Circular Economy for PS-foam demolition waste containing HBCD available today!

Collection of feedstock needs to increase

For a successful transition towards a Circular Economy for PS-foam demolition waste containing HBCD the collection of feedstock needs to be improved. PolyStyreneLoop together with all members and supporters of its cooperative asks for support of local, national and European governments to improve the current status quo.

These are the five areas we regard as pivotal:

- **Create awareness** of allowed end-of life treatment routes for PS-foam demolition waste containing HBCD. There are currently only two permissible routes for this waste stream: physical recycling through PolyStyreneLoop after separation of HBCD or incineration.
- Introduce **mandatory pre-demolition audit** to ensure the appropriate handling and treatment route for identified waste streams, amongst other for PS-foam demolition waste likely to contain HBCD.
- Favour **demolition** companies in the **tendering process** offering a recycling route instead of incineration.
- Assistance and support from regulatory bodies during set-up of **transboundary movement** of PS-foam demolition waste containing HBCD within Europe.
- Create **economic incentives** for the collection, pre-treatment, recycling of PS-foam demolition waste containing HBCD.

Polystyrene (PS) foam is a widely used insulation material in the construction sector. In Europe, expanded and extruded polystyrene (EPS and XPS) has been applied since the 1960s. In order to meet fire safety regulations, a flame retardant was added to the PS-foam. From the 1980s onwards the most common flame retardant was HBCD (hexabromocyclododecane). In 2013, HBCD was classified as persistent organic pollutant (POP) under the UN Stockholm Convention and the sunset date to use HBCD in Europe was in 2015.

The PolyStyreneLoop cooperative, currently counting over 70 members and supporters from the entire PS-foam value chain across Europe, was founded in November 2017 with the aim to develop and offer a sustainable solution for PS-foam demolition waste containing HBCD and to contribute to the Circular Economy. Polystyreneloop is currently building a demonstration plant with a capacity of 3,000 tons per annum in Terneuzen, the Netherlands, that is planned to be operational in Q2 2021. The plant can be expanded to increase its capacity to 10,000 tons per annum.

Picture 1: Status of construction December 2020 (left), model of the final PolyStyreneLoop plant (right)

PolyStyreneLoop B.V. | Postbus 95, 6000 AB WEERT | Frankrijkweg 10, 4538 BJ TERNEUZEN
info@polystyreneloop.eu| www.polystyreneloop.eu

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The urban mine of PS-foam demolition waste containing HBCD is substantial. In 2020 it is expected that in Europe already 33,000 tons of PS-foam demolition waste is generated that is suitable for treatement by PolyStyreneLoop. In 2050 this will have raised to almost 100,000 tons (Conversio, 2020).

Next to PolyStyreneLoop, the only alternative for PS-foam demolition waste containing HBCD is incineration. Through incineration the HBCD is destroyed and the energetic value of the PS is recovered. The valuable PS resource is however forever lost. In contrast, PolyStyreneLoop produces PS recyclate which is then applied to produce new EPS insulation products. The life cycle assessment (LCA) proves that the CO_2 footprint of PolyStyreneLoop is halved when compared to incineration. By 2050 PolyStyreneLoop can save the equivalent to almost 6 million tons of CO_2.

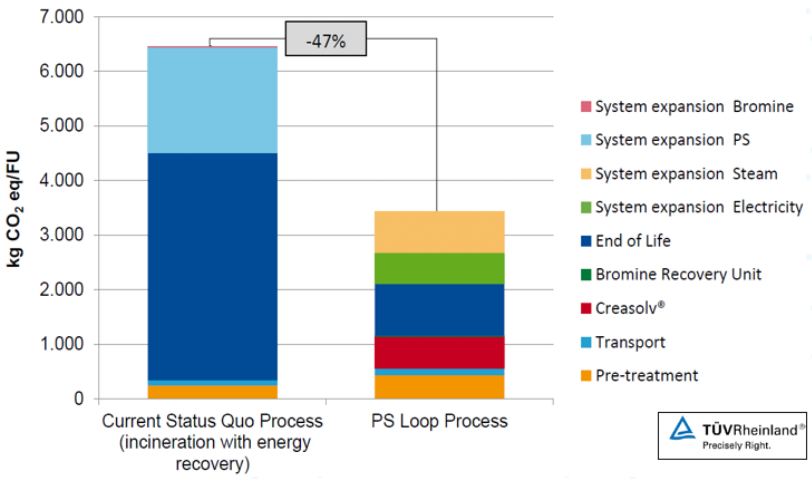


Figure 1: LCA comparing incineration versus PolyStyreneLoop for 1 ton EPS from External Thermal Insulation Composite Systems (ETICS)

PolyStyreneLoop uses the CreaSolv® Technology, a physical process, which allows the recycling of polystyrene without changing its molecular structure by separating the polystyrene from the HBCD. The HBCD is subsequently treated in a Bromine Recovery Unit (BRU) allowing for the recovery of elemental bromine and the safe destruction of HBCD. The CreaSolv® Process is a Solvent-based Purification (SBP)/Dissolution and has been added as Best Available Technology (BAT) to treat PS-foam containing HBCD in the Technical Guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with POPs of the UN Basel Convention (UNEP, 2018).

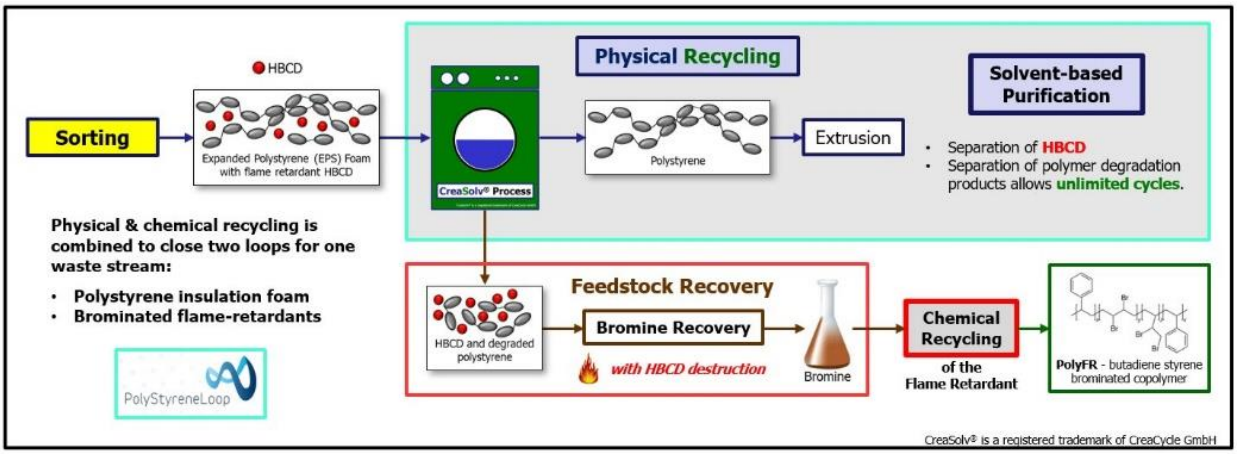
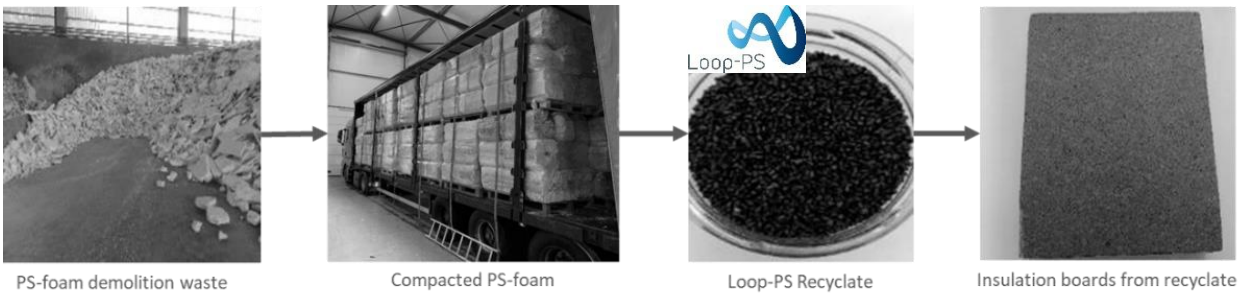


Figure 2: Illustration of the CreaSolv® Process and the Bromine Recovery Unit for PS-foam demolition waste containing HBCD

The German Federal Environment Agency (UBA) defines SBP/Dissolution as “material recycling” (like mechanical recycling) with reference to the CreaSolv® Process, because it is based on physical processes and keeps the polymer intact (Umweltbundesamt, 2020). The Dutch Waste Management Plan (LAP 3) differentiates between different types of recycling, where SBP/Dissolution falls under category c1 in the waste hierarchy as polystyrene is recycled into their original materials (Landelijk Afvalbeheerplan 3, 2019).

The Loop-PS recyclate produced by PolyStyreneLoop together with the elemental bromine recovered by the BRU are used to manufacture new flame-retarded PS- foam insulation boards used in the construction sector.



Picture 2: Illustration from demolition waste via Loop-PS recyclate to new insulation board

The European Manufactures of EPS (EUMEPS) have pledged to the EU to recycle 40,000 tons of EPS coming from demolition by 2025 (EUMEPS, 2018). Once the PolyStyreneLoop in Terneuzen is running, more plants can be built to offer a broad geographic coverage for all the PS-foam demolition waste containing HBCD generated across Europe. For a successful transition towards a Circular Economy for PS-foam demolition waste containing HBCD the collection of feedstock needs to be improved.

PolyStyreneLoop together with all members and supporters of its cooperative therefore asks for the support of local, national and European governments and authorities to improve the current status quo. Below are five areas we regard as pivotal:

- **Create awareness** of allowed end-of life treatment routes for HBCD in PS-foam demolition waste. There are currently only two permissible routes for this waste stream: physical recycling through PolyStyreneLoop after separation of HBCD or incineration.
- Introduce **mandatory pre-demolition audit** to ensure the appropriate handling and treatment route for identified waste streams, amongst other for PS-foam waste likely to contain HBCD.
- Favour **demolition** companies in the **tendering process** offering a recycling route instead of incineration.
- Assistance and support from regulatory bodies during set-up of **transboundary movement** of HBCD-containing PS-foam demolition waste within Europe.
- Create **economic incentives** for the collection, pre-treatment, recycling of HBCD-containing PS-foam demolition waste.

We would welcome the opportunity to further explain our position during a dialogue.

Yours sincerely,

Jan Noordegraaf
Director PolyStyreneLoop

Lein Tange
Director PolyStyreneLoop

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Our Members

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