CIRCULAR PLASTICS ALLIANCE STATE OF PLAY FOR COLLECTED AND SORTED PLASTIC WASTE FROM CONSTRUCTION

Construction Working Group June 2020

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Glossary

ABS	Acrylonitrile Butadiene Styrene
EVA	Ethylene-vinyl acetate
EPDM	Ethylene Propylene Diene Monomer Rubber
EPS	Expanded Polystyrene
HDPE	High Density Polyethylene
HIPS	High Impact Polystyrene
LDPE	Low Density Polyethylene
LLDPE	Linear Low-Density Polyethylene
PA	Polyamide (Nylon)
PA / ABS	Polyamide / Acrylonitrile Butadiene Styrene
PA 6	Polyamide 6
PA 66	Polyamide 66
PB	Polybutylene
PC	Polycarbonate
PE	Polyethylene
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PIR	Polyisocyanurate
PU, PUR	Polyurethane
PVB	Polyvinyl Butyryl
PVC	Polyvinyl Chloride
TPE	Thermoplastic Elastomer
XPS	Extruded polystyrene foam
XLPE	Crosslink able Polyethylene

1 Introduction

As part of the Circular Plastic Alliance commitment, the construction working group of the CPA has been tasked with putting together a current state of play on collected and sorted waste to assess the status of collection and sorting of plastics construction waste across Europe. The ultimate aim of the Circular Plastics Alliance is to increase the volume of collected and sorted plastic waste that is delivered to the recycling stream to contribute to the target of 10 million tonnes of plastic recyclate in new products placed on the market in the EU in 2025.

The findings from this report will be used to identify gaps and untapped potential for collection and sorting of construction plastics by the end of December 2020, in order to increase the amount that is collected and sorted and eventually recycled into new products to contribute to the target of the CPA.

For the purposes of this report collected and sorted waste is defined as follows:

- Collected waste: includes all kinds of collection modes (separate, mixed)
- Sorted waste: sent to recycling

The data used in this state of play for collected and sorted is mainly taken from the 2019 Plastics Europe Report[1] and focuses on post-consumer waste[2], due to the fact that the main collecting and sorting challenges for construction waste are based on post-consumer material, including post installation waste (e.g. off cuts arising from the installation process of a product)

Pre consumer waste as defined in ISO 472 [3]Plastics Vocabulary is a very important part of the recycling loop for construction waste and certainly needs to be considered with regard to recycled content. Pre consumer waste when mixed with post-consumer waste, can enhance quality and ensure that the end product meets the required performance for use in new building applications.

For this reason the data on PVC collected and sorted by application (3.2)includes both pre and post-consumer waste, as registered via the Recovinyl [4]system.(3.2)

The following sources have been used as a basis for the analysis of the current state of play for collected and sorted plastic waste from construction in Europe:

- Data on C&DW generation and treatment in recent years reported on Eurostat
- Results of a survey sent out by the Construction Working Group of the Circular Plastic Alliance to relevant members of the Circular Plastics Alliance

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[1] **Plastic waste, recycling, energy recovery and disposal from building & construction in Europe 2018", Plastics Europe 2019**

[2] **post-consumer ISO 472 [2.1700]**
descriptive term covering material, generated by the end-users of products, that has fulfilled its intended purpose or can no longer be used (including material returned from within the distribution chain)
Note 1 to entry: The term "post-use" is sometimes used synonymously.

[3] **pre-consumer ISO -472[2.1701]**
descriptive term covering material diverted during a manufacturing process
Note 1 to entry: This term excludes re-utilized material, such as rework, regrind or scrap that has been generated in a given process and is capable of being reclaimed within that same process.
Note 2 to entry: The term "post-industrial material" is sometimes used synonymously.

[4] www.recovinyl.com

and external stakeholders

- Interviews with the European Demolition Association (EDA) and the Association of Cities and Regions for sustainable Resource management (ACR+); as well as
- Several reports and reviews on construction waste and plastics in construction waste as referenced

2 Plastics in Construction

As shown in **Error! Reference source not found.** the Building and Construction sector represents the second largest end use market for plastics in Europe after packaging. The main polymers used are PVC, which makes up over 50% of the demand in the construction sector, followed by the family of Polyolefins (PE-HD/PE-MD, PE_LD/PE-LLD and PP), which make up around 25% of the demand, with EPS and PUR also accounting for significant volumes.

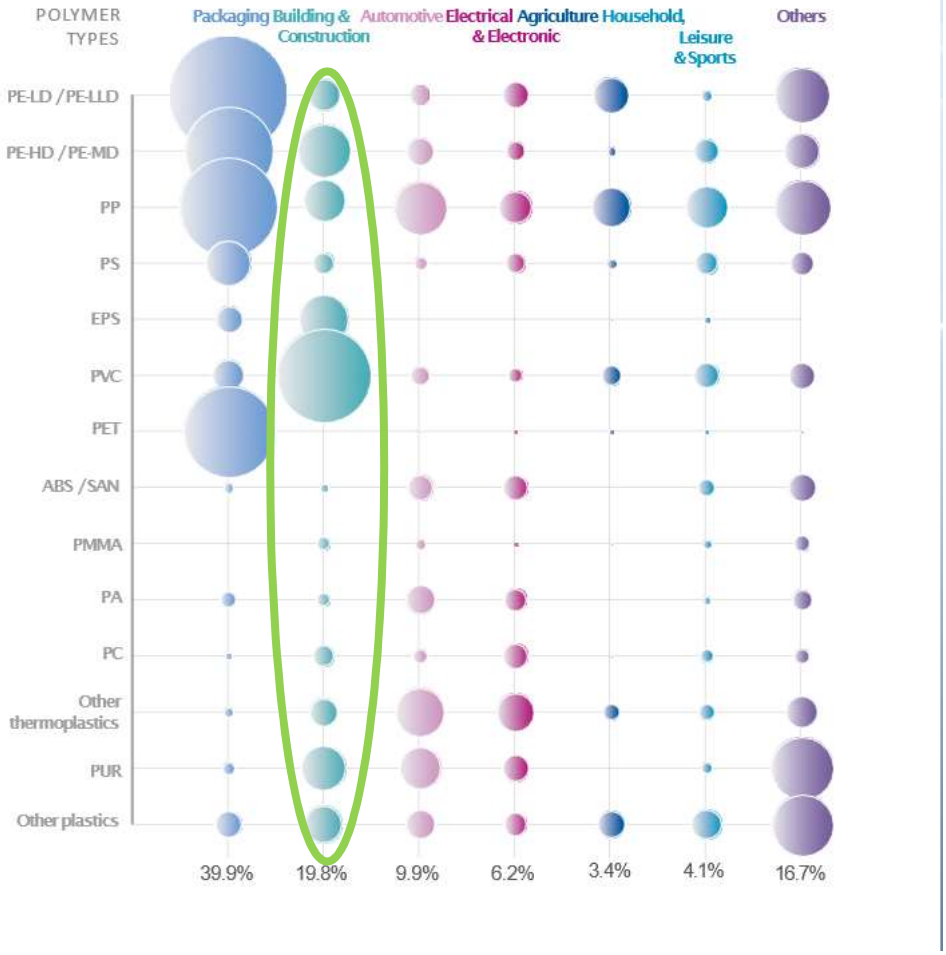

Figure 1 Plastics Demand by Segment and Polymer type in 2018[5]

According to the Plastics Europe report 'Circular Economy for Plastics' published in 2019, 29.1 million tonnes of post-consumer plastic waste arose in the overall waste stream in Europe in 2018, 1% of

[5] Source: Plastics Europe Market Research Group (PEMRG) and Conversio Market & Strategy GmbH

the total waste arising for Europe. It is estimated that plastics from the Construction & Demolition sector contribute 6% to the total plastic waste stream whereas packaging contributes 61% to the total plastics waste stream arising in Europe. Figure 2

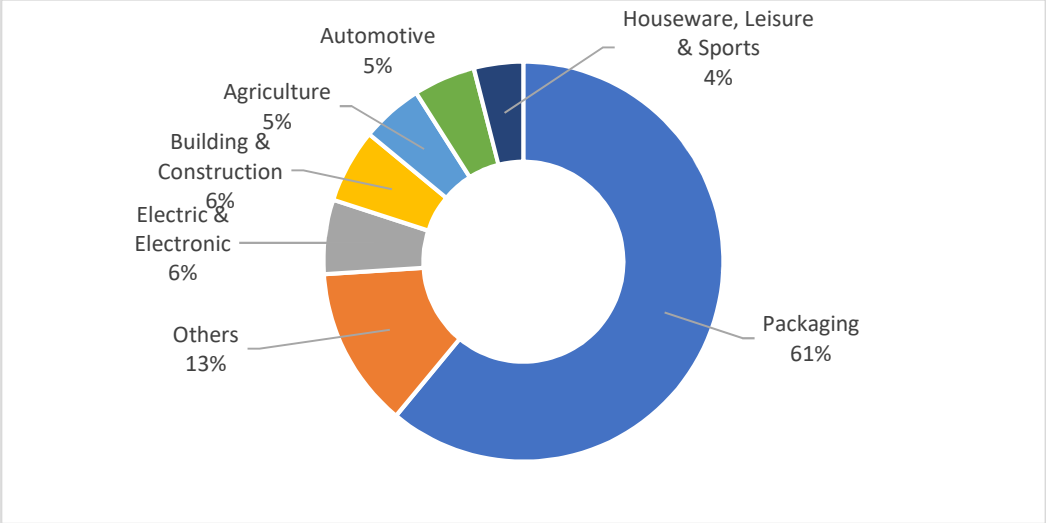

Figure2 Percentage of plastic waste arising by sector

According to Plastics Europe[6]as shown in Figure 3, in 2018 approximately 4 million tonnes of plastic recyclate were used in new products. The construction products sector used 46% of the total recyclate placed on the market, compared to packaging which used 24% of the total recyclate available. Therefore, the construction sector is a relatively low source of plastic waste but a large user of plastic recyclate.

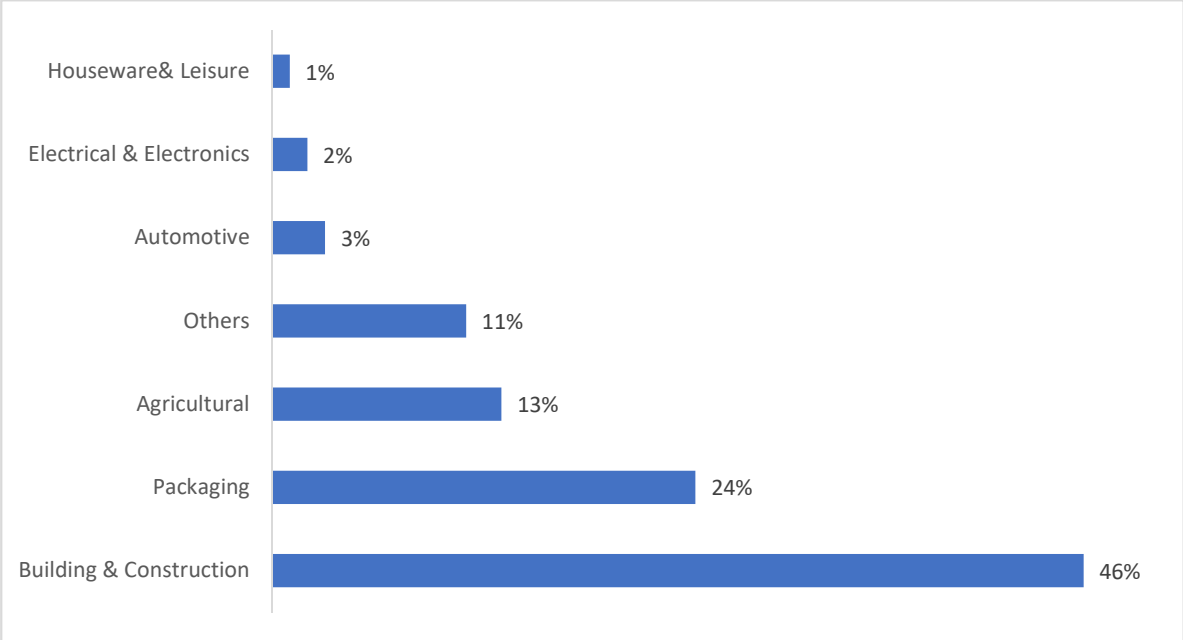

Figure3 Percentage of plastic recyclates used in products from the major market sectors

[6] THE CIRCULAR ECONOMY FOR PLASTICS,A European Overview, Plastics Europe, 2019, https://www.plasticseurope.org/en/resources/publications/1899-circular-economy-plastics-european-overview

The main applications for plastics in the Construction and Building Sector are:

- Flooring
- Roofing
- Windows, doors and related building products
- Pipes
- Building profiles, cladding
- Insulation materials
- Cables; and
- Building membranes

Figure 1 shows some of the predominant polymers used for plastic construction products.

Construction products	Type of Polymer
Resilient Flooring	PVC, other thermoplastic polymers and PU
Carpet	Polyamide 6, Polyamide 66, PP, PET
Roofing ,building membranes and sheets	PVC, PP, EPDM, PEHD, PC, PMMA
Windows, doors and related building products	PVC
Piping systems	PVC, PE, PP, PEX, ABS, PB, PA, PVDF, PPS
Building profiles cladding	PVC
Insulation materials	Polystyrene Foam XPS and EPS, / PIR and Phenolic
Cables	PVC, PE, Rubber, PP, PA , PU,EVA co-polymers

Figure 4 Polymers used in construction products

Plastic building and construction products are very durable and have an extremely long lifetime from 15 to 100 years, even exceeding 100 years in the case of some below ground pipes. As well as the obvious benefits of longevity and durability, this also brings with it challenges with regard to collecting and sorting as well as with regard to collecting end of life data.

Post-consumer waste volumes for a given year, are considerably lower than volumes of the total manufactured products placed on the market for the same year because production volumes have increased steadily over the past decades. Post-consumer waste today is directly linked to production volumes of many decades ago. Therefore, post-consumer waste volumes for construction plastics have to be assessed using historical sales data as well as analysis of waste streams.

The longevity of plastics construction products also brings challenges in the recycling process, as some end of life products will contain legacy substances, i.e. substances that complied with chemical legislation when the product they were used in was first placed on the market, but that are restricted under current legislation. This brings with it not only recycling challenges, but also collection challenges, as it is difficult to quickly analyse the additives content and to identify and sort these products and materials at a construction site or sorting centre.

In addition to this, plastics in construction are often an integral part of the building and embedded in the fabric of the building, such as in the case of piping and insulation materials, which are often

embedded behind walls, under floors and roofs. This means that they are difficult to extract for collection during the refurbishment and demolition process and rely on careful demolition and collection and might require additional pre-treatment and separation before recycling is possible.

3 Data on collection and sorting of plastics from construction

According to Eurostat there were more than 374 million tonnes of Construction and Demolition Waste, excluding excavated soil, arising in the EU 28 in 2016.[7] of which 1 million tonnes or 0.3% is plastic waste. Plastics Europe estimates that there were around 1.76 million tonnes of post-consumer plastic construction waste arising in 2018[8]. Assuming that the Construction and Demolition waste tonnage was fairly consistent in Europe between 2016 and 2018, even with this higher estimate, construction plastics amount to less than 0.5% of the total construction waste stream. Realistically speaking the plastics fraction of the construction waste stream is between 0.3% and 0.5 % of the total construction waste stream. Although this is a significant volume, it does pose a considerable challenge with regard to collection and sorting of the waste, particularly out of a mixed construction waste stream that is generated when buildings are crushed/collapsed rather than being deconstructed, which will consist mainly of rubble steel, metal, concrete, bricks, plaster etc.

3.1 Eurostat data for plastics from construction (NACE code F)

Eurostat data shows that more than 1 million tonnes of plastic waste arose from non-hazardous construction waste in 2016. Figure5 shows the data available on Eurostat for plastics waste from construction per country EU 28 for 2016

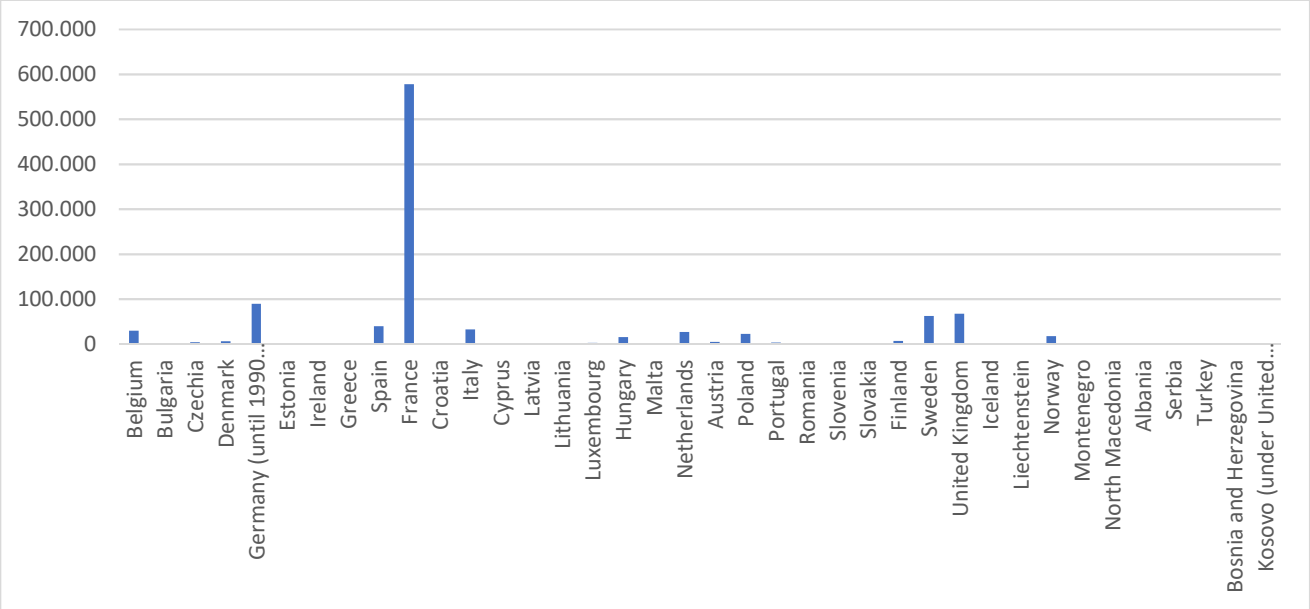

Figure5 Eurostat Plastics Waste from Construction 2016 per EU 28 country

There appear to be inconsistencies in reporting as some Member States do not report any volumes or only very small volumes and France reports nearly 580,000 tonnes, which would be more than half of the total collected across Europe according to Eurostat figures

[7] https://www.eea.europa.eu/themes/waste/waste-management/construction-and-demolition-waste-challenges

[8] Plastic waste, recycling, energy recovery and disposal from building & construction in Europe 2018@ Conversio elaborated on behalf of Plastics Europe April30_2019

The 2017 Deloitte report commissioned by the European Commission[9] finds that there is a large variation in the methods applied in data reporting at Member State level, which means that it is difficult to carry out a quantitative assessment of plastic construction waste arising per member states based solely on this data.

In addition to this, Eurostat does not collect data by polymer type. Therefore, the data in this report is based mainly on a Plastics Europe report written by Conversio[10]. Conversio uses a proprietary method to calculate waste arising, which includes a combination of life cycle analysis of selected products, analysis of Building and Construction waste streams, Destatis and Eurostat data, interviews and analysis from waste management and demolition companies as well as analysis of selected collecting and recycling activities.

According to the estimates of the Plastics Europe report shown in Figure 6, there were 1.76 million tonnes of post-consumer plastics waste from construction collected in 2018. PVC is the largest single polymer collected from the construction waste stream at 51.7%. This is followed by HD PE (12.8%0), EPS (8%), PP (7.4%), PS (1.7%) and PE -LD (5.1%). Other polymers comprise 13.4%

Type of plastics	Quantity (kt)	Share (%)
PE-LD	90	5.1%
PE-HD	225	12.8%
PP	130	7.4%
PS	30	1.7%
EPS	140	8.0%
PVC	910	51.7%
Other	235	13.4%
Total	**1,760**	100.0%

Figure 6 B&C plastic waste from building & construction applications by polymer type in EU28+2 (2018) (Plastics Europe, Conversio 29)

[9] Resource Efficient Use of Mixed Wastes Improving management of construction and demolition waste Final report October 2017

[10] "Plastic waste, recycling, energy recovery and disposal from building & construction in Europe 2018", Conversio elaborated on behalf of Plastics Europe, April 2019

Figure7 shows that of the 1.76 million tonnes of plastic from construction which was collected in 2018, 450 kilo tonnes or 26% was sorted for recycling.

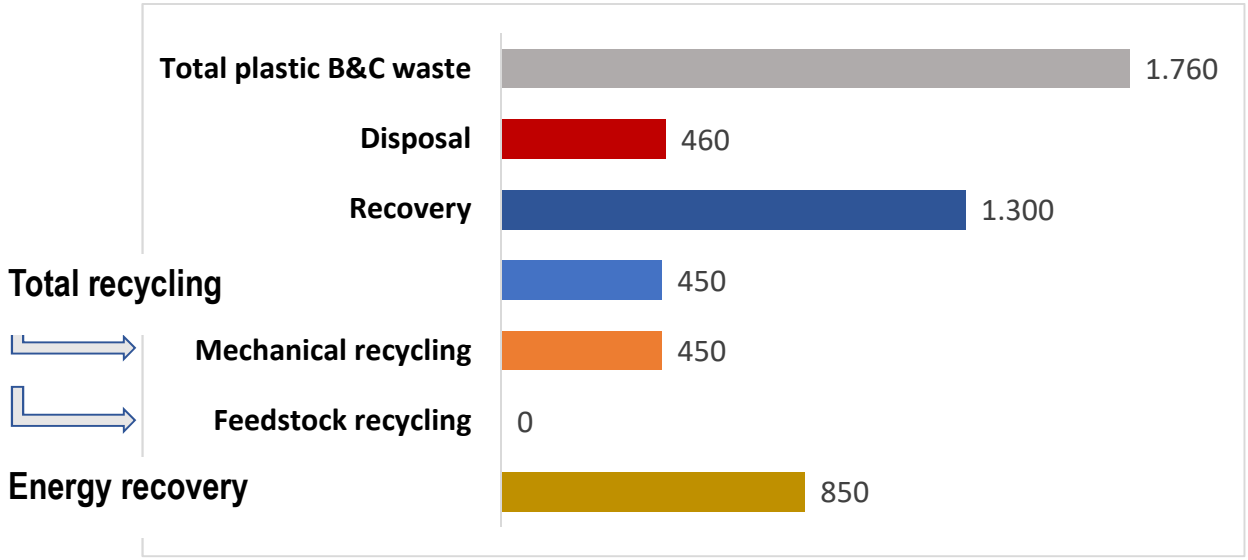

Figure7 Treatment of plastic waste from building & construction in EU 28+2 in 2018 (kt)Treatment of plastic waste from building & construction in EU 28+2 in 2018 (kt)

Figure8 provides an overview of plastic waste from building & construction by polymer type and by recycling, energy recovery and disposal. For the purposes of this report sorted waste is defined as sent for recycling, which is shown in the green bubbles. According to this, PVC has the highest sorting rate, followed by PE – HD, PP, and EPS. It cannot be totally excluded that the material sent for energy recovery has not been sorted as well, however it is unlikely to have been sorted by polymer type as it will be sent as a mixed fraction to incineration along with other plastics or construction wastes.

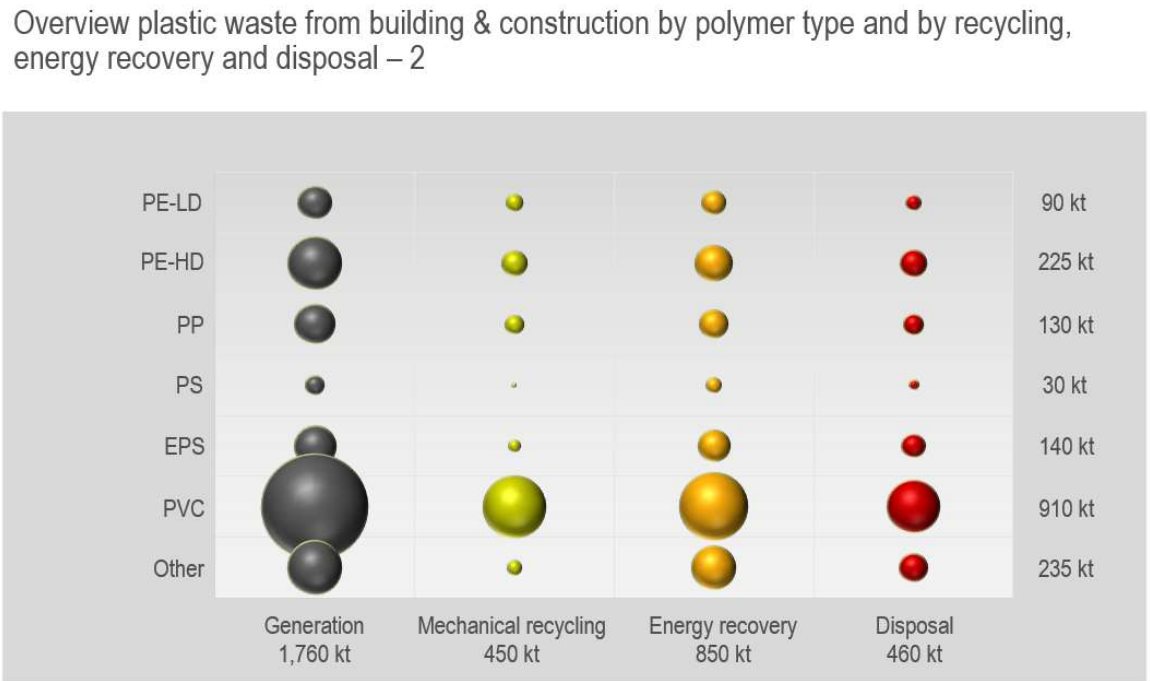

Figure8 Overview of plastic waste from building & construction by polymer type and by recycling energy recovery and disposal

Type of plastic	Examples of main construction products made from each polymer type	Total waste generation 2018		Recovery					Disposal/ landfill Total	
		in kt	in %	Total in kt	Thereof mechanical recycling		Thereof energy recovery			
					in kt	in %	in kt	in %	in kt	in %
PE-LD	Cables	90	5.1%	70	24	27.0%	46	51.0%	20	22.0%
PE-HD	Pipes, membranes, Cables	225	12.8%	164	54	24.0%	110	49.0%	61	27.0%
PP	Carpet, building membrane, sheets, pipes	130	7.4%	95	30	23.0%	65	50.0%	35	27.0%
PS	Insulation	30	1.7%	21	2	7.0%	19	64.0%	9	29.0%
EPS	Insulation	140	8.0%	95	13	9.0%	83	59.0%	45	32.0%
PVC	Windows, pipes, building profiles, flooring, cladding, cables, roofing membrane	910	51.7%	683	309	34.0%	373	41.0%	228	25.0%
Other	PU insulation, Polyamide carpets…	235	13.4%	172	18	7.50%	154	65.5%	63	27.0%
Total		**1,760**	100.0%	1,300	**450**	**26.0%**	**850**	**47.5%**	**460**	**26.5%**

Figure9[11] Overview showing mass balance of plastic waste from building & construction by polymer type and by recycling, energy recovery and disposal

[11] Adapted from Final report "Plastic waste from B&C in EU 2018" Plastics Europe

Figure 9 shows the mass flow for each polymer type in the post-consumer construction waste stream along with the percentage going to recycling, energy recovery and disposal/ landfill. The disposal figure includes incineration without energy recovery.
The main construction products are listed against the polymers used in these products. The total waste generation for plastics from construction is 1,760kt, of which 450kt are mechanically recycled and 850kt are sent to energy recovery. 460kt are sent to landfill. Section 3.2 focuses on data for PVC products by application, this data is not currently available for other polymer types.

3.2 Data by PVC application

Data for collection of PVC by application is available from Recovinyl, an initiative by the European PVC value-chain aimed at facilitating PVC waste collection and recycling under the Voluntary Commitments of Vinyl 2010 and now VinylPlus®. Recovinyl data is independently audited and verified and includes both pre- and post-consumer waste as defined in ISO 472. In 2019, 769,234 tonnes of PVC waste from construction was registered and recycled through the Recovinyl system.

This is comprised of 363,000 tonnes of window profile waste, 178,234 tonnes of flexible PVC and films including roofing and waterproofing membranes, flooring, coated fabrics, flexible and rigid films, 85, 000 tonnes of PVC pipes and 143,000 tonnes of PVC cable waste.

Figures 10,11,12Figure133 show the spread of recycling for each of these categories across Europe.

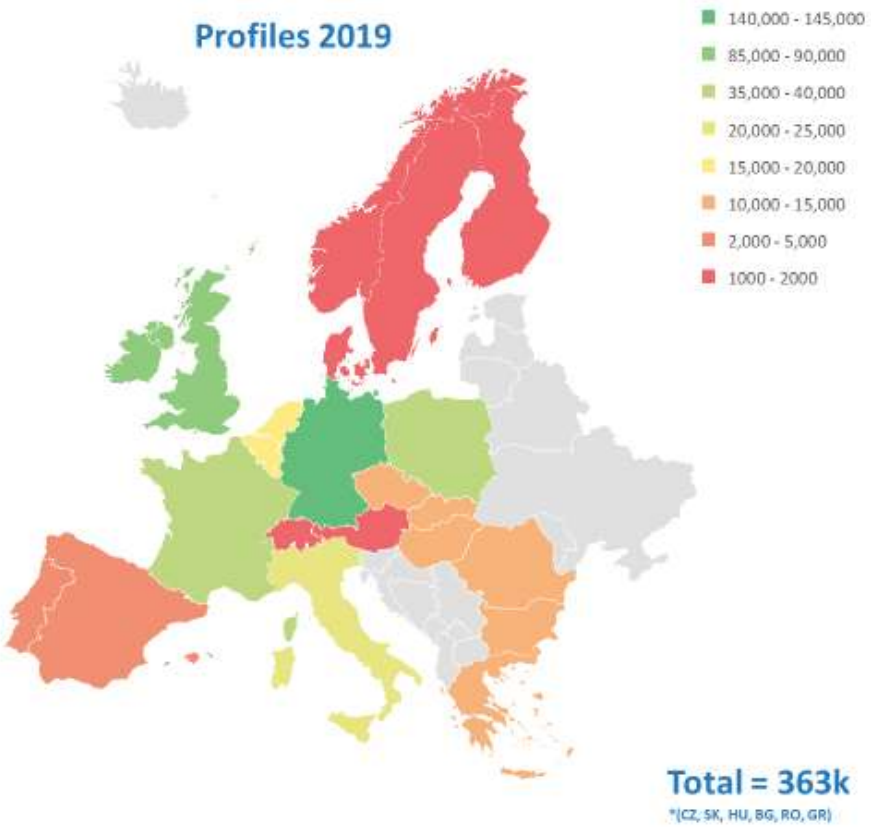

Figure10 PVC Window profile waste collected and recycled 2019

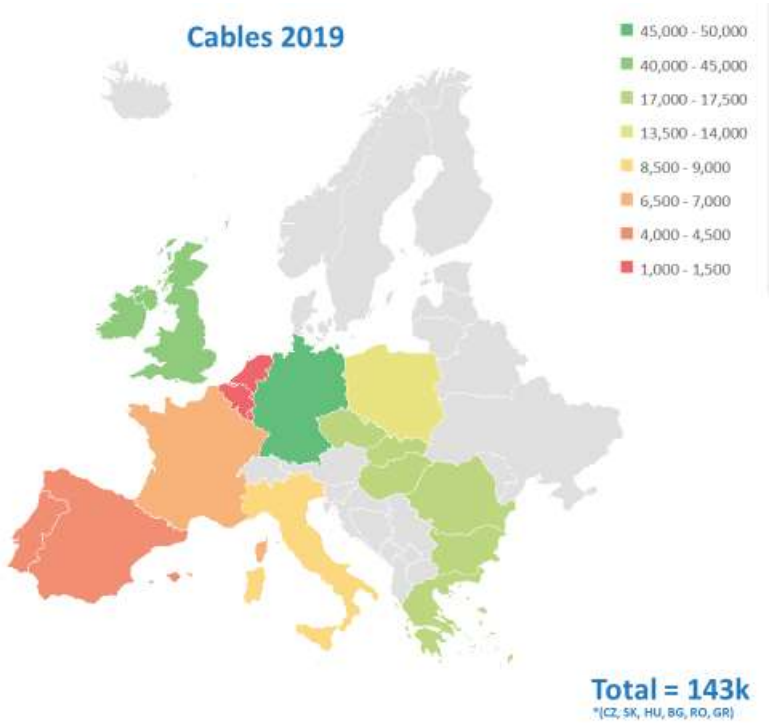

Figure11 PVC from cable waste collected, sorted and recycled 2019

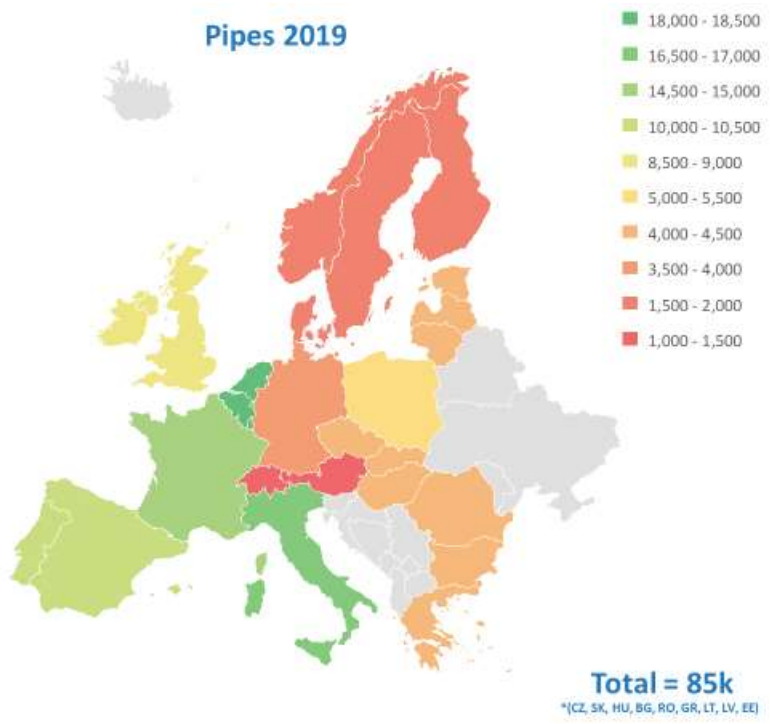

Figure12 PVC Pipes collected, sorted and recycled 2019

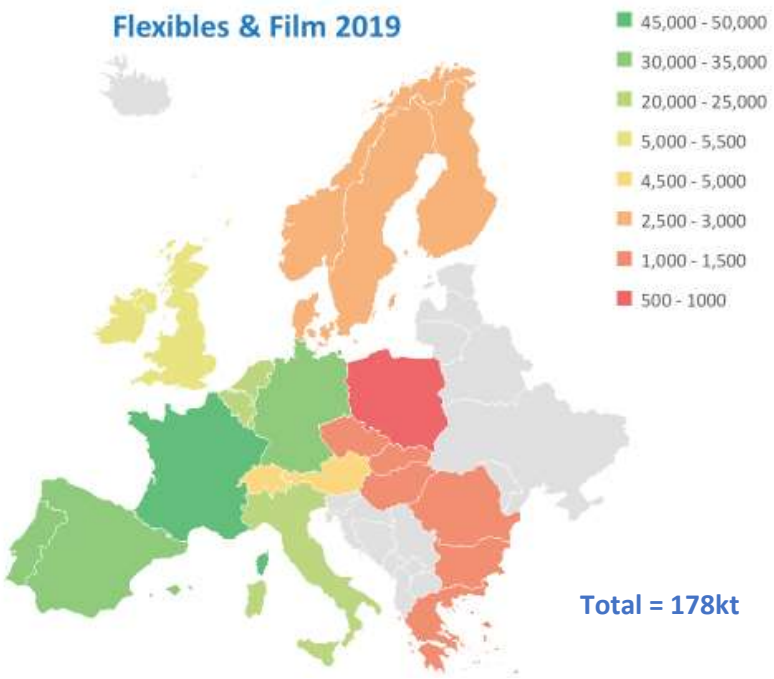

Figure13 PVC Flexibles & Films collected, sorted and recycled 2019

4 Collection and Sorting

4.1 Collection

The main collection options do not differ greatly across EU 28. They are:

- Unsorted waste collected in a container with mixed construction waste
- Waste separated on site as combustible waste by a waste management company
- Waste separated as recyclable plastics on site and collected by a waste management company
- Waste separated on site into various recyclable plastic waste fractions and collected directly by a material specific recycler

Generally, construction waste is collected by privately owned waste management companies based on private commercial arrangements. In some cases the waste is collected by contracts with municipalities.
For high value waste with a known outlet, waste is sorted on site into the various categories and picked up in separate containers by the waste company or in some instances by the recycler themselves.

The Deloitte report 2017 states that several countries have a national or regional obligation to collect construction material separately including plastics. Separation of different materials is then usually required on site using different containers for each material. The Deloitte report states that this is applies in 14 member states including AT, BE, NL, BG, CZ, DE, DK, EE, FI, HU, LU, SK, SI, SE, UK. However according to the report, this legal obligation is often not enforced.

4.2 Sorting

Material is either sorted on site as discussed in section 4.1 or collected mixed with other waste in containers and separated at a waste transfer station, which is usually operated by a private waste company. The business model of the waste company is based on sorting out any material of known value from the waste stream, and disposing of any material that is not of value to them at the cheapest rate possible, either via incineration or where available via landfill. Waste of value in this case is defined as being a waste that can either be sold to a recycling facility or sent to a recycling facility at a cost less than incineration or landfill.

Most sorting of construction waste is still undertaken by hand in the initial phase. Containers are emptied onto the floor or into waste bunkers and easy to identify objects, such as windows for example, will be grabbed out of the mixed pile using a mechanical grab. The remaining material will be either placed in a trommel to remove any small sized pieces, such as dust and grit and dirt and the rest is then generally sent to a sorting belt, where nonferrous metals are separated from ferrous materials. In a further stage, hand sorting is still common, whereby pickers are asked to pick specific materials out of the waste stream for recycling. Some commercial sites may have more sophisticated Near Infrared equipment to identify different plastics, but to the best of our knowledge these are not widely used in the construction waste sector.

4.3 Best Practice in collection and sorting

It is widely accepted that separate collection of materials from the construction waste stream leads to a higher chance of recycling and cleaner materials for recycling. The Plastics Europe report on plastics in the Circular Economy [12]shows that separate collection of plastics generally is key. According to the report separately collected plastic waste is ten times more likely to be recycled than waste that is collected mixed and has to be sorted in a waste separation facility. For construction waste in particular, plastics is a small fraction of the total waste consisting of rubble, bricks, etc which makes separate collection even more important.

[12] THE CIRCULAR ECONOMY FOR PLASTICS, Plastic Europe, December 2019

Figure14 Why is separate collection key for recycling

The Plastics Europe report also finds that placing restrictions on landfill, either by banning landfill altogether of by imposing a significant tax on the landfilling of waste, leads to an increase in recycling rates. [12]

4.3.1 Pre -Demolition Audits and Waste Management Plans

The European Commission Construction & Demolition Waste Management Protocol published in 2016[13] provides non-binding guidelines to improve waste identification, source separation and collection. It promotes the use of pre – demolition audits and waste management plans which need to be carried out before any renovation or demolition project.,

As laid out by the protocol a pre-demolition audit should be undertaken before the project and identify how the building should be demolished and identify any materials that should be reused recycled or treated separately E.g. hazardous materials.

According to the protocol a good pre demolition audit should consist of:

- Information on the quantity, quality and location in the building of all waste materials to be generated

[13] https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en

- Information on which materials should be separated at source, which materials can be recycled; and
- Information about how the waste will be managed and what the recycling options are, taking into account local markets for the individual waste streams.

This process is of particular importance for construction plastics, which are often embedded in the building behind walls and under floors and roofs. such as insulation, pipes. They are also usually firmly attached to the building, such as flooring, which can be adhered to the subfloor using adhesives or windows, that need to be dismantled separately. According to the Deloitte report 17 countries have made pre - demolition either mandatory or they are regulated regionally or on a voluntary basis.Figure15Figure15 shows countries that have embedded the pre - demolition audits in their law in green and those that have regional requirements or voluntary codes for pre demolition audits are shown in blue.

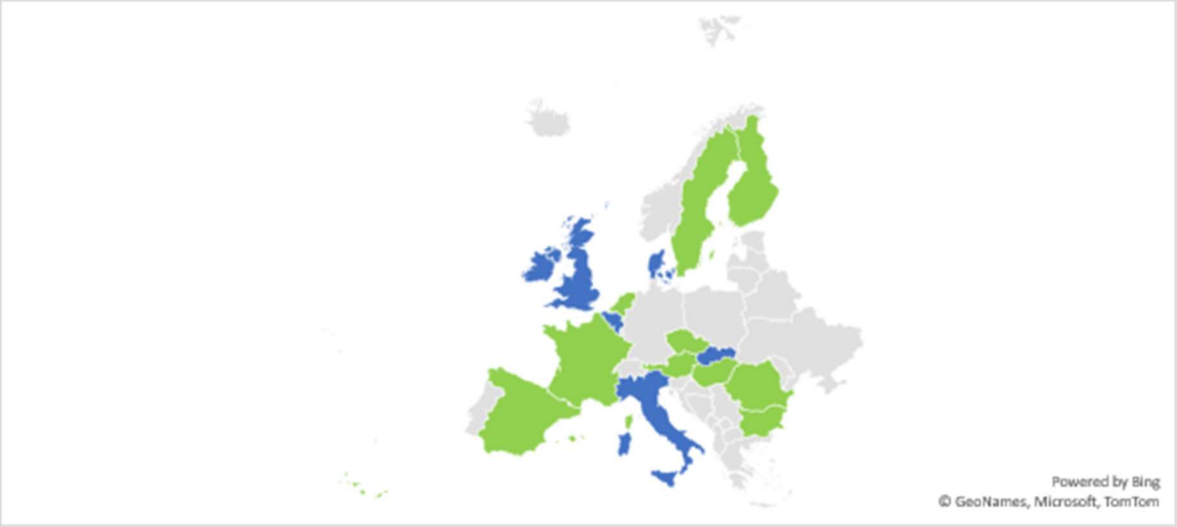

Figure15 Countries that have implemented pre demolition audits in law = Green, companies that have implemented them only in specific regions or on a voluntary basis = blue

It is difficult to say what percentage of demolition and refurbishment projects currently use pre demolition audits. The Deloitte report states that in many cases the audits are not strictly enforced. However, it also states that the impact of these pre demolition audits on recycling may not be known yet. Currently the data is not available to judge the effect of the legal requirement for pre demolition audits on the overall recycling rate for plastics from construction. However, this data should become available once the CPA Monitoring system is in place.

It should also be noted that pre demolition audits will be greatly helped by the use of product or building passports, which identify the products used in the building, the materials they are made of etc. These are only available in newer buildings and not mandatory, but the impact of product passports on demolition projects in the future should be significant. Digitalisation will play a key role in identifying product composition at end of life and should greatly increase the potential for collection and sorting.

Some of the best examples of collection and sorting of plastics from construction demonstrate that separate collection leads to a higher rate of recycling.

4.3.2 Collection and sorting of off cuts from construction product

On a construction and refurbishment site there are be typically two types of construction plastic waste available:

- post installation waste: clean waste from new construction products which have been cut to measure on site; and
- post-consumer waste: waste from used construction products that have been taken out of the building during the renovation phase.

If post installation waste is collected separately it provides a clean material generally of known composition for recycling.

5 Best Practice examples for collection and sorting

5.1 PVC Window Profiles

Window profiles have an efficient collection system across Europe. According to audited Recovinyl data, more than half of all the PVC sorted and sent to recycling in 2019, came from PVC window frames. This industry has been practising closed loop recycling for over 20 years. 363 000 tonnes of window profiles were recycled and therefore sorted for recycling in 2019.

There is generally a value attributed to window frames, as the waste from windows is of high quality and can be used back into windows. In addition to this, PVC window waste can be easily identified and picked out from the waste stream in the sorting process, without the need for sophisticated sorting technology. It is straightforward to identify PVC windows by site and therefore contamination from other plastics is minimal. This leads to a very high demand for the material from recyclers who are often willing to pay for the frames to be sorted out of the general waste stream.

The REWINDO recycling scheme in Germany (https://rewindo.de/)is an example of a process that has been set up specifically to collect window frames and recycle them back into profiles.

5.2 PVC Cables

Recovinyl audited collection data shows that 143,000 tonnes of cable waste were collected and sorted for recycling across Europe in 2019. Cable waste is collected out of the mixed waste stream by waste management companies as the copper within the cables has a very high value and therefore the sorting and collection of the product is worthwhile. The cables are usually ground in separate steps. Afterwards the metal is separated from the plastics using various techniques. The plastics are usually mixed plastics and undergo further recycling steps to achieve clean plastics by polymer.

5.3 Pipes

The Dutch Plastic Pipe Industry Association, Bureau Leiding operates a collection and recycling system for PE, PP and PVC Pipes in the Netherlands. The system called BIS (Buizen Inzamel Systeem

or in English: Collection System for Pipes), provides collection containers to sites as well as drop off points. Pipes must be pre-sorted, delivered clean without any chemical residues. https://www.bureauleiding.nl/bis-buizeninzamelsysteem

The collected and sorted rigid PVC waste is recycled and integrated in the middle layer of 3-layer PVC sewage pipes. The PVC pipe waste is often mixed with PVC window and profile waste.

In France the 3 French Federation for Pipes and fittings STR PVC, STR PEPP and Cochebat have set up a collection system working with a distributor in France and a French recycler to collect and recycle pipes, fittings, gutters, drains, ducts, sleeves and accessories made of PVC, PE, PP .

The aim is to have 4,000 collection points at specialist or temporary distributors on building sites in 2025 and to collect 30,000 tonnes of additional material in this way.

5.4 Vinyl Flooring

There are a number of good examples of collection and sorting schemes for vinyl flooring across Europe.

Recofloor

Recofloor operational in the UK is a scheme, founded and funded by flooring manufactures Altro and Polyflor, which collects both off cuts from the installation process and uplifted flooring directly from construction sites, from fitters or from distribution sites. The collection system uses backhaul collections to collect waste flooring from distribution sites. Flooring fitters drop off their waste at the distributors, when they go to pick up new flooring; manufacturers collect the waste from the distributors, when they deliver new flooring. The material is sorted on site. www.recofloor.org

Other collection schemes for resilient flooring, included PVC Next in France[14] and GBR Floor Recovery in Sweden[15].

Manufacturer's own schemes

Several manufacturers have their own schemes whereby they collect off cuts from the installation process directly from site. This enables them to collect material which is clean and can be used in the production of new flooring. This material would otherwise be lost in large mixed skips and end up in incineration or landfill.

AGPR

AGPR is a collection and recycling programme for PVC flooring based in Troisdorf Germany, it is an initiative by flooring manufacturers Altro, Gerflor, Polyflor and Tarkett. It collects pre-sorted waste for recycling, from waste management companies in France, Germany, Switzerland and Austria and recycles the material into a powder which can be used in the production new building products.

www.agpr.de

[14] http://solspvcpro.com/environnement-et-sante/collecte-et-recyclage.html)
[15] www.golvbranschen.se/miljo-hallbarhet/golvatervinning

5.5 Carpets

There are several examples of collection schemes for carpet tiles in Europe, either for reuse or recycling.

Collection for reuse

Greenstream flooring is a social enterprise, that collects separately sorted carpet tiles from refurbishment sites. Carpet tiles are taken out of the building and stacked on pallets. The pallets are then collected by Greenstream Flooring and taken back to their warehouse, where they are graded and sorted and then sold on to start-up companies, social housing and disadvantage households. https://www.findcarpettiles.co.uk/

Collection for recycling

The flooring manufacturer Tarkett has set up a system to collect separated carpet tiles from construction sites through their ReStart take back and recycling programme and send them to their plant in the Netherlands where Polyamide 6 face fibre is separated from the EcoBase® backing.[16] The PA6 is then recycled back into yarn by their yarn producer and partner Aquafil and used in the production of new flooring. The EcoBase® backing can be directly recycled in the production process into backing for new carpet tiles backing. [17]

5.6 Polystyrene Foam Insulation

Polystyrene foam is used in the production of insulation materials for the construction sector. It is used for insulation in foundation formwork of buildings, in beams and blocks, in walls and facades and below roofs.

Many manufacturers have schemes whereby they collect cut offs from installation. Typically, big 2m3 PE bags are provided, and a reverse logistics system is applied to pick up the collected material from the site.

In the application these insulation materials are embedded in the building and therefore at end of life have to be carefully dismantled in order to be recycled, further emphasising the importance of careful demolition of buildings to increase collection and sorting of plastics from construction. The volume of EPS insulation waste is expected to see a sharp increase. The reason is that higher insulation values only became part of common building practice since the end of the seventies. Older buildings tend to have much lower content of insulation materials.

The Polystyrene Loop Programme (PS LOOP) provides a recycling solution for expanded and extruded polystyrene (EPS and XPS) insulation materials. Material recycled by PolyStyreneLoop comes from demolition sites and has to undergo a process of collection, pre-treatment and transportation before it is finally treated in the recycling facility.

[16] https://www.tarkett.com/en/content/tarkett-and-aquafil-close-loop-carpet-tiles-key-step-towards-circular-economy

[17] https://www.youtube.com/watch?v=DcZ57qVhQDE

The PS LOOP system is set up to ensure that the material that arrives at the recycling plant meets the acceptance criteria. HUBS set up in Germany and The Netherlands deal with the sorting and pre-treatment of the material before sending it for recycling with the specific aspect that the legacy additive HBCD is removed from the PS polymer. It is an example of an innovative recycling technique solving the issue of closing the loop for a material stream that might contain a restricted substance.

A major part of the PS foam waste is generated at sites where old buildings are demolished. This work is done by demolition companies. In order to keep the waste suitable for treatment in the PSLoop demonstration plant, the PS foam waste has to be kept separate as far as possible from other waste like concrete, rubble, wood, glass etc

From the demolition sites waste collection companies collect the waste and bring it to the pre-treatment facility, HUBS that have contracts with PS Loop to ensure the correct sorting and pre-treatment of the material. Impurities are further removed, and material is compacted and prepared for transport to the recycling plant.

Figure16 Overview of applications and sorting for EPS insulation at demolition sites

6 Conclusion

The data available for collected and sorted waste is based on a combination of data sources as well as industry knowledge and experience. There is no Eurostat data available per polymer type for construction waste. An improvement in the monitoring of plastic waste arising from construction would help to set benchmarks and identify strengths and weaknesses in the collection systems in various member states. This is one of the key tasks set out in the CPA declaration.

The data used in this report is derived from studies commissioned by Plastics Europe which find that approximately 1.76 million tonnes of plastic waste are collected in Europe each year of which 26 per cent or 460,000 tonnes, is sorted for recycling. Products made of PVC are the most widely collected and sorted construction products, as they are organised under the umbrella of Vinyl Plus, the industry commitment to sustainable development.

Key challenges

Plastic construction products have a lifetime of 15 up to 100 years. This provides challenges regarding data collection as the volumes for products placed on the market today do not correspond to the volumes arising in the waste stream, which will be much lower. The longevity also means that some plastic construction products may contain legacy substances, that are difficult to analyse and detect and therefore also difficult to sort.

Plastic construction products are often embedded in buildings, adhered to the floors or placed in wall, floor or roof cavities, which makes them difficult to extract and creates a need for development of innovative pre-treatment and sorting processes.

Separate collection and sorting on site is desirable for construction products as it leads to cleaner uncontaminated materials. There are several examples of successful collection and sorting schemes for various construction products, including flooring, windows, pipes, insulation.

The EU protocol for demolition and construction recommends pre demolition audits and waste management plans to increase the volumes of material separately collected and pre-sorted at construction sites. 17 countries across the EU have put legislation in place for mandatory pre demolition audits and separation of material at building sites. These are not always strictly enforced and therefore stricter enforcement could lead to higher levels of collection and ultimately recycling.

In most cases construction waste is still collected as mixed waste, which makes it more difficult to sort out individual construction plastics. It should be noted that any waste material is only likely to be collected separately or sorted at a waste management facility if there is a significant demand for the sorted material and if it is cheaper to send for recycling than to send to incineration or landfill.

Although there are several examples of best practice available these need to be rolled out more widely to achieve an increase in recyclate that can be used in new products.

Figure17 Conclusions