

Flexible Polyurethane Foam

An Overview of Ongoing Recycling Initiatives

PURESMART Workshop, 31/05/21



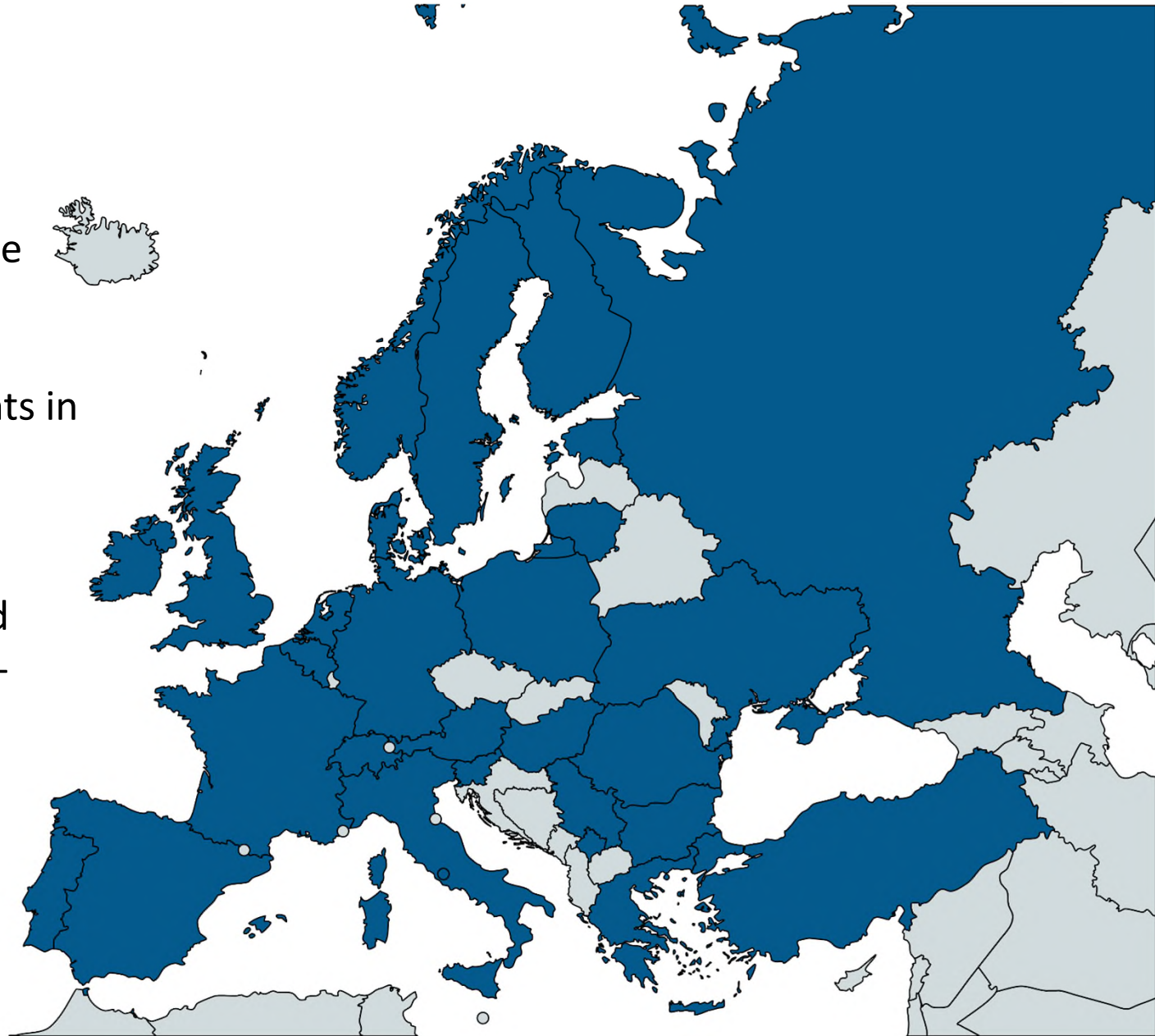
About EUROPUR

EUROPUR is the European Association of Flexible PU Foam Blocks Producers.

Our members operate PU foam production plants in 28 countries in geographical Europe.

Together, our members operate >70% of the PU foam plants in the European Economic Area and produce around 700,000 tonnes of PU foam (+/- 70% of the total production in the region).

Many of them also produce mattresses and furniture directly.

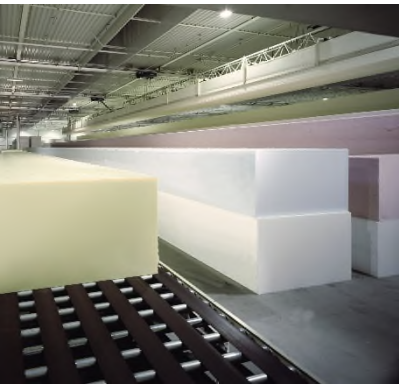


Flexible PU Foam Production in the EU

109 flexible polyurethane foam (slabstock) plants in EU28+CH+NO. Sector is mix of multinational companies and SMEs.

The flexible slabstock foam production in that area is of +/- **1 million tonnes**. Put into perspective, in volume, this represents an equivalent of about 11 times the Great pyramid of Gizah.

Flexible foam can also be moulded (for some furniture and car seats). Production of moulded foam for transport is about **255,000 tonnes** per year. Furniture is about **35,000 tonnes** per annum.



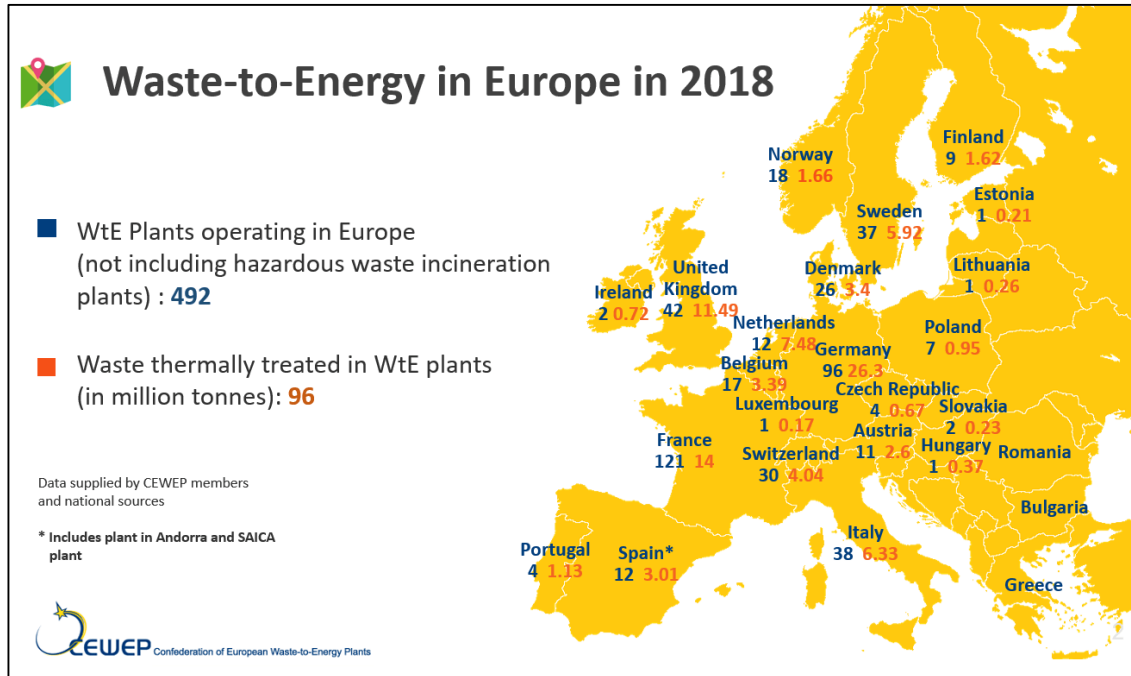
End of Life of PU foam today

End of Life of PU Foam today

- Dependent on the fate of foam containing products. We estimate that ~40 million mattresses reach EoL per year in the EU. Other estimate: the potential post-consumer foam volume that could be available for recycling is ~ 240-290 KT from mattresses and ~350-400 KT from furniture.
- In reality, most of EoL furniture and mattresses still get landilled or send to waste to energy plants. But EU waste legislation and EPR scheme are driving change. We estimate that the share of landilling has moved from 60% in 2012 to ~45% today for « bulky waste ».
- Remaining hurdle in many areas in Europe: absence of separate collection and dismantling of goods. In the absence of such infrastructure, recycling of materials is very difficult.
- Dismantling and sorting technology available for mattresses today. Still difficult for furniture.



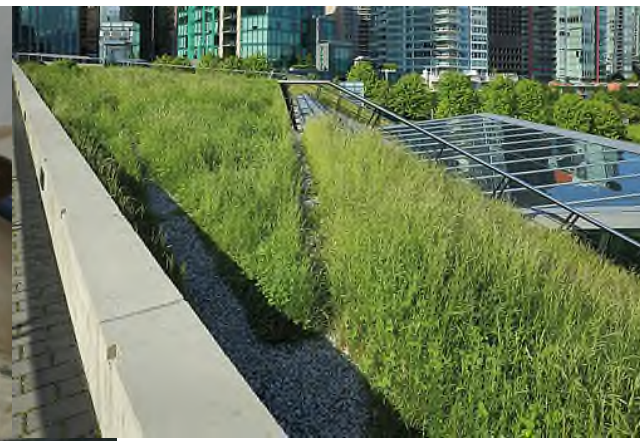
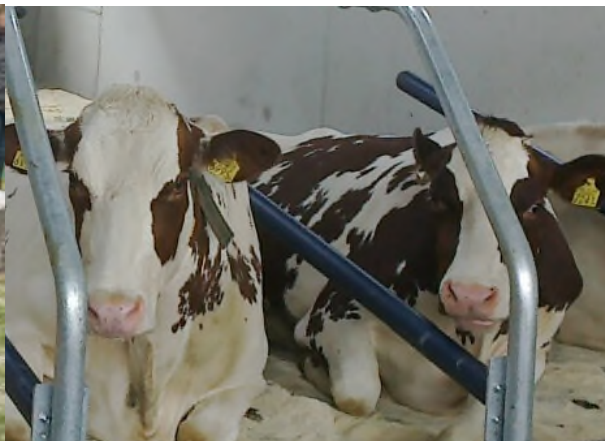
Waste-to-Energy / Solid Recovered Fuel



- Still very important EoL treatment technology today and good bridge to divert volumes from landfill, which will be banned in the coming years (2030).
- Will reduce in the future as new recycling technologies expand (also pushed by legislation)
- Able to process products that are too dirty or contaminated and need to be destroyed.

Mechanical Recycling

- Technology has been existing for decades to recycle production cut-offs
- Used in applications such as carpet underlay, acoustic insulation panels, gym mats, cow mats, furniture (majilis), sport pitches, green roofs...
- For post-consumer foams issues such as biological contamination and legacy chemicals need to be considered but are largely under control (RIVM study and upcoming EUROPUR report).
- Strongly growing. Our member Retour Matras in The Netherlands has installed capacity to recycle > 1 million mattresses per year.



Mechanical Recycling – It’s mainly a markets issue...

- Growth potential in some trim / rebonded foam markets but overall limited.
- Global trim market just about in balance.
- Europe is very dependent on trim exports.
- European trim production increasing because of increase of mattress recycling. By-product vs waste issue for exports.
- Exports to the US still n°1 but reducing because of use of domestic post-consumer foams.

Table 6: Estimated Global Supply and Demand for Trim Foam, 2013-2018(Kte)

Supply/Demand (Kte)	2013	2014	2015	2016	2017	2018
Post Production	831	945	1002	1070	1115	1173
Post -Consumer	133	136	136	139	144	148
Total Trim Supply	964	1081	1138	1209	1259	1321
Estimated Demand	898	991	1059	1117	1190	1266
Surplus	66	90	79	92	69	55

Source:LRM|

Europe	2013	2014	2015	2016	2017	2018
Total Trim Demand	110868	147481	156166	195973	219889	219015
Trim Production	230868	267481	281166	320973	344889	329015
Exported Trim	-120000	-120000	-125000	-125000	-125000	-110000

Source: LRM

Are there other recycling options for flexible PU foam?

Chemical Recycling (Chemolyse)

First foams made with polyols from post-consumer foams available soon!

Currently 6 plants under construction or planned in:

Belgium

France

Germany (2)

Spain

The Netherlands

The Vita Group joins the RENUVA™ Mattress Recycling Program by Dow

HOME BREAKING NEWS

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Local

Dow and Orrion to Build Industrial-scale PU Recycling Plant in France

May 30, 2020

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RetourMatras zet zijn zinnen op een circulaire matras

Innovatie, Nieuws, RetourMatras, Samenwerking 2 februari 2021

Persbericht 2 februari 2021

De investering van Ikano Industry lanceert nieuwe recyclingactiviteit

RetourMatras start een baanbrekende recyclingactiviteit en breidt haar matrasrecyclingcapaciteit uit van 1 miljoen naar meer dan 1,5 miljoen matrassen per jaar in Nederland en België. De Nederlandse matrasrecycleer kondigde een investering aan van Ikano Industry, dat zich aansluit bij de bestaande aandeelhouders Ingka Investments en Renewi.

covestro Global Corporate Website

Company Products Ir

Covestro Press / Closing the loop for polyurethane mattresses

25 March 2021

Covestro: a pioneer in foam recycling and cycle design

Closing the loop for polyurethane mattresses

- New pilot plant in operation for next level chemical recycling
- Innovative process for recovering both core raw materials enables high yields
- Pioneer for chemical recycling
- Co-shaping of a cycle in d

Triple Helix bouwt recyclagefabriek voor polyurethaan

Uit Trends van 01/04/2021 31/03/21 om 21:00 Bijgewerkt op 06/04/21 om 13:59

Jasper Vekeman
medewerker Trends en Moneytalk

Triple Helix plant in Antwerpen een chemische recyclagefabriek van de nieuwe generatie, een laatste schakel naar een circulair model voor polyurethaan. "De afvalberg aan matrassen is in Europa alleen al 678 keer de hoogte van de Mount Everest", zegt initiatiefnemer Steven Peleman.

Press release Madrid, March 18, 2021

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REPSOL

Repsol to build Spain's first polyurethane foam recycling plant in Puertollano

- Repsol plans to build **Spain's first chemical polyurethane foam recycling plant** at its Puertollano Industrial Complex. It will be capable of processing over 2,000 metric tons of waste per year.
- The plant entails an investment of **€12 million** and will be operational by the end of 2022.
- It marks yet another step forward in the company's **transformation of its industrial area** that involves turning production centers into multi-energy hubs capable of generating products with a low, zero, or even negative carbon footprint.

Global | Media

Home > Media > News Releases > BASF working toward circularity in recycling of mattresses

TRADE NEWS | June 29, 2020

BASF working toward circularity in recycling of mattresses

- Old mattresses are to provide raw materials for new ones
- The first pilot tests are up and running

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Thermochemical Recycling

PRIMA Project of Dutch Furniture Association (CBM) is ongoing and was recently presented at Interzum. Supported by a number of EBIA / EUROPUR members. Objective is to transform materials from EoL mattresses (not just PU) into valuable input fractions for the petrochemical industry.

Can process mattresses that are wet or contaminated, less need for sorting. Can process mattresses containing legacy chemicals.

Are we there yet?

No, but progress achieved in recent years
is tremendous!

Points to be considered: development of
recycling, uptake of recyclates, design for
dismantling...



Thank you for your attention

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