

FACTSHEET

Recycling and Recovering Polyurethanes OPTIONS IN PRACTISE

Society creates ever increasing amounts of waste, much of which could be recycled or recovered. Ecologically-sensible recycling and recovery conserves scarce resources, both materials and energy, which can be put to further use. The polyurethanes industry is committed to assist and play its part in the process.

ISOPA has been very actively providing manufacturers and users with information about the options available for the recycling and recovery of polyurethanes. There are several factsheets available giving details of the individual processes or looking at polyurethanes in a wider perspective.

This is a new edition of the Fact sheet “Options in Practise” and is intended to demonstrate the extent to which the technology options for recovery of polyurethanes are currently available and are used in practise.



Figure 1: At end-of-life – potential sources of energy and materials

Figure 2 gives an overview of typical recycling/recovery options and refers to the ISOPA Factsheets on these options

Figure 3 lists the applications areas or waste sectors and the recovery and recycling technologies used

Table 1 contains estimates of the quantities of wastes that have been recycled and recovered

Table 2 is a list of companies, practising the technology at small or commercial scale to production waste or to post consumer waste.

The number of companies involved in polyurethane recycling is large and is continuously changing. Therefore, this list should not be regarded as fully comprehensive but rather as a means to illustrate the utilisation of the recycling and recovery technologies.

ISOPA is interested in hearing from other technology users who would like to be included in future updates of this fact sheet.

Figure 2: Options for Polyurethane Recycling and Recovery

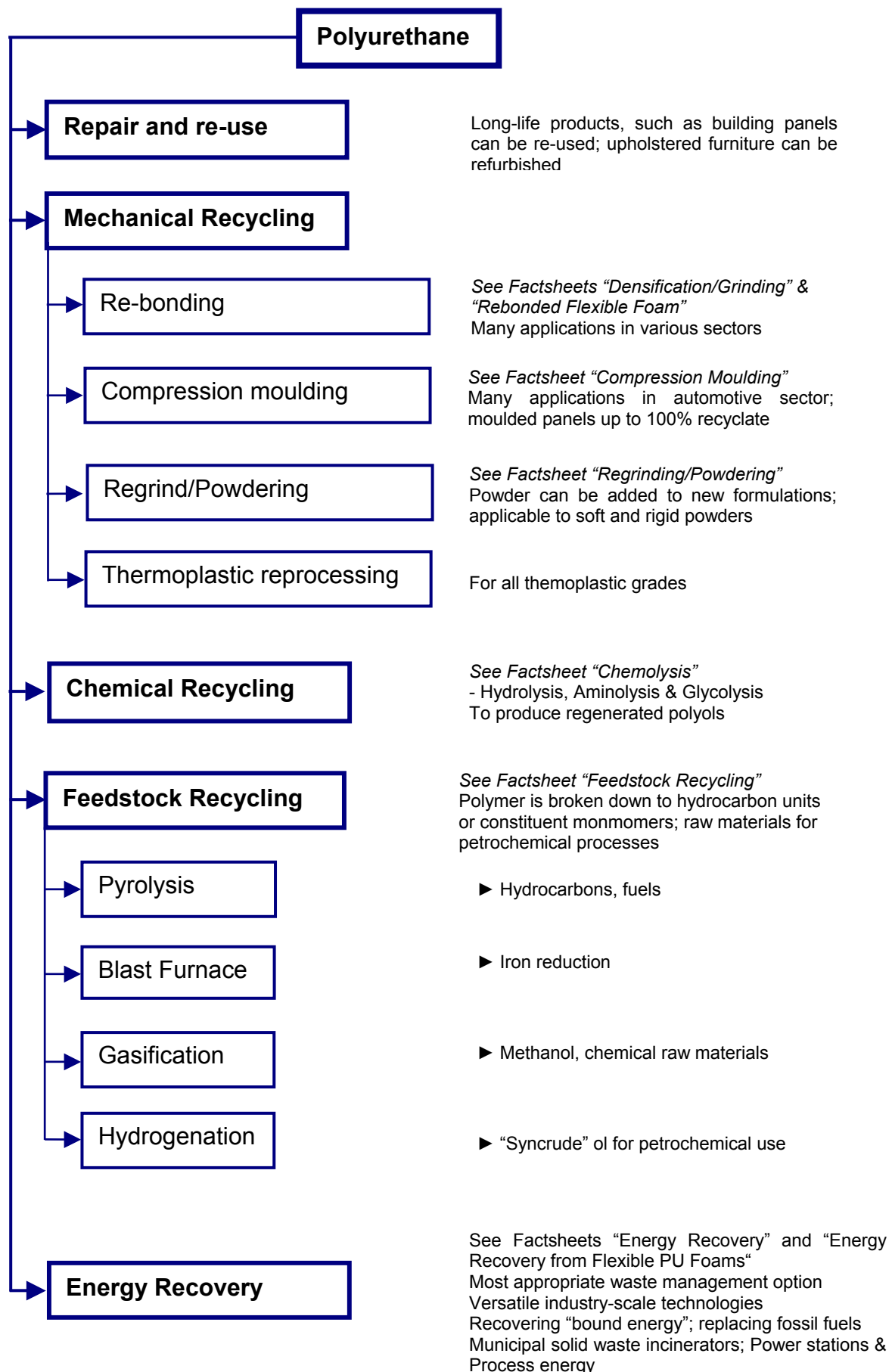


Figure 3 Applications areas/waste sectors and the recycling and recovery technologies which are relevant

	Life time extension	Granulate bonding	Filler	TP processing	Comp. moulding	Chemolysis	PC Feedstock	Energy recovery
Automotive - RIM	Low option desirability	Average option desirability	Low option desirability	Low option desirability	Average option desirability	Average option desirability	High option desirability	High option desirability
Automotive - Seating	High option desirability	Average option desirability	Low option desirability	Of no relevance	Low option desirability	Low option desirability	High option desirability	High option desirability
Automotive - Other	Average option desirability	Average option desirability	Low option desirability	Of no relevance	Of no relevance	Average option desirability	High option desirability	High option desirability
Domestic Appliances	Average option desirability	Average option desirability	Average option desirability	Of no relevance	Of no relevance	Low option desirability	High option desirability	High option desirability
Furniture and Bedding	Low option desirability	High option desirability	Low option desirability	Of no relevance	Low option desirability	Average option desirability	High option desirability	High option desirability
Insulation Boards	Low option desirability	Average option desirability	Average option desirability	Of no relevance	Of no relevance	Low option desirability	High option desirability	High option desirability
Sandwich Panels	Average option desirability	Average option desirability	Low option desirability	Of no relevance	Of no relevance	Low option desirability	High option desirability	High option desirability
Shoe Soles	Low option desirability	High option desirability	High option desirability	High option desirability	High option desirability	Low option desirability	High option desirability	High option desirability

 High option desirability
 Low option desirability

 Average option desirability
 Of no relevance

Recovery in Perspective

It is important to note that the total of 350 kt of recovered polyurethane in w. Europe in 2004 should not be compared with that year's consumption of raw materials of about 2,500 kt which were sold into the various industry sectors. This is because long lived polyurethanes result in much smaller amounts of waste in the same year.

Total polyurethane waste is estimated to be about 1,500 kt in 2004, approximately half of which is not suitable for collection and subsequent recycling, because of small volumes and/or wide distribution. This waste is best recovered by combustion (incineration with energy recovery) together with municipal solid waste.

While the remainder may be technically and logistically better suited to recycling, the economics have not proven sufficiently favourable to allow commercial implementation.

The choice of the most suitable option(s) for recycling/recovery is governed by a number of factors that vary from case to case and also from location to location. Some of the most important ones are the properties of the polyurethane to start from, the intended application for the recyclates, and the capacity of the market to absorb the recycled material. Logistics are also frequently of key importance, especially with respect to economics.

This is the reason why maximum advantage for the environment is generally gained by a combination of options that depend strongly on the individual local conditions and may therefore differ from one place to another.

**Table 1: ESTIMATED AMOUNTS OF RECYCLED AND RECOVERED
POLYURETHANES IN W. EUROPE IN 2004
(kt)**

Flexible rebond and loose flocks	130*
Pressboards for roads/floors	7
Glycolysis	<1
Powder (oil/chemical binder)	2
Powder in other applications	1
Flocks into insulation	3
Energy recovery in Municipal Solid Waste Combustors	200
In ASR to MSWI	2
Industrial Incineration	1
Industrial Gasification	2
Total	349 kt

*65 kt in Europe and 65 kt in North America

This estimate and the breakdown represent the best knowledge of ISOPA as of 2004. Polyurethane recyclers, collectors, exporters, etc. are all welcome to make use of the ISOPA office for the confidential collection of actual data in the following years.

Table 2: List of compagnies actively engaged in PUR Recycling (not comprehensive!)

Processes (P): RB = Rebonding / CH = Chemolysis

Input (I): PW = Production Waste / PCW = Post Consumer Waste

Company	Web site	Address	Tel	Fax	P	I	Remarks
Agglorex BVBA	www.agglorex.com	Industriepark Kerkhoven Nijverheidsweg 84 B-3920 Lommel	32 11 54 25 32	32 11 54 57 92	RB	PW	Rebonding
ORSA SRL	www.univa.va.it	via A. Colombo 60 I-21055 Gorla Minore	39 0331 60 91 11	39 0331 60 92 41	RB	PW PCW	Rebonding = Greiner Perfoam
BACHL, spol. Sr. O.	www.bachl.cz	Brnenska 669 CZ-66442 Modrice u. Brna	42 05 47 428 111	42 05 47 428 100	RB	PW	Adhesive pressing
BSW GmbH Berleburger Schaumstoffwerk	www.berleburger.de	Postfach 1180 D-57301 Bad Berleburg	49 27 51 803 0	49 2751 803 109	RB	PCW PW	Rebonding
Bramming Plast-Industri A/S	www.bpi.dk	Vardevej 9 DK-6740 Bramming	45 7957 10 00	45 7517 32 00	RB	PW	Rebonding
C.C. Umwelt AG	www.cc-umwelt.de	Bataverstrasse 25 D-47809 Krefeld	49 21 51 5258 0	49 21 515258 800		PW PCW	Rebonding Energy recovery
COPLA Srl	www.copla.it	via T. Tasso 76 I-36027 Rosà	39 0424 58 04 85	39 0424 58 15 41	RB	PW	Thermoplastic
Dutrabond bv	www.dutrabond.com	Weverstedehof 14 NL-3431 HR Nieuwegein	31 30 60 54 566	31 30 60 53 355	RB	PW	Rebonded foam trader
Ecoindustria Srl		Strada Fabreccia 47 Loc. Villa Fatiggi I-46100 Pesaro	39 0721 283 542	39 0721 283 463	RB	PW	Rebonding Stopped glycolysis
Espe Oy	www.espe.fi	PO Box 64, Nevantie 2 FIN-45101 Kouvola	358 5 78 451	358 5 78 45 653	RB	PW	Rebonding
Federal BY-Products (Holland) B.V.	www.federalfoam.com	Industrieweg 161-163 P.O. Box 222 NL-5680 AE Best	31 499 39 08 90	31 499 37 02 37	RB	PW	Rebonding

Company	Web site	Address	Tel	Fax	P	I	Remarks
F.S. FEHRER Automotive Systems GmbH	www.fehrer.de	Heinrich-Fehrer-Strasse 1-3 D-97318 Kitzingen	49 93 21 302 0	49 93 21 3027348	RB	PW	Rebonding
Foltmar	www.foltmar.com	Postboks 79 DN-3600 Frederikssund	45 47 31 16 16	45 47 31 17 00	RB	PW	Rebonding - will restart
Formtech AG	www.formtech.ch	Püntstrasse 2 CH-8492 Wila	41 52 397 22 22	41 52 397 22 20	RB	PW	Rebonding
Getzner Mutter & Cie	www.getzner.at	Herrenau 5, Postfach 159 A-6700 Bludenz-Bürs	43 55 52 6933010	43 55 5269330 20	CH	PW	Glycolysis
Greiner Perfoam GmbH	www.greiner-perfoam.com www.greiner.at	Eduard-Suess-Strasse 25 A-4020 Linz	43 7223 9010 0	43 7223 9010 99	RB	PW PCW	no service
Grupo Antolin	www.grupoantolin.es	Ctra.Madrid-Irun, Km 244,8 Apartado 2069 E-09007 Burgos	34 947 47 77 00	34 947 48 48 08	RB	PW	car scrap to headliners
Copo Fehrer S.A.	www.grupocopo.com	Ctra. N-232, km 207,8 Poligono Industrial La Corona E-50740 Fuentes de Ebro. Zaragoza	34 976 160 366	34 976 160 674	RB	PW	only internal Energy recovery
Gumotex AS	www.gumotex.cz www.gumotex.com	Mladeznicka 3 A, c.p. 3062 CZ-69075 Breclav	42 05 19 314 111	42 05 19 322 909	RB	PW	service
Icoa SA	www.icoa.es	c/ Ronda, 5 Urbanizacion Siberex E-28320 Pinto (Madrid)	34 1 691 12 04	34 1 691 63 00	RB	PW	Rebonding
Inespo, S.L.	www.recticel.com	Ctra. Barcelona, 142 Km 2,2 E-08213 Polinya (Barcelona)	34 93 713 17 58	34 93 713 01 60	RB	PW	Recticel group
Alfa Systems Sp. Zo. o.	www.eng.alfasystems.com	ul. Sienkiewicza 11 PL-56-120 Brzeg Dolny	48 71 319 22 25	48 71 319 26 95	RB CH	PW	"still trying"
Isola N.V.	www.isola.be	Schurhovenveld 3856 B-3800 Sint-Truiden	32 11 68 31 11	32 11 69 64 85	*	PCW	* Rigid foam powder for insulation mortar

Company	Web site	Address	Tel	Fax	P	I	Remarks
Kopur d.o.o.	www.kopur.si	Pod gradom 1 SL-2380 Slovenj Gradec	38 62 88 27 431	38 62 88 27 433	RB	PW	from Johnson Controls back in car parts
Kayfoam Woolfson	www.kayfoamwoolfson.com	Bluebell Industrial Estate, Naas Road IRL-Dublin 12	353 1 419 29 99	353 1 460 25 74	RB	PW	Rebonding
Kay-Metzeler Limited	www.kay-metzeler.co.uk	Wellington Road Bollington, Macclesfield UK-Cheshire SK10 5JJ	44 1625 57 33 66	44 1625 57 40 75	RB	PW	Rebonding
Keel Produktions AG	www.keelag.ch	Bühlstrasse 72 8583 Sulgen	41 71 640 05 25	41 71 640 05 26	RB	PW	Adhesive pressing from automotive RIM
Latexco Recycling	www.latexco-recycling.be	B.A. Gilbertlaan 16 B-8700 Schuiferskapelle	32 51 409 365	32 51 409 366	RB	PW	
Metzler Schaum GmbH	www.metzler-schaum.de	Donaustrasse 51 D-87700 Memmingen	49 8331 830 0	49 8331 830 397	RB	PW	Rebonding
Multy Mousse Sprl.	www.multy.nl	106 Route de Maastricht B-4600 Visé	32 43 79 60 63	32 43 79 60 79	RB	PW	Rebonding packaging
NMC Décoration SA	www.nmc.be	Rovert 10 B-4731 Raeren	32 87 85 85 00	32 87 85 85 11	RB	PW	just starting
PDR Recycling GmbH + Co KG	www.pdr.de	Am alten Sägewerk 3 D-95349 Thurnau	49 92 28 950 0	49 92 28 950 50	CH	PCW	OCF cans
Platec Plattentechnik GmbH	www.platec-plattentechnik.de	Saathainer Strasse 266 D-04910 Elsterwerda	49 35 33 70 00	49 35 33 700 200	RB	PW	Adhesive pressing
Poliuretanos S.A.	www.poliuretanos.com	Cami Matamala, s/n E-17244 Cassa de La Selva	34 972 460 472	34 972 460 053	CH RB	PW	Glycolysis
Polytex Skumplastfabrik ApS	www.polytex.dk	DK-4300 Holbaek	45 59 43 60 40	45 59 43 63 78	RB	PW	blocks, sheets and products

Company	Web site	Address	Tel	Fax	P	I	Remarks
Porolon AS Porolon AS	www.porolon.no	Vegsund N-6012 Alesund	47 70 17 92 00	47 70 17 92 01	RB	PW	Rebonding
PR.IS. Srl	web site under construction	Zona Industriale Riganello I-64020 San Nicol� a Tordino	39 0861 58 567	39 0861 58 84 38	CH	PW PCW	Glycolysis
Puren Schaumstoff GmbH	www.puren.com -	Rengoldshauser Strasse 4 D-88662 �berlingen	49 7551 80 99 0	49 7551 80 99 20	RB	PW	Adhesive pressing - stopped glycolysis Rigid foam powder as absorbent
Recticel Woodbridge Moulded Foam Belgium S.A.	www.rwmf.de	Damstraat 2 B-9230 Wetteren	32 93 68 92 11	32 93 68 95 59	RB	PW	Rebonding
Recticel Woodbridge GmbH & Co. KG	www.rwmf.de	In der T�tenbeke 27 D-32339 Espelkamp	49 57 72 914 0	49 57 72 914 113	RB	PW	Rebonding
Recticel B.V.	www.recticel.nl	Spoorstraat 69 NL-4041 CL Kesteren	31 488 48 94 00	31 488 48 31 87	RB	PW	Rebonding
Rampf Ecosystems GmbH & Co. KG	www.rampf-gruppe.de www.rampf-ecosystems.de	Els�sser Strasse 7 D-66954 Pirmasens	49 63 31 87 03 0	49 63 31 87 03 42	CH	PW	produces recy-polyols
Schulpen Schuim Leiden b.v.	www.multy.nl	Zaalbergweg 17 NL-2314 XS Leiden	31 71 531 21 21	31 71 576 05 87	RB	PW	Rebonding
Stahlwerke Bremen GmbH	www.stahlwerke-bremen.de	Auf den Delben 35 D-28237 Bremen	49 421 648 0	49 421 648 22 51	*	PCW	* Feedstock recycling -blast furnace -
Steinbacher D�mmstoff GmbH	www.steinbacher.at	Salzburgerstrasse 35 A-6383 Erpfendorf / Tirol	43 53 52 700 0	43 53 52 700 530	RB	PW	Adhesive pressing
Superlon Oy	www.superlon.fi	P.O. Box 85 FIN-26101 Rauma	358 2 83 87 93 00	358 2 83 87 93 11	RB	PW	Rebonding
SVZ Schwarze Pumpe GmbH	www.svz-gmbh.de	S�dstrasse D-02979 Spreetal OT Spreewitz	49 3564 69 37 70	49 3564 69 37 34	*	PCW	* Feedstock recycling - gasification -
Tramico SA		Route d'Authou F-27800 Brionne	33 232 44 82 41	33 232 455 493	RB	PW	Rebonding

Company	Web site	Address	Tel	Fax	P	I	Remarks
Vebe S.r.l.	www.vebel.it	Via delle Industrie 44 I-30020 Marcon	39 041 45 69 694	39 041 45 67 361	RB	PW	Thermoplastic
Vitafoam Ltd.	www.vitafoam.co.uk	Oldham Road Middleton, Manchester UK-Lancashire M24 2DB	44 161 655 26 63	44 161 655 31 98	RB	PW	Rebonding



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