



Fortum Recycling and Waste

Plastics hold value

Views about circular
economy of plastics

22.10.2020

Auli Westerholm

Join the
change

 fortum

This is Fortum

Fortum is a European energy company with activities in more than

40 countries

19,000
experts worldwide

We provide our customers with electricity, gas, heating and cooling as well as smart solutions to improve resource efficiency. We want to engage our customers and society to join the change for a cleaner world.

Together with our subsidiary Uniper, we are the third largest producer of CO₂-free electricity in Europe. With approximately 19,000 professionals and a combined balance sheet of approximately EUR 69 billion, we have the scale, competence and resources to grow and to drive the energy transition forward.

Fortum's share is listed on Nasdaq Helsinki and Uniper's share on the Frankfurt Stock Exchange.

Good position to drive CO₂-free power generation in Europe



~60%

Increase in Fortum's
CO₂-free power
generation



3rd largest

CO₂-free generator
in Europe



2nd largest

nuclear generator
in Europe



66%

of our electricity
production in Europe
was CO₂-free in 2019

Fortum Recycling & Waste Operations in the Nordics

30 offices/treatment centers

Finland
Sweden
Denmark
Norway

**Around 650 employees
In the Nordics**

Recycling

Refineries to recycle plastics, metals, ash and Li-ion battery chemicals

High temperature incineration
In order to treat hazardous waste

Waste-to-Energy
In order to treat municipal solid waste and industrial waste



Finland

Riihimäki

High temperature incineration
Waste-to-Energy
Bottom ash treatment
Plastic refinery

Ikaalinen

Metal recycling

Pori

Ash refinery

Harjavalta (Crisolteq)

Li-ion battery recycling plant

Sweden

Kumla

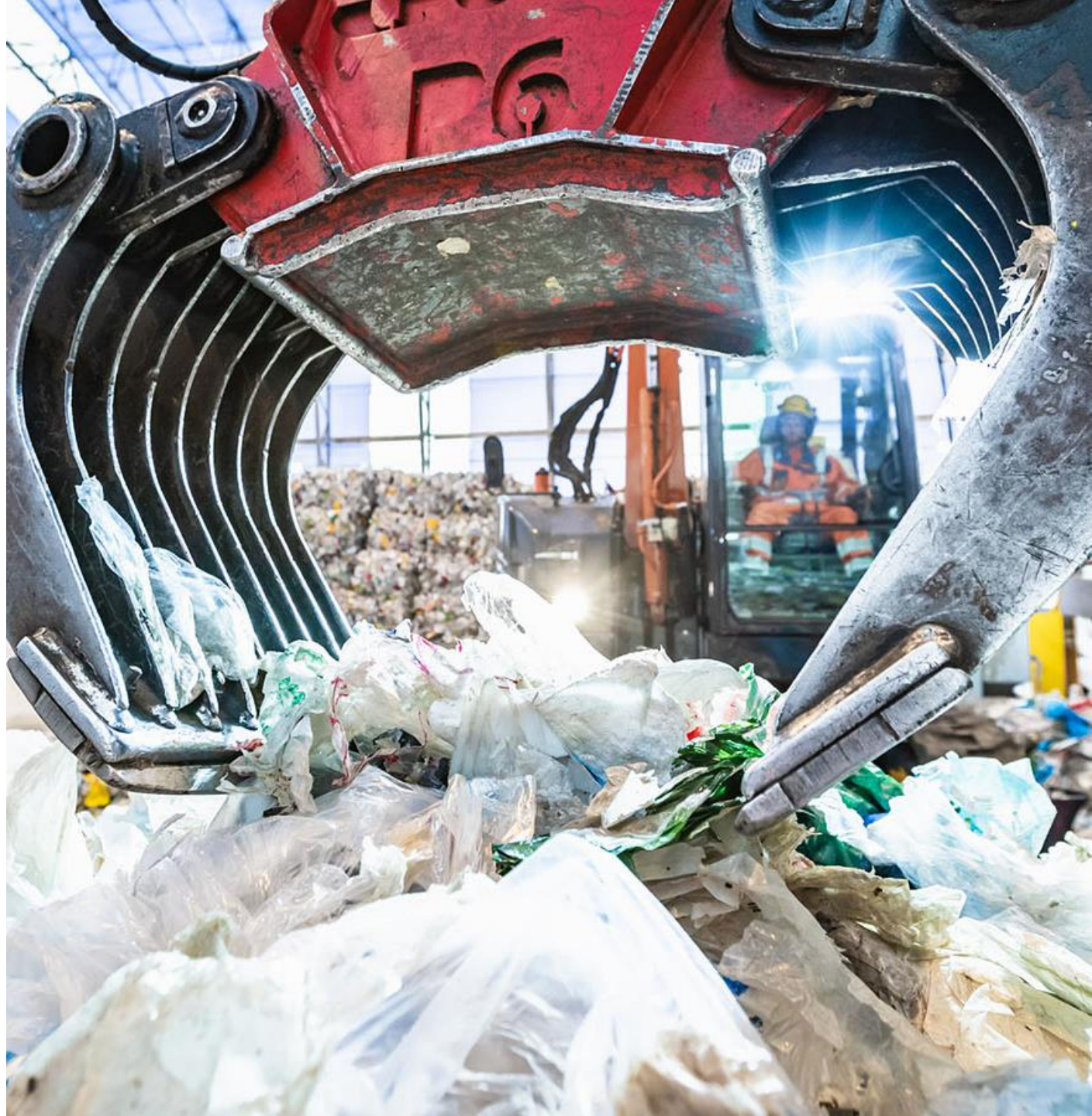
High temperature incineration
Waste-to-Energy

Denmark

Nyborg

High temperature incineration

Case: Plastic packaging waste recycling in Finland



Extended Producer Responsibility (EPR) of plastic packaging in Finland

- Deposit scheme for PET drink bottles
 - Deposit paid back to consumer when returning waste
 - Return around 75% of sold bottles
 - Recycling around 90% of collected bottles
- Separate collection of all other plastic packaging waste, including post-consumer packaging started 2016
 - Producers pay to EPR organisation Suomen Uusiomuovi (SUMI) annual recycling fee according to the amount of packages put on the market
 - SUMI organises collection and waste treatment including recycling, reporting and communications
 - Return around 34% of sold packages
 - Recycling around 70% of collected packages

Total recycling of PPW waste around 40% in 2019.



Fortum Plastic Refinery

- Capacity 20 000 t/a source separated post-consumer plastic packaging waste
- Started in 2016
- Recycling service for Finnish extended producer responsibility organisation, Suomen Uusiomuovi Oy
- Input:
 - all post-consumer packaging waste from separate collection, industrial packaging waste
- Outputs:
 - Products: plastic polymer granulates (end-of-waste raw material)
 - Wastes: solid waste and waste water sludge for waste-to-energy



Automated sorting



Sorting by polymers

- PP, HDPE, LDPE, PET

Automated NIR machines

- Constant quality

High efficiency

- Own sorting ensures availability

Washing and compounding

The background image shows a complex industrial facility. In the upper left, there's a large metal hopper or conveyor system filled with a light-colored granular material. To the right, a large white bag is suspended from a metal frame. Below this, there's a large, circular industrial tank or mixer. In the foreground, a red metal component is visible on the left. The overall scene is a typical industrial processing environment.

Washing removes impurities

- Multiple steps
- Own knowhow in water treatment

Compounding with additives

- Upgrading the properties



Fortum Circo granulate

CIRCO can be used to replace virgin raw materials in the production of plastic products

Quality of the granulate can be guaranteed because Fortum controls the whole production process from sorting to production

Circo can be customized for customer's processes and product requirements

CIRCO granulates recycled for production of

- HDPE extrusion

- LDPE film application

- PP injection moulding applications



Products from CIRCO® and other Fortum recycled plastics



Fortum views on circular economy of plastics



Fortum Plastics Review, September 2019

7 main issues raised and reflected

- 1 Environmental benefits from recycling plastics many times over
- 2 Design for recycling
- 3 Confidence in recycled materials comes with quality
- 4 Demand for recycled plastics
- 5 Prevent unsound and false recycling
- 6 Environmental benefits with mechanical recycling
- 7 Curb littering and marine pollution



1 Recycling plastics many times over gains environmental savings

- The biggest environment benefits can be achieved by recycling of the existing used plastics.
- Replace fossil with biobased plastics still has challenges because
 - It is currently cheap to produce plastics from fossil sources because of the access to excessive raw material from crude oil.
 - Current production technologies for bioplastics raw materials are using fossil fuels and there may have a larger carbon footprint compared to fossil ones
- The way forward is to take care that existing used plastics are recycled and that new plastics are recyclable, also the bio-based plastics



2 Design for recycling

- Recyclability is mainly determined in the design phase
- EU has set a target that all plastic packaging must be either recyclable or reusable in 2030.
- Enforcement of Extended Producer Responsibility (EPR) schemes should support design for recycling.
- Also using recycled plastics in packaging should be incentivised
- Development of the standardisation and Ecodesign Directive recommended



Safe circular economy needs decontamination before recycling

Fortum's view on waste hierarchy in safe Circular Economy



3 Confidence in recycled materials comes with quality

- Separate collection of plastic wastes of different origins and natures is an essential factor in the pursuit of high-quality recycled materials.
- Enforcing mixing bans and the traceability of wastes containing hazardous substances is crucial for safe circular economy.
- Plastic wastes containing unwanted substances, e.g. chemicals restricted in current legislation have to be separated and destroyed by suitable incineration treatment with energy recovery.
- Incineration with energy recovery should be the preferred treatment option for non-recyclable plastic wastes and residues from recycling processes



4 Demand for recycled plastics

- Currently there is a mismatch between the supply and the demand of recycled plastics in EU.
- Some solutions suggested:
 - Increase the demand by demanding the use of recycled materials in standards
 - EU Ecolabel criteria to include requirement of min. content of recycled plastic raw material
 - Development of public procurement criteria to incentives use of recycled plastics
 - Development of incentives to help plastic converters to shift using recycled plastic raw materials in their manufacturing process



5 Prevent unsound and fake recycling

- Neither collection or sorting of plastic wastes calculate as recycled – new calculation rules in the waste directive are important to be implemented in practice
- Shipments of plastic waste under Basel control (new rules) prevents plastics waste ending up in countries with no adequate waste treatment options.
- Transportation of plastic wastes inside EU with current procedure helps to develop tailored recycling processes for different plastic wastes.



6 Environmental benefits with mechanical recycling

- EU Strategy for plastics state that plastics sorting and recycling capacity has to be fourfold by 2030 compared to 2015
- Mechanical recycling has the lowest carbon and environmental footprint among the various recycling options.
- Chemical recycling is still in its infancy but can be developed to complement mechanical recycling when high quality mechanical recycling is not applicable.
- Chemical recycling into fuels does not calculate as material recycled; it calculates equally to incineration with energy recovery.
- Treating rejects and non-recyclable plastic in incinerators with energy recovery is a well proven and recognized and safe disposal, where the energy content in the residue is effectively utilized for heat and electricity production.



7 Curb littering and marine pollution

- Plastics are needed and their use in many applications contribute to other environmental benefits.
- Biodegradability of plastic items is not the solution for littering and marine pollution, and they can harm the existing recycling operations.
- The ease of returning plastic products after use needs to already be taken into account in the design phase.
- Investments in waste management infrastructure, high-quality recycling facilities and shaping people's behavior can promote the greatest change.



EU Waste Directive, article 4: Waste Hierarchy

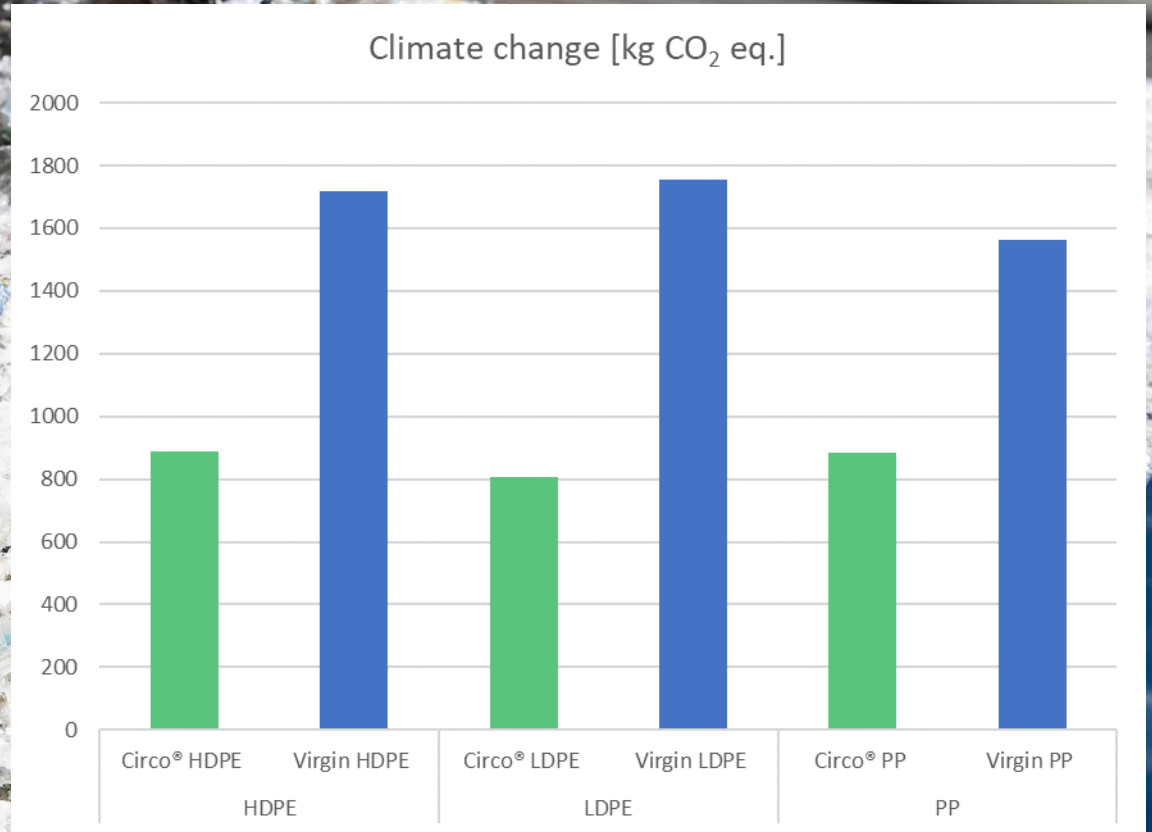
1. **The following waste hierarchy shall apply as a priority order** in waste prevention and management legislation and policy:



2. When applying the waste hierarchy referred to in paragraph 1, Member States shall take measures to encourage the options that deliver the best overall environmental outcome. This may require specific waste streams **departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts** of the generation and management of such waste.

Sustainable solution

- Based on an independent LCA study, Fortum Circo granulates' climate change impact is approximately half of virgin plastics



Thank you - Join the change!

Read more:

www.fortum.com/circo

Follow us:

www.fortum.com

[Twitter](#)

[LinkedIn](#)



Fortum
CIRCO®
Recycled plastics