowering the carbon footprint of products and contributing to the fight against climate change.

Fortum Circo® recycled plastic

Fortum Circo® is a plastic recyclate produced from post-consumer plastic waste. Fortum Circo® is currently available in three qualities: HDPE, LDPE and PP.

With consistent and high quality, versatility and solid availability, Fortum Circo® plastics can be used in a wide variety of products – from household appliances to industrial and commercial films and blow-moulded articles.

Fortum Circo® is made with no compromises: it is a safe and reliable solution for sustainable plastics production.



Fortum
CIRCO®



Learn more about the UN Sustainable Development Goals, the blue water footprint, water and plastic, and how we can all help sustain the goals.



Sustainable in every sense

Fortum supports the UN Sustainable Development Goals (SDGs) on the journey towards a low-carbon society. Replacing virgin plastic with Fortum Circo® will not only help reach your company's sustainability goals, it also contributes to several key UN Sustainable Development Goals.

The environmental effects of plastics have been widely discussed. However, for many uses, their versatility, durability, light weight and safety are hard to match. Plastics also hold value and can be recycled up to ten times.

There are differences in plastics when it comes to sustainability. The origin of the feedstock material and the way the plastic waste is treated plays a key role in the sustainability of the recycle and its production. By having the whole recycling process of Fortum Circo® in our own hands, we can guarantee transparency and sustainability throughout the production process.



Climate change

By using Fortum Circo®, companies can significantly lower the carbon footprint of their products and contribute to the UN's Climate Action SDG.

The climate change impact of Fortum Circo® recyclates is, on average, less than half of that of virgin granulates for all three studied plastic types: 43% lower for PP, 48% for HDPE and 54% for LDPE.

The climate change impact includes the generation of anthropogenic (i.e. caused by human) greenhouse gases that lead to large-scale shifts in weather patterns.

kg CO₂ eq./
1000 kg granulate

2000

1500

1000

500

0

PP

HDPE

LDPE

 FORTUM CIRCO®
 VIRGIN PLASTIC

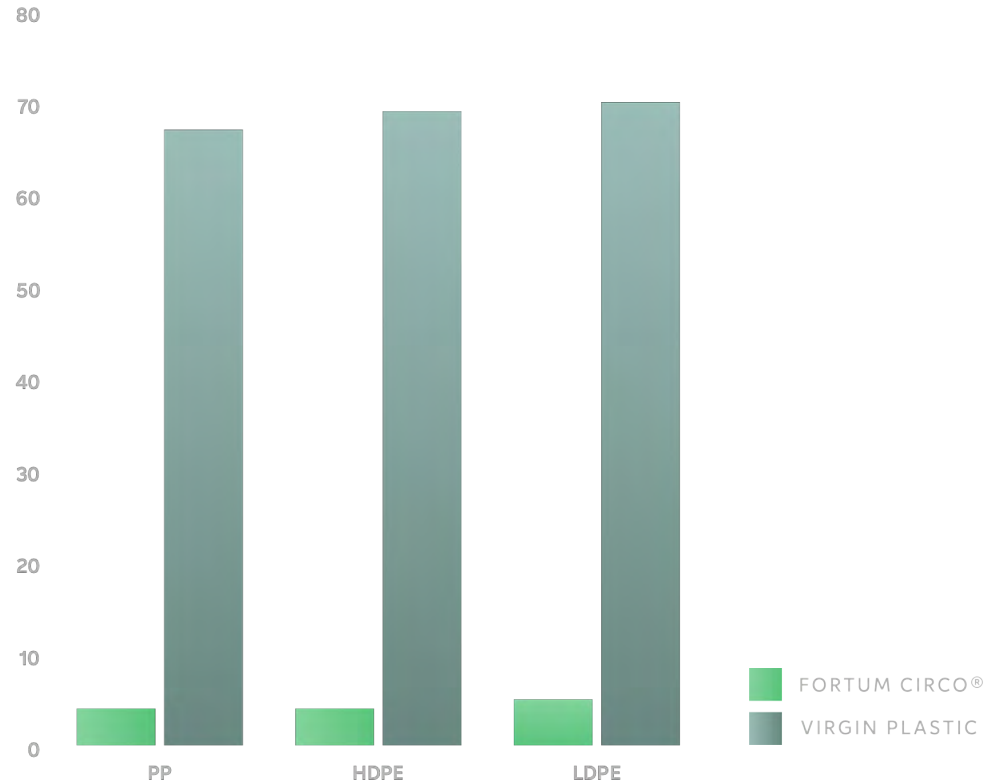
Fossil resource depletion

Keeping plastic in circulation with Fortum Circo® will save a significant amount of valuable non-renewable resources and contribute to the UN's Responsible Consumption and Production SDG.

The fossil resource depletion impact of Fortum Circo® recycles is remarkably lower than that of virgin granulates in case of all three studied plastic types: 94% lower for PP and HDPE, and 93% for LDPE.

Fossil resource depletion describes the consumption of non-renewable, fossil resources that cannot be renewed by natural means.

GJ of fossil fuels/
1000 kg granulate





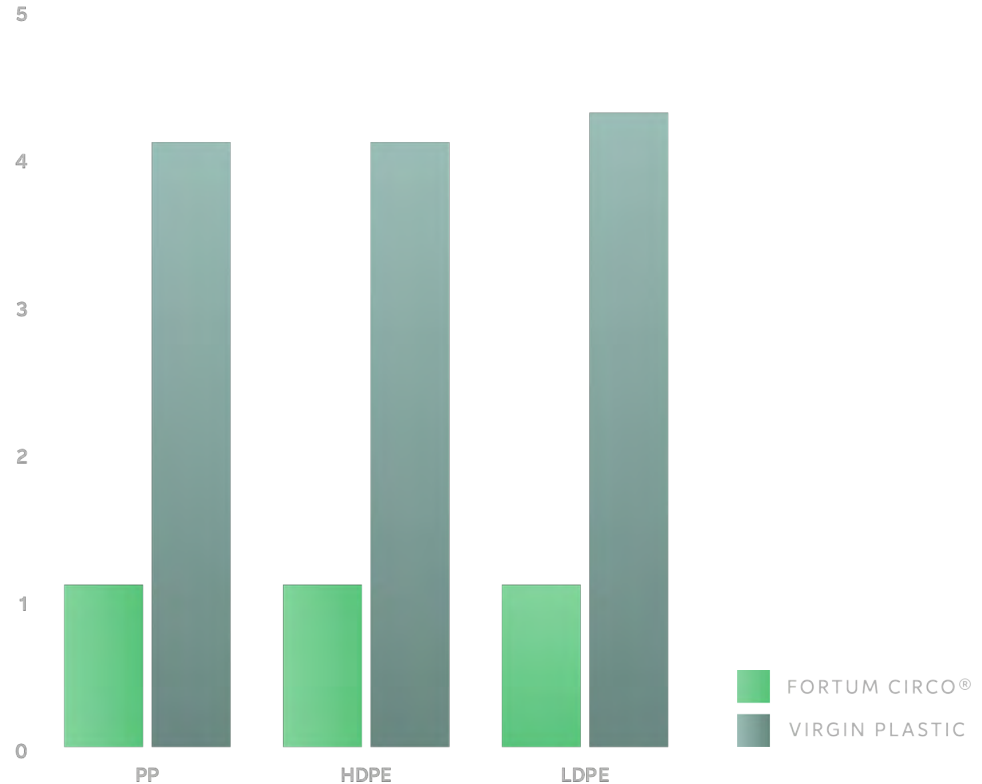
Acidification

Using Fortum Circo® can significantly reduce the acidification of the environment, helping to protect biodiversity and contributing to the UN's Life Below Water SDG.

The acidification impact of Fortum Circo® recyclates is lower than that of virgin granulates for all three studied plastic types: 73 % lower for PP and HDPE, and 74% for LDPE.

The acidification impact describes the generation of emissions that contribute to acidification of soil and water by decreasing the pH of the natural environment.

kg SO₂ eq./
1000 kg granulate





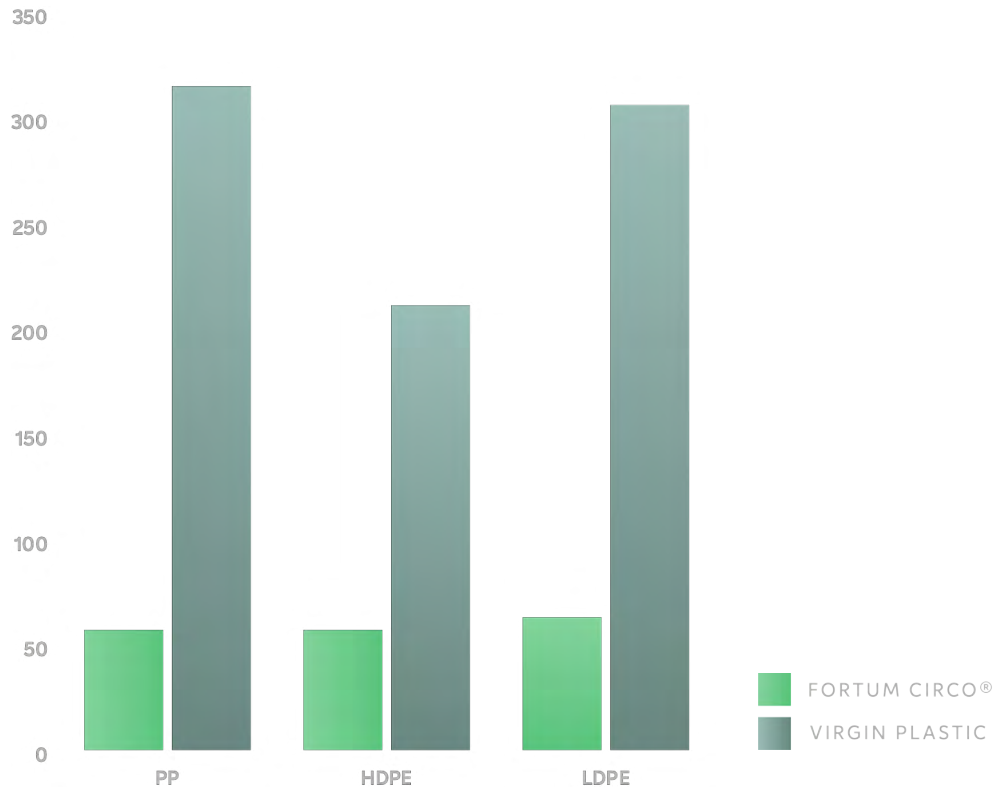
Particulate matter

Using Fortum Circo® can help people live healthier lives in urban areas and contribute to the UN's Good Health and Well-being SDG.

The particulate matter impact of Fortum Circo® recyclates is much lower than that of virgin granulates for all three studied plastic types: 82% lower for PP, 73% for HDPE and 79% for LDPE.

Particulate matter (PM) is a mixture of extremely small particles and liquid droplets. Particles less than 2.5 micrometers pose a threat to human health as they can get deep into the lungs or even into the bloodstream.

grams of PM_{2,5} eq./
1000 kg granulate





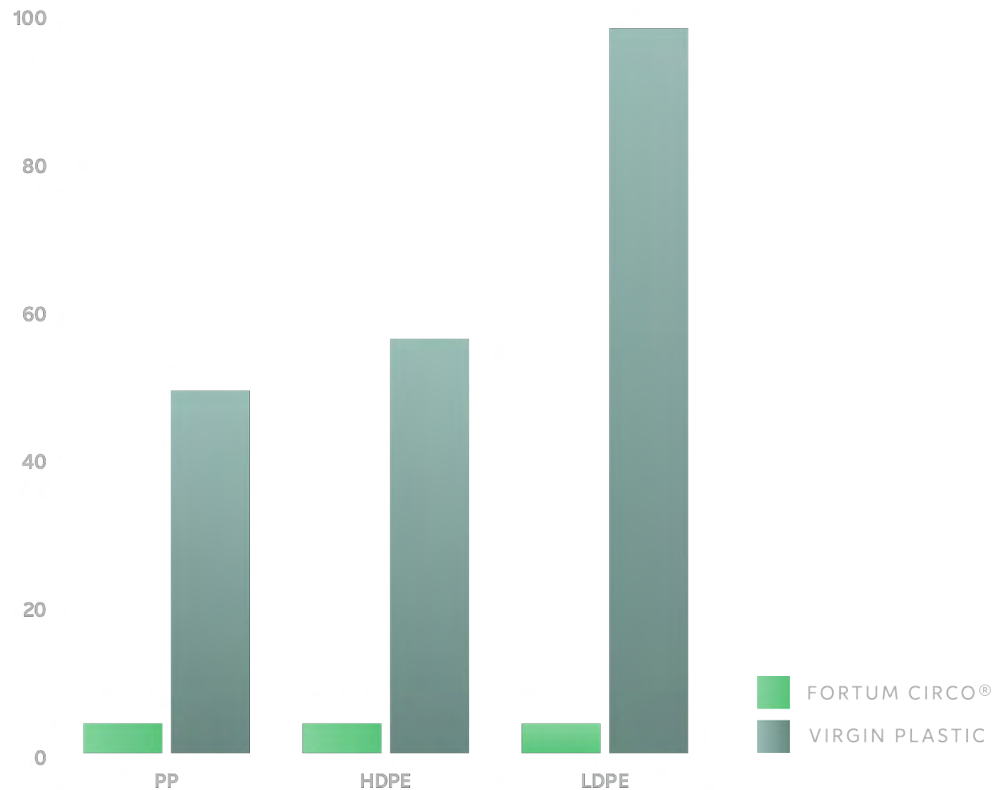
Water scarcity footprint

Using Fortum Circo® will reduce waste, help save precious water resources and contribute to the UN's Clean Water and Sanitation SDG.

The water scarcity footprint impact of Fortum Circo® recycles is only a fraction of virgin granulates' impact for all three studied plastic types: 92% lower for PP, 93% for HDPE and 96% for LDPE.

Water scarcity footprint is based on the consumption of water resources in relation to regional water availability.

m³ world eq./
1000 kg granulate



Studied system

Cradle-to-gate is the assessment of the product life cycle from resource extraction (cradle) to the refinery gate.

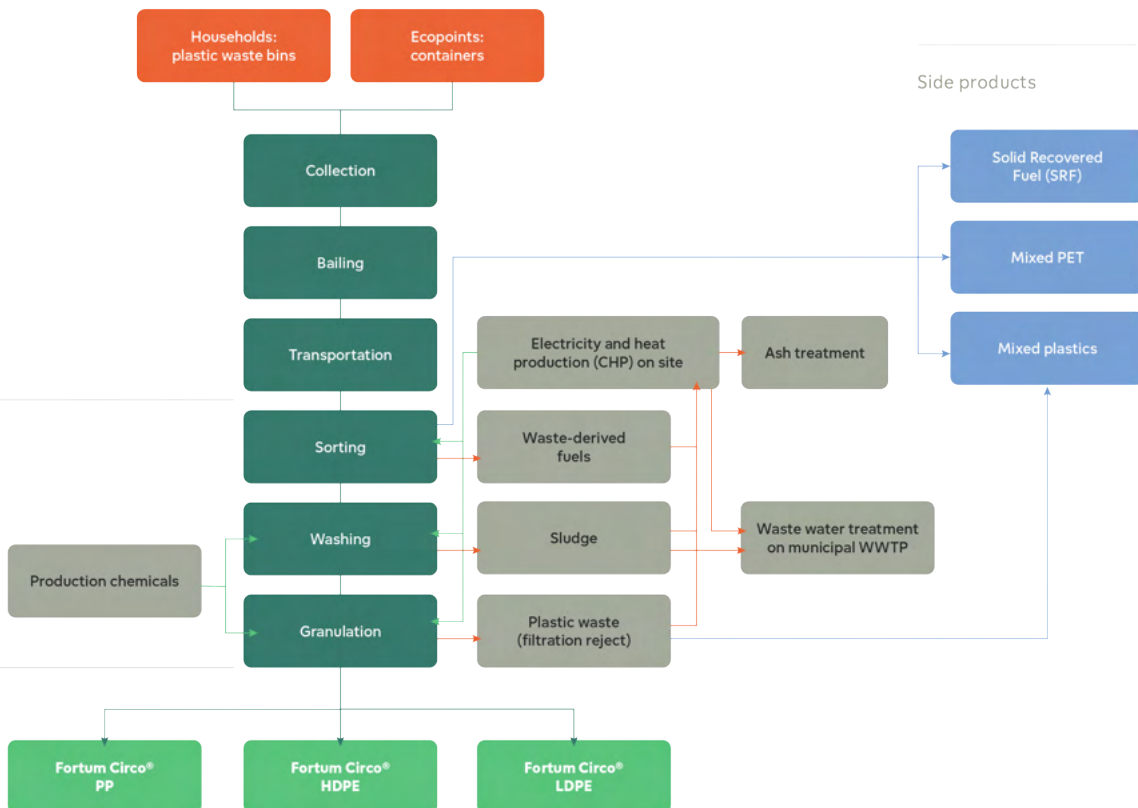
The assessment forms the basis for the environmental product declarations (EDP) of a plastic product, which contains Fortum Circo® recycled plastics.

The illustration is a simplified version of the studied system.

Raw material acquisition

Production

End products



About the study

The potential environmental impacts of Fortum Circo® HDPE, LDPE and PP plastic granulates are assessed using LCA as a method in this study. Fortum Circo® granulates are derived from recycled plastic material and are referred to as recyclates. Fortum Circo® recyclates are produced by Fortum Waste Solutions Oy at the Riihimäki Plastic Refinery in Finland. Fortum Circo® recyclates are intermediate products used to replace the granulates made from virgin plastics.

This study has been conducted and the report compiled according to the requirements of the ISO 14040 and ISO 14044 standards. The commissioner of the study is Fortum Waste Solutions Oy. The practitioner of the study is LCA Consulting Oy. The study has undergone a critical review by VTT - Technical Research Centre of Finland to ensure quality as well as compliance with the ISO 14040 and ISO 14044 standards.

HDPE, LDPE and PP granulates made of virgin material have been modelled based on the secondary data of Plastics Europe Ecoprofiles and the LCI data of these granulates.

The LCI datasets of Plastics Europe are converted to represent the granulate production plant located in Finland by using the Finnish electricity grid mix in the gate-to-gate processes.

For assessing the water scarcity footprint of virgin granulates, the water consumption in the gate-to-gate production phase (i.e. in the polyolefin production phase) was set in Finland. Thus, the AWARE factor of Finland was used for these water flows. For water consumption in the background processes, the low characterization factors were used since the water flows were not set to any particular location in the LCI dataset.

Since secondary datasets of virgin granulates including multiple production phases and aggregated data are used for the product comparison of Fortum Circo® recyclates and virgin granulates, the interpretation of the results must be performed with caution.

It cannot be stated that the LCIA results of virgin LDPE, HDPE and PP recyclates are fully comparable with the LCIA results of Fortum Circo® recyclates since the documentation provided related to secondary datasets of virgin granulates is not as comprehensive as the LCA study of the Fortum Circo® recyclates. Thus, the equivalence of these product systems cannot be fully stated.

However, the system boundary and the functional unit are the same for Fortum Circo® recyclates and the respective virgin recyclates and thus an indicative interpretation of product comparison may be conducted.

Transition made easy

Using recycled plastic in your products has never been easier. Readily available worldwide, Fortum Circo® can be customised to different compounds and adapted to your existing processes, so there is no need to invest in new moulds or equipment. We can even tailor Fortum Circo® to match your specific needs.

www.fortum.com/circo