



Non-profit foundation under Dutch law “PolyStyrene Loop” takes initiative to support the circular economy by building a demonstration plant for sustainable recycling of End of Life EPS containing HBCDD (including bromine recovery)

Non-profit foundation under Dutch law “PolyStyrene Loop” takes a proactive initiative to build a demonstration plant by 2018 for sustainable recycling of End of Life EPS containing HBCDD (including bromine recovery using the latest technologies available) supporting the circular economy.

The Polystyrene Loop foundation will elaborate on the Solvolysis technique, which was developed by Fraunhofer IVV. By using this technique, EPS can be recycled into Polystyrene, at the same time realising full bromine recovery out of the HBCDD flame retardant.

The industry is convinced already today for the need to proactively further develop this technology, in order to be ready for closing the loop and to offer an industry concept that can deal with the growing volumes of construction waste that will finally originate from the demolition of buildings in the coming decades.

A total of 23 people from various sectors of the European Expanded PolyStyrene (EPS) industry, Dutch national and provincial authorities plus EPS recyclers took the initiative for a kick-off meeting hosted by ICL IP Europe in Terneuzen. The theme of the meeting centered on the motto “Demo plant for sustainable recycling of EPS containing HBCDD including bromine recovery” originating from construction waste becoming available in the near future. This process can be seen as the most sustainable form of raw material feedstock recycling contributing and stimulating to a more circular economy.

To this end, various presentations covering the legal frame work of EPS waste and recycling including the Solvolysis technique developed by the Fraunhofer IVV, the business case and funding options were given. The need for a formation of a supporting consortium to build a Solvolysis demo plant was identified. The idea to include all participants from the EPS industry (recyclers, EPS bead producers and EPS converters) and a flame retardant raw material producer was well accepted. This project and the final demonstration plant will strongly support the Circular Economy

A plant tour of the ICL IP Europe facility showed the Bromine Recovery Unit (BRU), which can be used in a sustainable way to recover bromine from HBCDD coming from the Solvolysis demo plant. The BRU is already in operation since 2002 and was that time already designed to meet future bromine recycling demands. This proprietary solvent-based polymer recycling process dissolves PS from EPS waste while maintaining the polymer chain. It is known as the “CreaSolv® Process” and has also recently been applied in the European POLYSOLVE project. It offers a closed loop recycling for polystyrene foam within a sustainable circular economy.

It was decided to form a non-profit foundation “PS Loop” so the industry clearly demonstrates that it is determined to form a recycling entity that is committed to realize the recycling concept in Terneuzen and then to roll out this recycling concept to other EU member states, when the EoL EPS will be available, thus fully embracing the circular economy. The project management will consist of a core team (the founders of this project) and supporting teams each covering essential elements. It was decided to work with four different working groups to build the information data base in order to progress this project further.

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These **working groups will cover: Waste handling legal frame work, Logistics cost, Detail engineering work for the Solvolysis demo plant and Funding options.** The core team constitutes as a start with representatives from Sunpor, Synbra, ICL IP Europe and EUMEPS.

The objective is to have the “Solvolysis technique” incorporated in the EoL technical guidelines for HBCDD containing polystyrene foam as an additional End of Life option besides incineration, and to have a demo plant available by 2018. Other styrene converters are invited to join in.

Press release Ends \\

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Summary workshop held in Terneuzen the 28th of October 2015

E. Engels Director ICL IP Terneuzen: After welcoming words from he gave a presentation how ICL is dealing with bromine containing waste streams since 2000. In 2002 a bromine recovery unit was built able to handle bromine containing waste streams. Nowadays customers’ waste streams containing bromine salts are handled and converted back into new products and thus being able to close the bromine loop.

R. van Bremen, Authority from Province of Zeeland stressed the need to shift from an environmental to a circular economy for a sustainable development. In Zeeland already good examples are shown for sustainability.

C. Luttikhuisen from the Netherlands Ministry of Infrastructure and the Environment described the EU POP regulation concerning the HBCDD in PS foams: 1000 ppm in waste (Annex IV) and 100 ppm as UTC (Unintentional Trace Contamination) value (Annex I). He also mentioned that REACH authorization for using HBCDD until 21/8/2017 has been granted last week. He welcomes the idea of the industry setting up a demonstration plant for EPS recycling and thus being able to destroy HBCDD as a POP.

E. Meuwissen, EUMEPS detailed the availability of EPS waste streams and current way of recycling (mechanical, disposal, etc.).

G. van Veen, De Vries recycling depicted the EPS waste foam collection process and their recycling practice.

L. Tange, ICL IP Europe pointed out that incineration of EPS waste cannot be the only option due to limited number of incinerators in Europe. In addition, they cannot always handle all types of waste.

M. Schlummer, Fraunhofer IVV presented their latest solvolysis recycling technique for EPS foam waste containing HBCDD (CreaSolv® process and results from the European POLYSOLVE project). It is based on the use of selective solvents to dissolve a polymer. The process allows to obtain clean PS granulates and HBCDD as separate products. Today the technique is able to separate the HBCDD from the EPS and have a recycled PS with a high quality.

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R. Eberstaller, Sunpor: showed that EPS foam obtained during a trial this year using solvolysis processes HBCDD foam maintain their properties and can be used 100% like virgin PS to produce EPS foams with good properties.

L. Tange, ICL-IP Europe, hinted at recovering of PS but also Bromine from the obtained stream. This will certainly help to improve the misperception of the EPS industry and demonstrate the circular economy.

J. Noordegraaf, Synbra Technology: The Solvolysis business case was presented by showing the cost estimate of recycling. It becomes attractive with increasing demo plant capacity when plant depreciation is also taken into account. The process has an immediate positive cash generation. The main issue will be to get sufficient PS foam from demolition areas into the demo plant. Alternatives for starting up are to use existing waste streams for learning and testing the system with EPS from packaging.

L. Linnebank, PNO showed the EU funding options in order to build up a demo plant.

Core team members during the start up:

Fraunhofer IVV: Fraunhofer IVV is one out of 66 institutes and research units of the Fraunhofer Gesellschaft e.V. and focuses on process engineering and packaging. In co-operation with the CreaCycle GmbH, Grevenbroich, Fraunhofer IVV has developed a solvent based plastic recycling process (CreaSolv® process, CreaSolv® is a registered trademark of CreaCycle GmbH). It is able to treat mixed and contaminated plastic waste and - amongst other features - allows separating legacy additives from target polymers.

Sunpor Kunststoff GmbH: is the third-largest producer of EPS-raw material in Europe, with two production plants in St. Pölten/Austria and an annual production capacity of around 230,000 tonnes of EPS polymer granulate. 90 % of production goes to export. Sunpor's main customers are in construction (insulation) and packaging industry. The company is 100% owned by the Norwegian O.N. Sunde AS group.

ICL IP Europe: manufactures flame retardant products to enhance fire safety and to protect life and property. It is the industrial chemicals segment of Israel Chemicals Limited (ICL) and is the world's largest producer of elemental bromine, and a leader in the production, marketing of bromine and bromine compounds, supplying over 33% of global demand. It also has a leading position in the manufacturing of phosphorus based compounds for fire safety.

EUMEPS is the European association of the EPS industry. EUMEPS membership represents over 90% of the European manufacturing industry. The common interest between members is a belief that EPS is the most cost effective packaging and insulation material. For thermal insulation in construction, EPS offers long-term properties such as high insulation value, high compressive strength and moisture resistance. EPS is lightweight, versatile, easy and completely safe to work with, making it the ideal material in a wide range of applications. EPS has a key role in ensuring safe, comfortable and energy efficient buildings, whilst also contributing strongly to the mitigation of greenhouse gas emission.

EPS comprises about 35 per cent of the total thermal insulation market in Europe, with over 55,000 people employed in the European EPS industry. The role of EUMEPS is to ensure that the advantages of EPS are brought to a larger audience. This is achieved by information sharing to enable an informed dialogue with stakeholders on a national and European level.

Synbra Technology bv: is the in-house polymerisation and R&D facility 'Technology & Innovation' and the centre of excellence in materials and product development in the Synbra Group in Etten-Leur, The Netherlands. Synbra has a leading position in Europe regarding Expandable Polystyrene (EPS) for Sustainable Insulation Systems and Industrial Products & Solutions for a wide diversity of markets. Synbra Holding is active in The Netherlands, Germany, France, Denmark and Portugal.