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Plastics recycling in Europe

Amounts – Technologies – Plants – Capacities – Players

Cologne, July 2020

Extract

ecoprog GmbH

Plastics recycling in Europe

The requirements towards plastics recycling in Europe are increasing continuously. For plastic packagings, for instance, the statutory recycling quota will increase to 55% by 2030.

As the waste statistics are changing at the same time, this means that almost twice as large recycling amounts must be produced in the future. Also, the end consumers are demanding from commerce and industry to handle plastics in a more sustainable way. Simultaneously, industry association PlasticsEurope estimates the global plastics production to have increased by about 75% between 2002 and 2018 alone.

Despite the wish to recycle more, the day-to-day business is a difficult one for plastic recycling companies – and not only since the COVID-19 pandemic. The business is characterised by decreasing market prices (as a result of the drop in the oil price) and higher costs, e.g. for energy and the disposal of sorting residues.

The EU member states are establishing numerous measures, especially because of the requirements stipulated by the EU. Among these measures are the introduction or expansion of deposit schemes for plastic bottles, an intensification of separate waste collection, but also higher costs for waste disposal and incineration. Some countries, such as Italy, have already introduced a general plastics tax. However, these measures will probably not be enough to actually reach what is aspired in the European plastics recycling sector. This is why topics such as recycle quotas or a European plastics tax are being pushed as well. Additional players enter the market, e.g. the promising market of chemical plastics recycling, in order to participate in this dynamic development.

ecoprog has analysed the plastics disposal sector in detail – to add facts to the heated debate about plastics recycling in Europe, which has been going on for months.

The study “Plastics recycling in Europe” includes:

- A detailed analysis of all the important political, economic, operational and technical trends in European plastics recycling.
- The description and analysis of more than 1,200 sorting plants and more than 1,000 plastics recycling plants (by site), including key data on operators, input and capacities (wherever possible).
- A detailed assessment of this data and the analysis of legislation and market factors at country level (30 European countries). This also includes capacities and market shares of sorting and recycling by country.
- Background on the planning boom for chemical recycling plants in Europe and an overview of more than 30 chemical recycling projects.

The market study is available in English and German language starting from 4,500.- € plus VAT. Subscribers of ecoprog's w&b Monitor will receive a discount starting from 600.- €. **Please find detailed price information at the end of this extract.**

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| | |
|--|------------|
| Preface | 11 |
| Management summary | 13 |
| 1 Basics and definitions | 17 |
| 1.1 Plastics | 17 |
| 1.2 Occurrence and collection | 18 |
| 1.3 Sorting | 21 |
| 1.4 Recycling | 21 |
| 1.5 Value chain | 24 |
| 1.6 Plastic recycling in the waste management system | 25 |
| 1.7 Geographical differentiation | 26 |
| 2 Plastic amounts in Europe | 29 |
| 2.1 Production | 29 |
| 2.2 Processing | 30 |
| 2.3 Consumption | 31 |
| 2.4 Waste and recycling | 32 |
| 3 Plant technology | 35 |
| 3.1 Sorting plants | 35 |
| 3.2 Recycling plants | 37 |
| 3.3 Plants for chemical recycling | 40 |
| 4 Overview of costs and revenues | 45 |
| 4.1 Exemplary investment costs | 45 |
| 4.2 Types of operational costs | 46 |
| 4.3 Overview of the most important revenues | 47 |
| 5 Legal framework and market factors | 49 |
| 5.1 Price development for recyclates | 49 |
| 5.2 Plastics demand | 57 |
| 5.3 EU Circular Economy Package | 59 |
| 5.4 European Strategy for Plastics | 66 |
| 5.5 European Green Deal | 69 |
| 5.6 Measures and implementation of the countries | 69 |
| 5.7 Self-commitment of the industry | 76 |
| 5.8 Declining waste exports | 81 |
| 5.9 Booming development of chemical recycling | 83 |
| 5.10 Impact of the disposal market | 85 |
| 6 Capacities | 87 |
| 6.1 Sorting plants | 87 |
| 6.2 Recycling plants | 90 |
| 6.3 Chemical recycling | 93 |
| 7 Competition | 95 |
| 7.1 Sorting | 95 |
| 7.2 Recycling | 97 |
| 7.3 Chemical recycling | 99 |
| 8 Market potentials | 101 |
| 9 National markets and plants | 107 |

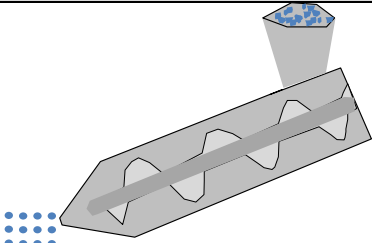
| | | | | | |
|--|----------------|-----|------|-------------|------------|
| 9.1 | Austria | 107 | 9.16 | Latvia | 377 |
| 9.2 | Belgium | 119 | 9.17 | Lithuania | 383 |
| 9.3 | Bulgaria | 128 | 9.18 | Luxembourg | 390 |
| 9.4 | Croatia | 136 | 9.19 | Malta | 396 |
| 9.5 | Cyprus | 143 | 9.20 | Netherlands | 397 |
| 9.6 | Czech Republic | 147 | 9.21 | Norway | 412 |
| 9.7 | Denmark | 165 | 9.22 | Poland | 416 |
| 9.8 | Estonia | 172 | 9.23 | Portugal | 460 |
| 9.9 | Finland | 177 | 9.24 | Romania | 472 |
| 9.10 | France | 184 | 9.25 | Slovakia | 486 |
| 9.11 | Germany | 262 | 9.26 | Slovenia | 493 |
| 9.12 | Greece | 318 | 9.27 | Spain | 499 |
| 9.13 | Hungary | 328 | 9.28 | Sweden | 527 |
| 9.14 | Ireland | 346 | 9.29 | Switzerland | 533 |
| 9.15 | Italy | 355 | 9.30 | UK | 537 |
| Data sources and methodology | | | | | 587 |
| Glossary | | | | | 591 |
| Register sorting plants | | | | | 593 |
| Register recycling plants | | | | | 601 |
| Register chemical recycling plants | | | | | 619 |
| | | | | | |
| Table of figures | | | | | |
| Figure 1: Common plastics and their recycling codes | | | | | 17 |
| Figure 2: Value chain of plastics recycling, overview | | | | | 23 |
| Figure 3: ecoprolog waste matrix | | | | | 25 |
| Figure 4: Analysed area | | | | | 26 |
| Figure 5: Flow chart plastics production and recycling in Europe, 2018 | | | | | 28 |
| Figure 6: Key figures of the European plastics industry | | | | | 29 |
| Figure 7: Primary plastics use of European plastics converters, by segment, 2018 | | | | | 30 |
| Figure 8: Recyclate use in Europe, by industries | | | | | 32 |
| Figure 9: Examples for sorting technologies for plastic waste | | | | | 36 |
| Figure 10: Shredding | | | | | 38 |
| Figure 11: Example of technical units of a recycling plant | | | | | 39 |
| Figure 12: Common recyclates from plastic sorting plants | | | | | 40 |
| Figure 13: Overview chemical recycling | | | | | 41 |
| Figure 14: Overview market factors | | | | | 49 |
| Figure 15: Value chain, using the example of polyethylene | | | | | 50 |
| Figure 16: Oil price development 1992-2020 | | | | | 51 |
| Figure 17: Price development primary plastics in Germany | | | | | 52 |
| Figure 18: Price development used plastics in Germany | | | | | 52 |
| Figure 19: Plastic recyclate prices in Germany | | | | | 53 |
| Figure 20: Development of plastics production | | | | | 55 |
| Figure 21: Hierarchy for waste handling | | | | | 57 |
| Figure 22: 2030/2035 goals of the Circular Economy Package | | | | | 58 |
| Figure 23: Material recovery quotas for MSW in Europe, 2017 | | | | | 59 |
| [...] | | | | | |

3.2 Recycling plants

Recycling plants process a presorted plastic stream into a product that is ready to be used in the plastics industry. In the beginning, this product usually is cleaned grist. [...]

The dry grist can either be marketed as a raw material or processed into granulate, which entails an additional step. So-called extruders melt the grist by using heat, portions it into strings, sometimes adds additives to it and cuts this mass into even pieces. Granulate is the end product of this process, and within the industry, it is called regranulate or recycle. [...]

Figure9: Example of technical units of a recycling plant

| Technology | Illustration | Description |
|------------|---|---|
| Extruder |  | The sorted plastic waste is conveyed and melted by a rotating screw in a heated cylinder. The result is a homogeneous plastic mass, which is mixed with additives and pressed out to produce equally sized granulate. |
| [...] | | |

3.2 Chemical recycling plants

So far, there are only few plants for chemical recycling (also called feedstock recycling) that are operational at a commercial scale. Chemical recycling still is in the research and development phase.

In such a stage of development, many different processes and technologies are being examined, and this is also true for chemical recycling. Established standards have not been developed yet. Also, it is not clear whether (and then to what extent) one of these technologies will be able to dominate in commercial operations. This is why the variety of processes is considerably larger for chemical recycling than it is for mechanical recycling (for now).

The chemical recycling processes have in common that – contrary to mechanical recycling – they split up the polymer chains in the plastics, with the goal to obtain petrochemical basic materials that can be used to produce new plastics or for other purposes. The two processes that currently secure most of the funding capacities are thermochemical processes and solvolysis.

Thermomechanical processes can generally be differentiated into incineration, gasification and pyrolysis. At first, it may be surprising to classify the incineration of plastics as a form of recycling. Eventually, however, incineration also is a chemical reaction with reaction products. [...]

5.8 Declining waste exports

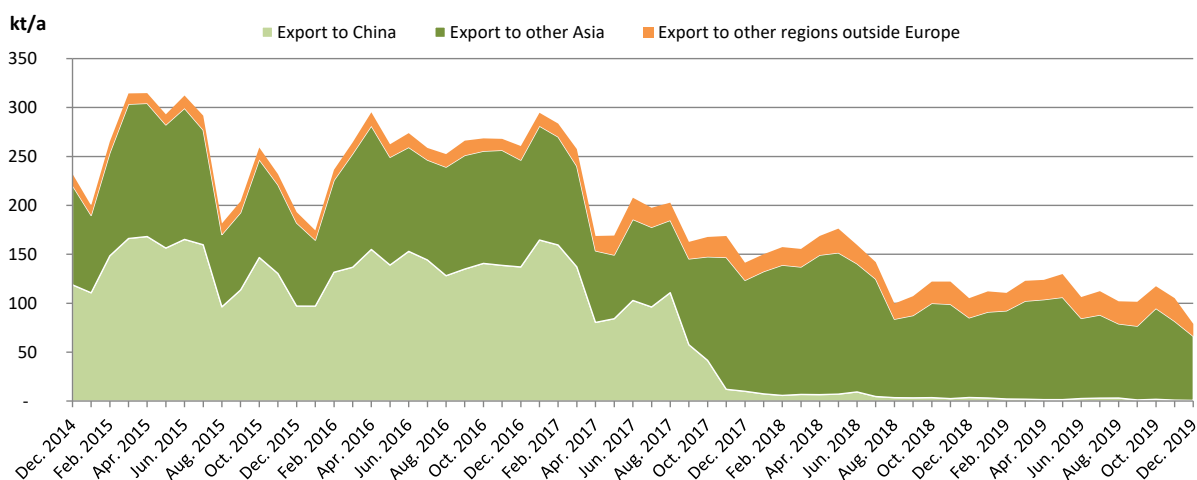
The Asian markets had evolved into an important destination for high-quality plastic waste and waste paper exports until 2017. In the same year, China, in the course of its economic rise, became the largest customer of plastic waste and waste paper worldwide.

Then, in 2017, China passed a law that significantly impeded the import of these materials. Starting in January 2018, an import ban for unsorted and mixed plastic waste and other fractions such as unsorted waste paper was introduced. Additionally, ambitious impurity limits of 0.5% weight proportion are in place for sorted waste (plastics, waste paper, wood, scrap) since March 2018.

As a result of this development, European exports of plastic waste dropped drastically, and already in 2017 – from 165 kt/a in January 2017 to 10 kt/a in December 2017 (we analysed the European export statistics for HS code 3915: waste, paring and scrap, of plastics).

This is the consequence of the import restrictions from 2017, but also of comprehensive controls of plastic recycling operations, which were carried out in the same year in China and also resulted, according to information by experts, in the shutdown of many plants. The actual import restriction for high-quality plastic waste is only in place since March 2018.

Figure 28: European plastic waste exports



Evaluation of HS 3915 (Waste, Pairing and Scrap of plastics) of European trade statistics, source: Eurostat

Increasing exports to other Asian countries such as Malaysia, Vietnam and Indonesia can only compensate parts of the drop in the Chinese demand. Other target markets outside of Asia hardly play a role at all for exports of high-quality plastic waste. As a result, exports of high-quality plastic waste from Europe have declined dramatically – from 3.0 million tons in 2015 to 1.3 million tons in 2019. [...]

[...]

8.30 United Kingdom

| Key figures | | | |
|---|--------|---------------------------------------|--------|
| Inhabitants 2020 [UN est. in million] | 67.9 | Number of plastic sorting plants | 168 |
| MSW 2018 [1,000 t/a] | 30,786 | Sorting capacity, est. in 1,000 t/a | 11,000 |
| Plastic packaging waste 2017 [1,000 t/a] | 2,260 | Number of recycling plants | 89 |
| Est. total post-consumer plastic waste 2017 [1,000 t/a] | 3,802 | Recycling capacity, est. in 1,000 t/a | 1,500 |

| Management Summary | |
|--|--|
| <p>The UK remains a dynamic market with a significant project pipeline. The Brexit is leading to uncertainties whether the EU targets for 2030 are to be implemented in national law. By contrast, the current UK waste policy will strengthen the recycling through a plastic packaging tax, a deposit scheme for plastic bottles and a planned extended producer responsibility for 2023. The UK will stay a dynamic market.</p> | |

| Background, legislation and current disposal | |
|--|---|
| Background | <ul style="list-style-type: none"> - Following the Brexit on 31 January 2020, the UK is no longer an official member of the European Union. A transitional period is in place until the end of 2020, in order to clarify the further economic and social cooperation between the EU and the UK. It is generally assumed that the UK will remain in close economic contact with the EU. Nevertheless, as of May 2020, it remains unsure whether and how the UK will adopt the EU targets 2030 in its domestic waste policy. - As announced by the country's finance minister in March 2020, a plastic packaging tax should be introduced from April 2020 onwards. Packaging consisting of less than 30% of recycle will then be taxed GBP 200 (EUR 227) per ton. - Packaging producer responsibility was introduced nationwide in 1997 and is planned to be expanded by an extended producer responsibility scheme in 2023, which is currently being planned. As of June 2020, the concrete outline of the system has not yet been published. - A deposit system will be introduced in Scotland in 2021, and Wales and England will follow in 2023/2024. |
| Achieving the objectives of European waste legislation | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Plastic packaging recycling rate</p> </div> <div style="text-align: center;"> <p>MSW recycling rate</p> </div> <div style="text-align: center;"> <p>MSW landfill rate</p> </div> </div> <p style="text-align: right; font-size: small;">Source: Eurostat</p> |
| Separate collection | <ul style="list-style-type: none"> - Kerbside system is dominating in the UK; the collection varies from multi-stream collection (plastic and cans, paper separately) over one-stream and two-stream systems (one waste streams or two waste streams collected together) to co-mingled schemes (all dry recyclables collected in one bin, sometimes also including glass). Co-mingled schemes are dominating with a share of approx. 50%. About 90 to 95% of the population has access to separate collection schemes. - Leading EPR system: Valpak Limited, established in 1997. [...] |

| | |
|---|---|
| <p>Current disposal MSW</p> | <p>MSW treatment in kt/a in 2018</p> <p>Source: Eurostat</p> <ul style="list-style-type: none"> - Due to high landfill taxes and a landfill ban for unsorted MSW, the MSW landfilling share is negligible. - Another consequence is that Belgium has constructed large incineration capacities for waste treatment. |
| <p>Current disposal plastic packaging</p> | <p>kt/a</p> <p>Energy recovery Material recycling Others*</p> <p>* may contain: Landfilling, export or no specific information due to data protection reasons. Source: Eurostat</p> <ul style="list-style-type: none"> - With a market share of 80%, Fost Plus reported around 780 kt/a of (total) packaging waste in 2018. - In 2017, 345 kt/a of plastic packaging waste was registered in Belgium. Due to the formerly limited plastic packaging collection scheme (expanded in 2020/2021), incineration has a high share due to the fact that plastic packaging waste is partly collected unseparated and incinerated together with the residual waste. |
| <p>Plants and competition</p> | |
| <p>Sorting plants</p> | <ul style="list-style-type: none"> - We have identified 16 sorting plants for plastic wastes in Belgium. Through the comparison with data provided by the leading EPR scheme Fost Plus (with a market share of 80%), the vast majority of plastic sorting facilities under contract has been identified. The average capacity of the plants with available information on capacities is 24.5 kt/a. - Most sorting plants are awarded by Fost Plus. <p>Sorting plant operators</p> <p>Source: ecoprolog</p> <ul style="list-style-type: none"> - The majority of the sorting plants are operated by domestic private companies, some of which are also active internationally, e.g. Indaver. - Foreign large disposal companies are Suez and Renewi (the latter with headquarters in the UK). Renewi was founded in 2017 as a merger of British disposal company Shanks and Netherlands-based Van Gansewinkel Group. - The German waste management company PreZero (belonging to the SchwarzGroup) is currently entering the Belgian market by planning the sorting facility in Evergem. [...] |

| <p>Material recycling plants</p> | <ul style="list-style-type: none"> - [...] - At the same location in Eschlikon, InnoRecycling produces 16 kt/a of granulate from 20 kt/a of plastic waste. - We know of seven other plastic recycling plants in Switzerland; they accept PET only or different kinds of plastic waste. - The latest plant went operational in 2019 in Bilten. This facility, operated by Poly Recycling, processes PET into granulate. <div style="text-align: center;"> <p>Material recycling plant operators</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Data for Material recycling plant operators pie chart</caption> <thead> <tr> <th>Operator Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Polyrecycling / Innorecycling / InnoPlastics</td> <td>37%</td> </tr> <tr> <td>More information in the report</td> <td>50%</td> </tr> <tr> <td>Other</td> <td>13%</td> </tr> </tbody> </table> <p><i>Source: ecoprolog</i></p> </div> <ul style="list-style-type: none"> - Almost all plants in Switzerland are operated by national recycling companies. Veolia is the only international company active in the Swiss market. Veolia has a 85% stake in RecyPET AG, which runs the PET recycling plant in Frauenfeld. - Poly Recycling AG with its spin-offs InnoRecycling and InnoPlastics are the domestic market leaders in Switzerland. | Operator Category | Percentage | Polyrecycling / Innorecycling / InnoPlastics | 37% | More information in the report | 50% | Other | 13% |
|---|--|-------------------|------------|--|-----|--------------------------------|-----|-------|-----|
| Operator Category | Percentage | | | | | | | | |
| Polyrecycling / Innorecycling / InnoPlastics | 37% | | | | | | | | |
| More information in the report | 50% | | | | | | | | |
| Other | 13% | | | | | | | | |
| <p>Chemical recycling plants</p> | <ul style="list-style-type: none"> - We are not aware of any chemical plastic plant or project in Switzerland. | | | | | | | | |
| <p><i>More details on the plants are included in the annex to this country chapter.</i></p> | | | | | | | | | |
| <p>Market development</p> | | | | | | | | | |
| <p>Market development</p> | <ul style="list-style-type: none"> - The Swiss market for plastic recycling is comparatively saturated. Additionally, the strong position of waste incineration and the political will to prefer recycling only if it is economically preferable hinder the further expansion of the plastic recycling sector. - Already in the first edition of this report in 2015, we tracked the information that the plastic separate collection and recycling should be expanded; however, as of 2020 a nationwide separate collection scheme is still not being discussed (or such discussions are only taking place at an internal level). - As of May 2020, it is unsure, whether Switzerland will adopt its waste policy towards the new European waste targets for 2030. In the long term, however, an increase of the separate collection is likely in order to align the system to the European waste hierarchy. - Therefore, in the long run, we expect the demand for selected sorting capacities to increase – if the separate collection is extended. | | | | | | | | |

Figure 83: Plant asset and projects in Portugal



Sorting plants in Greece

[...]

Fyli / Greece

Operator: Watt SA
Group affiliation: Watt SA
Fyli
Tel.: 0030 2105584216
www.watt.com.gr

Status: active
Start of operation: 2008
Throughput (t/a): 100.000
Input category: dry recyclables
Input: Packaging waste from the dry recyclable bring system scheme including paper and cardboard, plastic, metal and glass.
Output category: bales
Output: different fractions of recyclables
Investment sum: EUR 10 million
Main technical parts: optical, magnetic and air separators

External remarks: In 2019 the plant processed 83 kt/a of commingled waste of the dry recyclable bring system scheme.

Ioannina / Greece

Operator: PK Recycling North West LTD
Group affiliation: PK Recycling Nort West LTD
Industrial Area of Ioannina
455 00 Ioannina
Tel.: 0030 2651025514 ; 0030 2651057617

Status: active
Throughput (t/a): 7.000
Input category: dry recyclables
Input: Packaging waste from the dry recyclable bring system scheme including paper and cardboard, plastic, metal and glass
Output category: bales
Output: different fractions of recyclables

External remarks: In 2019, the plant processed 7 kt/a of commingled waste of the dry recyclable bring system scheme. It operates in collaboration with the Greek recycling system Hellenic Recovery Recycling Corporation (HERRCO).

Ionia / Greece

Operator: Eco Trans Ltd
S.S. Achialou - Neochoroudas, P.O.Box 201, plision
Industrial Area of Sindos
57008 Ionia
Tel.: 0030 2310722500
www.eco-trans.gr

Status: active
Throughput (t/a): 22.000
Input category: dry recyclables
Input: Packaging waste from the dry recyclable bring system scheme including paper and cardboard, plastic, metal and glass.
Output category: bales
Output: different fractions of recyclables

External remarks: In 2019, the plant processed 22 kt/a of commingled waste of the dry recyclable bring system scheme. It operates in collaboration with the Greek recycling system Hellenic Recovery Recycling Corporation (HERRCO).

Kalamata / Greece

Operator: Dimitrios Kouzis
Kalamata
Tel.: 0030 2721069362

Status: active
Throughput (t/a): 8.000
Input category: dry recyclables
Input: Packaging waste from the dry recyclable bring system scheme including paper and cardboard, plastic, metal and glass
Output category: bales
Output: different fractions of recyclables

External remarks: In 2019, the plant processed 8 kt/a of commingled waste of the dry recyclable bring system scheme. It operates in collaboration with the Greek recycling system Hellenic Recovery Recycling Corporation (HERRCO).

Katerini / Greece

Operator: Ecosip
4th Km Katerinis Elassonas Road
60100 Katerini
Tel.: 0030 2351039901
www.osipidisrecycling.gr

Status: active
Start of operation: 2005
Throughput (t/a): 4.000
Input category: dry recyclables
Input: Packaging waste from the dry recyclable bring system scheme including paper and cardboard, plastic, metal and glass
Output category: bales
Output: different fractions of recyclables (Paper, Tetra Pak, Glass, PP/PE, LDPE, PET)

External remarks: In 2019, the plant processed 4 kt/a of commingled waste ...[...]

Plastic recycling plants in the Czech Republic

[...]

Ludkovice / Czech Republic

Operator: Ekotrend Ludky s.r.o.

Status: active
Throughput (t/a): 15.000
Input category: single plastics
Input: PVC production scrap
Output category: granulate
Output: PVC granulate (soft/hard)
Employees: 110
Main technical parts: Shredder: Vecoplan, Weima, Condux, Zerma; grinding machines: Alpine, Zerma, Herbold; regranulator lines: Bausano, Raiffenhauser

Luštěnice / Czech Republic

Operator: Thomas Verpackungen Union sro
Újezdec u Luštěnic 61
29442 Luštěnice
Tel.: 00420 326109016
www.thomas-vu.cz

Status: active
Input category: single plastics
Input: LDPE film
Output category: other products
Output: LDPE foil, film, bags etc.
Main manufacturer: Pplast technology SP.Z O.O.SP.K

External remarks: In February 2020, the company awarded a plastic waste granulation line to Plast technology SP.Z O.O.SP.K at a value of CZK 7.1 million (EUR 288,000).

Měnin / Czech Republic

Operator: Profol s.r.o.

Status: active
Input category: single plastics
Input: commercial plastic waste: foils, plates, moldings, profiles, bottles, canisters, inlets and drips (LDPE, HDPE, PP, FIVE, PVC, HIPS, ABS, PA6/66, PC, PMMA, POM)
Output category: granulate
Output: grist

External remarks: The company has a production output of 2 t/h. Also, cables and CU inserts are recycled.

Mníšek pod Brdy 1 / Czech Republic

Operator: Purum s.r.o.
Group affiliation: Purum Kraft Group

Status: active
Throughput (t/a): 7.200

Input category: single plastics
Input: focus on PET, PP, ABS, PC / ABS, PMMA, PS and PC
Output category: granulate
Output: PET flakes, regranulate

External remarks: The company offers a wide range of waste management services, including transport, collection, disposal of hazardous waste, energy recovery and others.

Modřice / Czech Republic

Operator: Petka Cz, a.s.
U Vlečky 592
664 42 Modřice
Tel.: 00420 547425997
Fax: 00420 547216802
www.petkacz.cz

Status: active
Start of operation: 2005
Throughput (t/a): 6.600
Input category: multiple plastics
Input: PVC, PE, PP, PET
Output category: granulate
Output: flakes
Main technical parts: sorting, separated of metal with metal detector, milled, washing and rinsing, drying, filled into "big bags"

Moravský Písek / Czech Republic

Operator: CVM Moravia spol s. r. o.
Kovodělská 62
696 85 Moravský Písek
Tel.: 0042 518387691
Fax: 0042 518387328

Status: active
Input category: multiple plastics
Input: dry plastic waste
Output category: granulate
Output: plastic grist
Main technical parts: plastic crushing

Mutěnice / Czech Republic

Operator: AUTO KMENTA, s.r.o.
Sklepni 1113
696 11 Mutěnice
Tel.: 00420 518370544

Status: active
Input category: multiple plastics
Input: dry plastic waste
Output category: granulate
Output: plastic grist
Main technical parts: plastic crushing

[...]

Plastic recycling plants in Sweden

Norrköping Miljösäck / Sweden

Operator: Miljösäck
Röda Stugans Gata
60103 Norrköping
Tel.: 0046 11282500
Fax: 0046 11187358
www.miljosack.com

Status: active
Throughput (t/a): 8.000
Input category: multiple plastics
Input: LDPE/LDPE polyethylene
Output category: granulate
Output: granulate (colored/semi transparent)
Employees: 55

External remarks: raw material is collected only in Sweden. According to company information the plant generates a turnover of EUR 10 million.

Norrköping Cleanaway / Sweden

Operator: Cleanaway PET Svenska AB
Hanholmsvägen 67
60238 Norrköping
Tel.: 0046 11190486
Fax: 0046 11107700
www.cleanaway.se

Status: active
Start of operation: 2006
Throughput (t/a): 15.000
Input category: single plastics
Input: PET bottles
Output category: granulate
Output: PET flakes, granulate

External remarks: The recycling facility takes up PET bottles sorted by the sorting station Norrköping Returpack located in the same municipality. It produces PET flakes and granulate for further reprocessings.

[...]

Chemical recycling plants in Sweden

Jönköping / Sweden

Operator: Hällstorp Recycling
Hällstorps gard 7
55614 Jönköping

Status: unknown
Start of operation: 2019 (planned)
Input category: dry recyclables
Input: organic waste, plastic, wood, cardboard
Output category: Others/not specified
Output: oil and fuel
Main manufacturer: Swestep

External remarks: Owner of the plant is Hällstorp Recycling. Initially, the plant was planned to start operation in late 2019. As of June 2020, the current status of the project is uncertain.

Örebro / Sweden

Operator: REZ Power
Vrana Säteri 310
69794 Sköllersta

Status: unknown
Start of operation: 2019 (planned)
Input category: dry recyclables
Input: organic waste, plastic, wood, cardboard
Output category: Others/not specified
Output: oil and fuel
Main manufacturer: Swestep

External remarks: Owner of the plant is REZ power. Initially, the plant was planned to start operation in late 2019. As of June 2020, the current status of the project is uncertain.

Undisclosed / Sweden

Operator: Eastman

Status: planned
Start of operation: 2021
Input category: multiple plastics
Input: polyester polymers, including polyester as well as coloured, coated and contaminated PE
Output category: Others/not specified
Output: two base monomers, dimethyl terephthalate and ethylene glycol

External remarks: US-based chemical company Eastman plans to build two chemical plastic recycling plants in Sweden. One plant will use the company's methanolysis process to chemically recover two base monomers, dimethyl terephthalate and ethylene glycol, from a mixed stream of polyester polymers, including polyester as well as coloured, coated and contaminated PE. As of August 2019, the plant is under construction and expected to be operational within 24 to 36 months. The second facility will employ a recycling process called Carbon Renewal Technology, which is based on gasification. The process breaks down a wide range of mixed plastics into the basic chemical constituents of carbon monoxide and hydrogen, which in combination form a synthesis gas. The plants' costs and their locations were not revealed.

Price and product information

You can order the market report here:

<https://www.ecoprolog.com/publikationen/abfallwirtschaft/kunststoffrecycling/order-kunststoffsartierung.htm>

Price models:

- Single user copy: 4,500.- €*
- Company version: 9,000.- €*
- Corporate version: price upon request

Product information:

Single user copy: personal copy (personalised and password-protected PDF file, sent via e-mail)

Company version: company-wide copy (legal entity), sent via email

Corporate version: for different, legally connected companies (e.g. sister companies, subsidiaries abroad).
Price depends on number of companies and employees.

Subscribers of ecoprolog's waste & bio Infrastructure Monitor ([Info](#) | [Order](#)) will receive a discount of 600.- € (1,200.- € in case of a company version).

Options: Additionally, you can order all detailed information on plants and projects in MS Excel (only possible in combination with a company or corporate version). The data set contains information on more than 2,200 sorting and recycling plants, including location, operator, general contact details, input, output and capacity (if possible): 4,500.- €*

Additionally, you can order a printed copy of the study: 150.- €*

* plus 19% VAT for customers within Germany and EU customers without a VAT ID.