PSRA Polystyrene U.S. and Canada End Markets Study

THE U.S. AND CANADA POLYSTYRENE END MARKETS STUDY

The Polystyrene Recycling Alliance (PSRA) commissioned a detailed survey of polystyrene end markets in the US and Canada with the aim of developing a national inventory of facilities that are receiving, processing and/or reclaiming any form of polystyrene (e.g., GPPS, HIPS, EPS, and XPS). Through PSRA, the polystyrene industry is working to accelerate recycling and recognizes that end markets are an essential component to enabling a circular economy for all types of polystyrene.

For this study, PSRA engaged Resource Recycling Systems (RRS) to develop a vetted database of companies who handle recovered polystyrene in some capacity. Through rigorous web-based research and primary interviews with key companies, RRS developed a knowledge base that is composed of business profiles for companies that handle recovered polystyrene and a facility catalogue. With this work, PSRA has a current picture of the US and Canadian reclamation landscapes and insights into opportunities for building collection and recovery infrastructure for the four forms of polystyrene. This data provides critical insights that may inform how the industry can grow recovery efforts and to support fact-based discussion with stakeholders.

KEY FINDINGS & INDUSTRY INSIGHTS

POLYSTYRENE USE APPLICATIONS AND COLLECTION PATHWAYS

Polystyrene foam (EPS/XPS) has a robust recycling supply chain built around large commercial generation volumes and generators who can leverage established reverse distribution logistics that allow for aggregation and recycling. GPPS and HIPS have a solid foundation built around post-industrial recovery that provides a backbone for future recovery efforts. Opportunities to improve recovery of GPPS and HIPS will be 1) providing reliable sources of supply to reclaimers and 2) consistent market demand for reclaimed resin.

Table 1: Collection Pathways for Polystyrene Based on End User Industries.

RESIN	EPS	XPS	GPPS	HIPS
Primary End Uses & Associated Industries	• **Distribution & fulfillment** (transport packaging) • **Construction** (insulation) • **Retail** (transport packaging, foodservice packaging) • **Consumers** (transport and product packaging, foodservice packaging)	• **Construction** (insulation) • **Consumers** (meat trays) *XPS is used in some transport packaging for thermal protection.*	• **Consumers** (appliances, foodservice packaging)	• **Consumers** (electronics, foodservice packaging)
Primary Collection Pathways	• **Self-backhaul** • **3rd-party service provider** (broker/toller, equipment/logistics provider) • **Private** (valet service, drop off) • **Municipal** (drop off)	• **3rd-party service provider** (broker/toller, equipment/logistics provider) • **Private** (valet service, drop off) • **Municipal** (drop off)	• **Private** (valet service, drop off) • **Municipal** (curbside – limited)	• **Private** (valet service, drop off) • **Municipal** (curbside-limited)

EPS AND XPS FOAM RECOVERY AND END MARKET LANDSCAPE

- This study identified 81 companies across the US and Canada as handling recovered EPS and/or XPS, with around 52% of them being manufacturing end markets that use recycled EPS/XPS as a feedstock to manufacture transport packaging and other consumer products. These companies represent a combined total of 119 facilities across 30 US states and four Canadian provinces, according to RRS research. There are also 700+ drop-off sites for EPS today.

- The US and Canadian recovery and end market landscape for EPS and XPS is well developed within the commercial business-to-business supply chain. The presence of reliable end market demand provides a strong foundation around which further collection, aggregation, and recycling for EPS/XPS can be built.
- EPS/XPS recovery benefits from the following conditions:
    - **Well-established reverse supply chains:** EPS/XPS have established reverse supply chains due to reliable end market demand from recyclers who purchase it in densified form and recycle the material directly into new products. One recycling pathway for EPS/XPS is direct manufacturer take-back programs. Other recycling pathways are either through large end users that backhaul to distribution centers where material can be aggregated and densified or through densification equipment being deployed to generation sites (i.e., construction or big box stores).
    - **Strong domestic and international demand:** There is relatively strong domestic and international demand for densified EPS/XPS. Ongoing domestic investment includes major capacity additions to use densified EPS as feedstock with improvements in extrusion technologies for the inclusion of recycled content. Additionally, there is international demand from European and Asian companies that are importing densified material from North America to their reclamation and manufacturing sites in other countries. Some businesses involved are vertically integrated companies who sell or lease densification equipment to EPS/XPS end users and then purchase the densified material for use in overseas manufacturing (e.g., fish industry, medical, automotive, sports equipment, insulation manufacturers).
    - **Applications with lower quality thresholds:** XPS is typically used as insulation in construction, but it is also used in some consumer applications such as meat trays. Like EPS, it is highly recyclable and when recycled into insulation it has the added advantage of having higher color impurity tolerances compared to other end markets using recovered polystyrene where brand quality specifications are stricter and require low-color impurity.

GPPS AND HIPS RIGIDS RECOVERY AND END MARKET LANDSCAPE

- Forty-five companies in the US and Canada were identified as handling recovered GPPS and/or HIPS, according to RRS research, with around 13% being manufacturing end markets that use recovered GPPS/HIPS as recycled feedstock for a variety of consumer products. These companies represent around 50 individual facility sites across 22 US states and four Canadian provinces.
- GPPS and HIPS are used primarily in consumer-facing products. This study did identify that there are post-industrial recovery activities for these forms.
    - GPPS and HIPS reclaimers report that medical plastic is the dominant post-use stream currently being reclaimed and used as PCR today. In addition, reclaimed electronics captured through special e-waste recycling programs is an additional source of post-consumer recycled (PCR) HIPS.
- Increasing GPPS and HIPS post-consumer recovery will require both a growth in collection volumes that can be supplied to reclaimers capable of transforming the material into new products and reliable end market demand to consistently purchase the recycled GPPS and HIPS from reclaimers.
- Plastics industry and key stakeholder organizations like PSRA are already driving initiatives and partnerships to increase GPPS and HIPS recovery. This study has identified some potential areas of focus for the plastics industry that could help to grow collection and boost end market demand and recycling for GPPS and HIPS:
    - **Build reliable demand:** Continue to document the volumes of GPPS and HIPS being reclaimed today, encompassing activities across mechanical and chemical recycling, along with the sources of material. In addition, the industry needs to send a signal that there will be reliable offtake demand for PCR content. When demand is established, it creates an environment that encourages investment in reclamation and creates a market that encourages collection.

- **Build reliable supply:** To build a more reliable supply of post-use GPPS and HIPS, working with intermediaries like plastic recovery facility (PRF) operators and chemical recycler operators who are purchasing and sorting large volumes of mixed plastics or producing GPPS/HIPS as a by-product will be critical to growing the volume of post-use supply. To cover the additional operational costs of sorting GPPS/HIPS from mixed plastics or from single-stream material, subsidies can be offered on a per pound basis to encourage PRFs, MRFs, and secondary sorters to sort GPPS/HIPS into a commodity bale. Once reliable demand and post-use supply is demonstrated, the industry can work on driving formal collection through targeted recovery programs.