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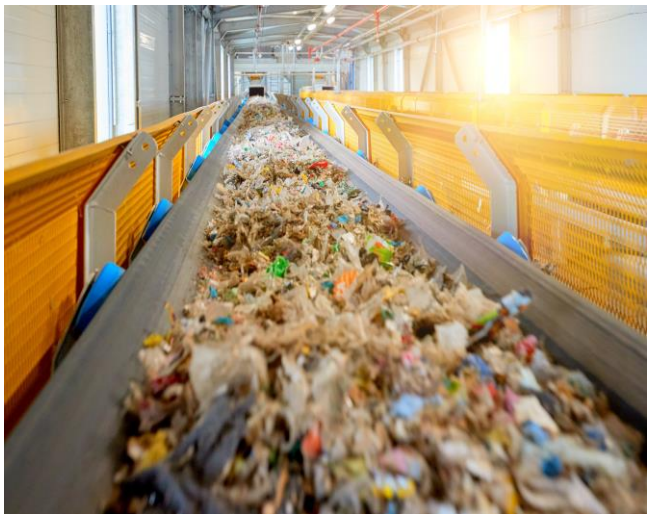

Picture credits: top left: WtE plant in Dubai, UAE, by courtesy of Hitachi Zosen Inova AG; bottom left: © mhoufotolia – stock.adobe.com; top right: © Martin Mecnarowski – stock.adobe.com; bottom right: © Goss Vitalij – stock.adobe.com.

Waste to Energy 2023/2024

Technologies, plants, projects, players and backgrounds of the global thermal waste treatment business

Extract

16th edition, 2023

ecoprog GmbH

Waste to Energy 2023/2024

The leading standard reference in the global WtE business. The 16th edition includes:

- Global market development forecast 2023–2032 on a country-by-country basis
- New constructions and extensions, capacities, shutdowns, and investment volumes
- Analysis of more than 2,700 plants and about 950 projects on a country-by-country basis
- Analysis of market factors, trends and support schemes for the world's most important markets
- Market shares of all important operators and technology providers
- Investment and operational costs and revenues with exemplary calculations
- Explanation of backgrounds, technologies and operating modes of thermal waste treatment

In addition, you will get access to waste & bio Data (WtE module) **for 1 year.**

The database contains details on all plants and projects, including capacity, status, start of operation, technology, flue gas cleaning, manufacturer, operator, and more. This also includes our weekly updated WtE Project Tracker and list of active plants.

The study is available starting from 3,300.– €*. **Please find detailed price and product information at the end of this extract.**

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Content

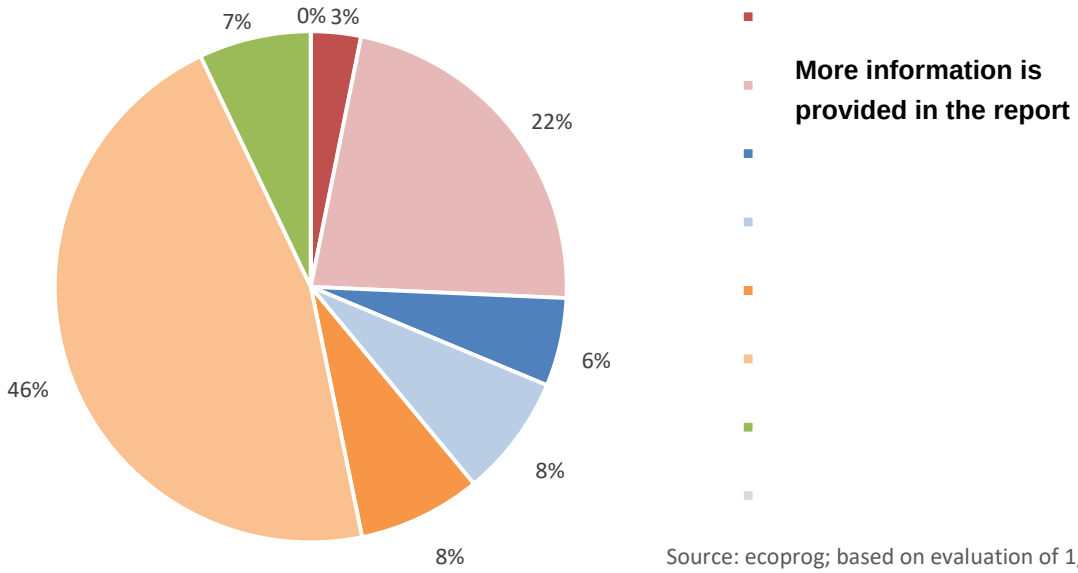
5 Technology providers: competition and market shares

The expression “WtE technology provider” usually refers to the stakeholder that owns the combustion (or gasification) technology used in a WtE facility. **[…]**

Aside from the technology provider, in many projects a so-called EPC contractor (Engineering, Procurement, Construction) is responsible for the implementation of the full project. However, the models of how to **[…]**

As of today, regarding the competition in technology provision / EPC contracting the global market is split geographically.

Figure 27: Market shares of plant manufacturers worldwide



Source: ecoprog; based on evaluation of 1,349 combustion units commissioned/awarded since 2019.

In Europe, still the 2nd largest market in the world, current technology providers of WtE technology mainly arose from medium-sized and family-run engineering firms. These developed in regions **[…]**

In the field of technology provision, as of today **[…]**

More than 20% of the European WtE capacity in the past 5 years was awarded to projects in which **[…]**

In Japan, and also to a smaller extent in South Korea, an individual WtE technology emerged. Historically, when rare space for landfilling **[…]**

Brazil

Last update: 11-2023

Inhabitants [million]	216.4	Number of waste incineration plants	-
Municipal solid waste [1,000 t]	81.8	Incineration capacity [1,000 Mg/a]	-
of which thermally treated [1,000 t]	-	Average age of incineration lines	-
Electricity from waste 2020 [GWh]	2,269	Share of total electricity production 2020 [%]	0.4
Heat from waste 2020 [TJ]	-	Share of total electricity production 2020 [%]	-

Management summary

The 2020 waste reforms are still lacking enforcement and the WtE capacity target will be clearly missed. However, we do expect more WtE projects to be developed in the years to come. A potential game changer might arise from the regulation of the carbon markets approved in October 2023 by the Senate.

Background / market factors / legal framework

Brazil is the most important economy in South America and more than 40% of the population of the market region “South & Central America” lives in this country.

The economic development during the last decade has seen ups and downs. **[…]**

In 2022, a total of 81.8 million tons of MSW has been generated in Brazil, of which 76.1 million tons were collected. This is a major increase compared to 2020, when MSW was estimated at 66.6 million, according to the Ministry for Regional Development (SNIS). **[…]**

The targets include institution building, the reduction of landfilling and more recycling and organic treatment. By 2040, all municipalities should introduce waste fees and develop integrated waste management plans.

Moreover, all inhabitants should be connected to waste collection and 70% should have access to separate waste collection. The recycling quota (without organics) should grow to 20% and 45% of all packaging materials should be recovered. In the future, the *Planares* should be updated every 4 years. **[…]**

More information is provided in the report

Figure 265: WtE target in Brazil’s national waste management plan

	2020	2024	2028	2032	2036	2040
Capacity (MWel)	0	311	462	626	804	994

According to the *Planares*, until 2040, WtE facilities with a power production capacity of 994 MWel should be installed, with 311 MW by 2024. This target will clearly be missed **[…]**

Plants

There are currently no active waste incineration plants in Brazil.

Some very old plants that were installed by Swiss manufacturer Von Roll in the 1950s and 1960s, were closed years ago. **[…]**

In cement kilns, too, pre-treated waste is combusted. For example, Brazilian company Votorantim Cimentos is co-incinerating alternative fuels at 14 of its plants **[…]**

More information is provided in the report

Market development

According to our data, we know of **X** projects, with **X** having obtained environmental permits.

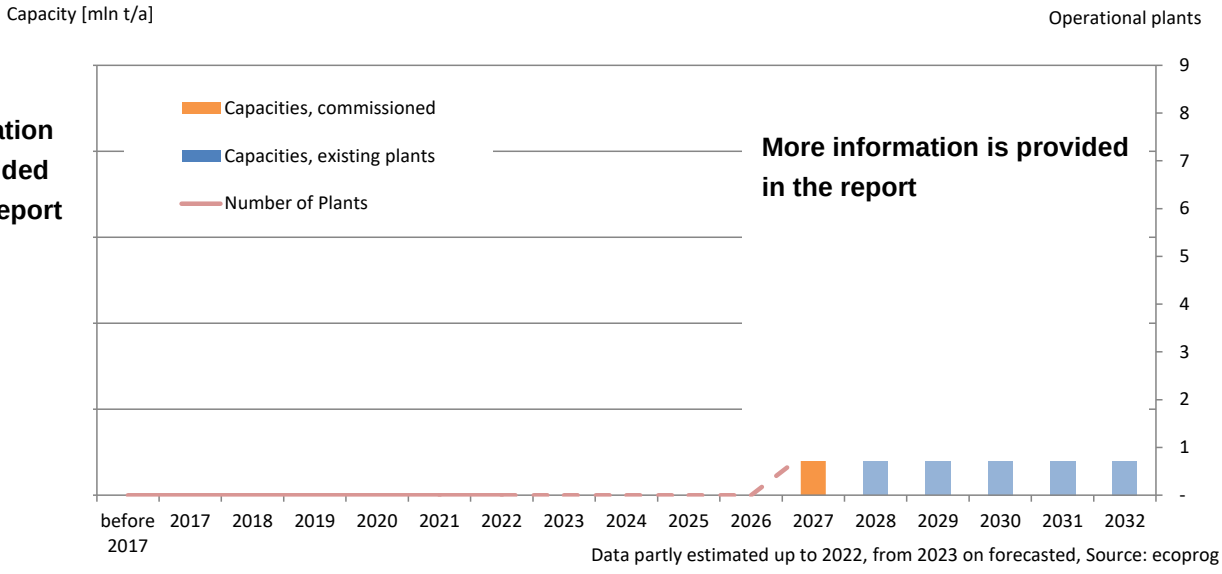
Of these projects, **X** are being discussed in the southern state of Rio Grande do Sul **[…]**

A total of **X** projects can be allocated to **[…]**

More information is provided in the report

Figure 266: Development of plants and capacities in Brazil

More information is provided in the report



One main risk of the Brazilian WtE market is still the country's unstable political situation. In the past, this led to concerns that the newly elected administration might repeal (at least parts) of the legal and regulatory framework for WtE implemented under the Bolsonaro administration. However, the current government **[…]**

Competition

The **X** current projects in Brazil **[…]**

Apart from the stakeholders in these projects, petrochemical company Braskem and waste management company Foz do Brasil also announced WtE projects in the past.

As in other developing WtE markets, project implementation remains difficult. One reason for this is the high cost pressure. **[…]**

More information is provided in the report

For most projects, no technology suppliers have been chosen so far.

As there is no doubt that the WtE market in Brazil has great potential in the years to come, we expect every larger technology supplier to make efforts to establish a local subsidiary if this has not been done already.

Figure 267: Project outlook Brazil

#	Project	Unit / plant*	Capacity (t/a)	Start	Status
1	Barueri	plant	317,550	2027	under construction
2	Brasília	plant	547,500	n/a	planned
3	Mauá	plant	1,095,000	n/a	planned
4	Nova Odessa	plant	255,500	n/a	planned
5	**More information is provided in the report**				
6					
7					
8					
9					
10					
[…]	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**

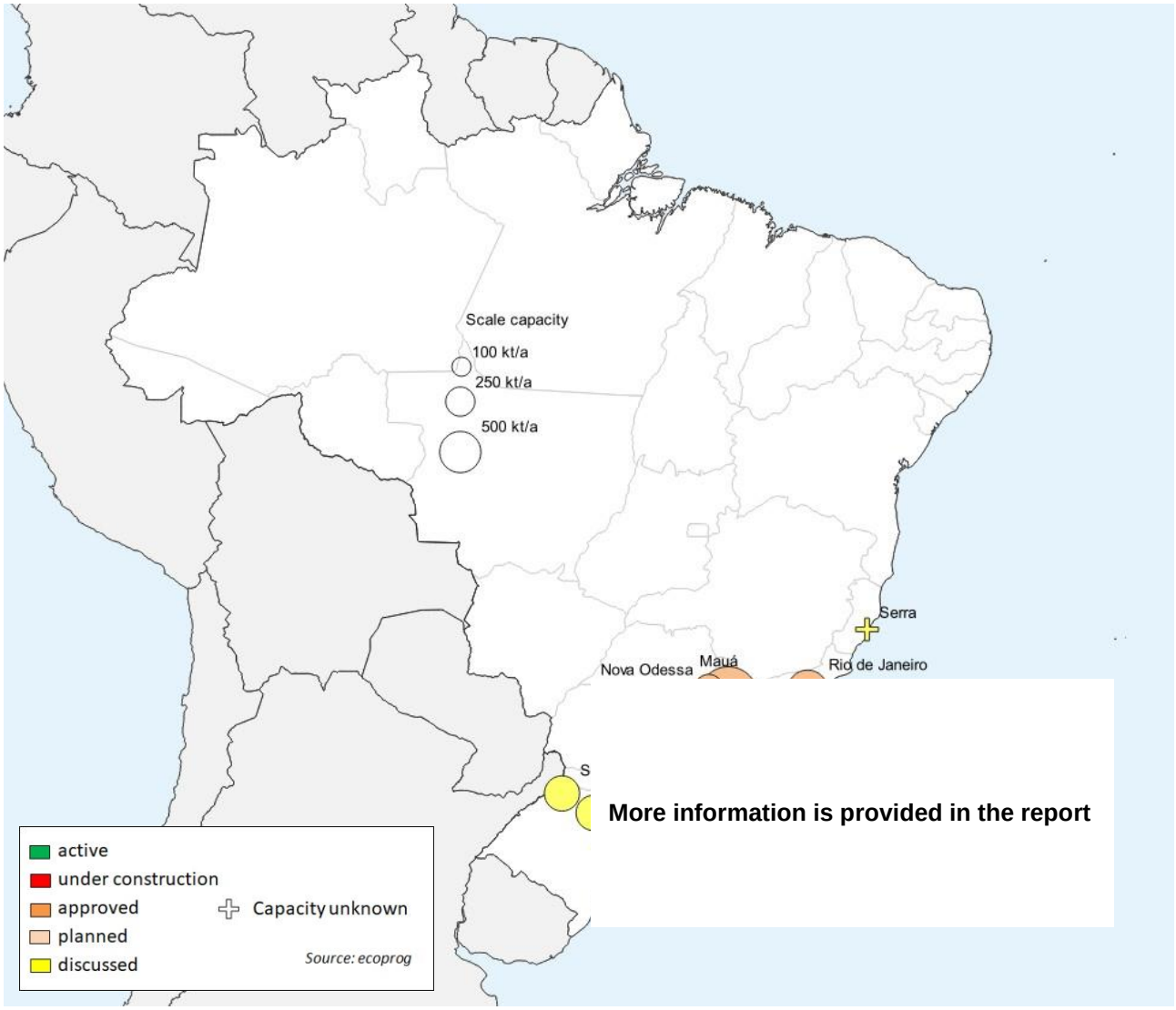
As of November 2023

** "Plant" refers to a completely new facility, while "unit" refers to a new unit to be installed at an existing plant.*
Details for all plants and projects and weekly updates are provided in our database waste & bio Data to which you have access.

In our outlook, we expect **[…]**

More information is provided in the report

Figure 268: Locations of plants and projects in Brazil

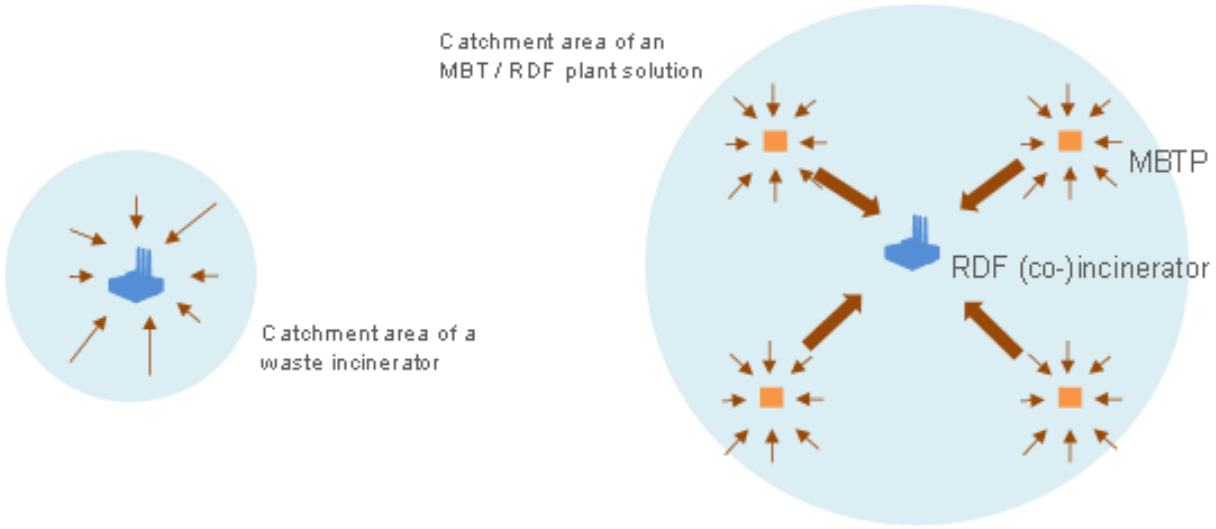


Active Plants

You can find further details for all plants, such as technical equipment, manufacturer, or address for 12 months at www.ecoprog.com. The database is updated weekly.

#	Name	Operator	Start	Capacity [t/a]	Units
1	Bangkok Nong Khaem C&G	C&G Environmental Protection (Thailand) Co., Ltd.	2016	182,500	2
2	Chonburi	Chonburi Clean Energy	2019	100,000	1
3	Hat Yai	GiDEC Co., Ltd	2014	96,000	1
4	Kaeng Khoi 2 RDF	TPI Polene Power Company Limited	2015	n/a	1
5	Kaeng Khoi RDF	TPI Polene Power Company Limited	n/a	n/a	1
6	Khon Kaen	Alliance Clean Power Co., Ltd.	2018	144,000	1
7	Krabi	Alliance Clean Power Co., Ltd.	2020	182,500	1
9	Mueang Nong Khai District RDF	Nongkhainayu Co., Ltd.	2022	118,400	1
10					
11	**More information is provided in the report**				
12					
13					
[…]	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**

Figure 298: Catchment area of waste incinerator and RDF plant



Source: ecoprog

In recent years, however, the political discussion of “WtE vs. MBT” has eased off, even in Europe. This is especially a result of the so-called “output criterion” and the landfill target of 10% for municipal waste until 2035. This drastically limits the possibility of a pre-sorting with subsequent landfilling. **[…]**

This is a challenge, especially for countries where MBT facilities have been introduced as a primary infrastructure for the treatment of mixed household waste (e.g. Italy, Spain, Poland, and Hungary). After building up an MBT infrastructure **[…]**

Finally spoken, MBT plants and similar sorting and organic treatment facilities can reduce the amount of waste that is thermally treated. However, as these facilities **[…]**

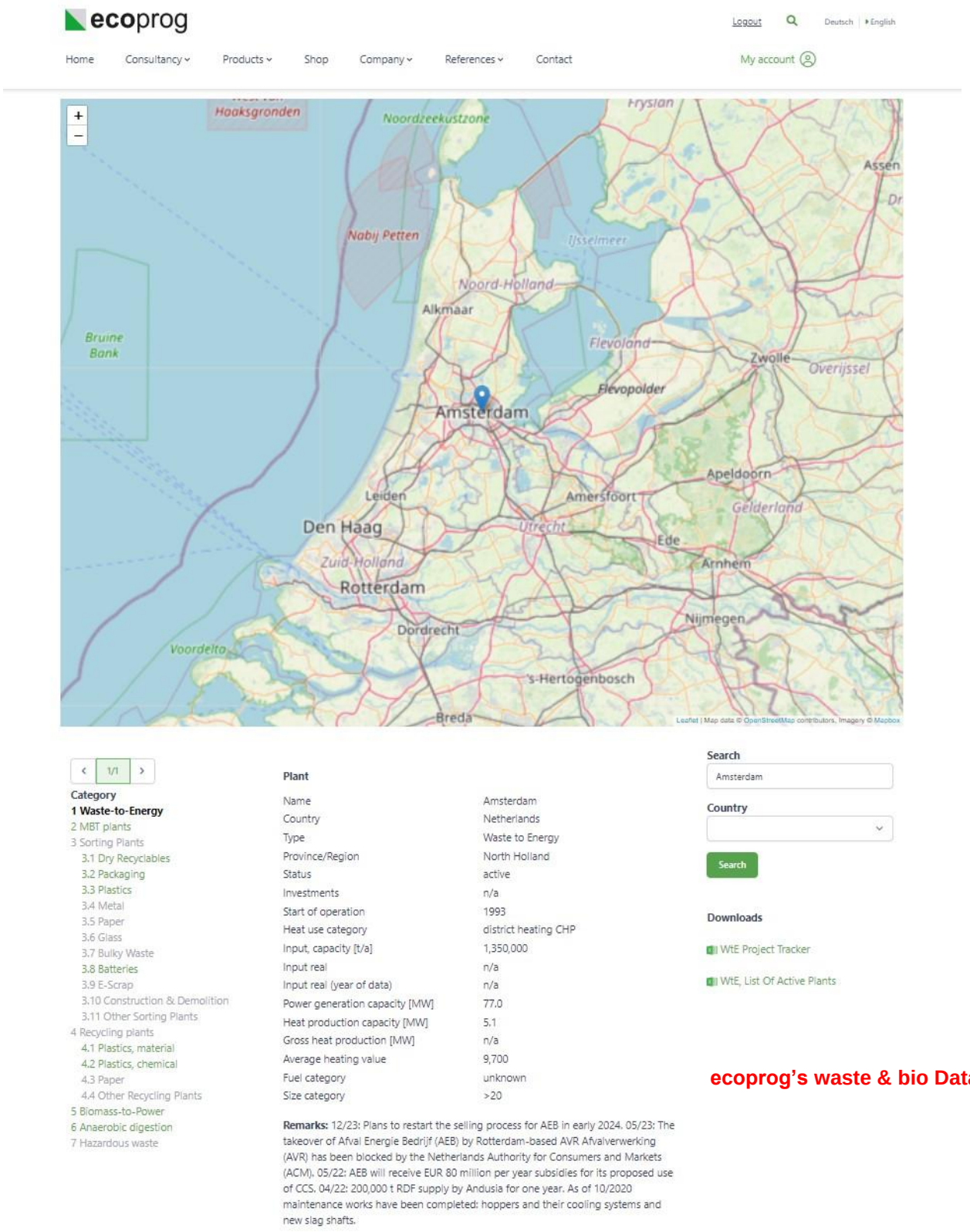
Chemical recycling

Another approach to recycling that is currently being explored is chemical recycling, which is discussed as an alternative or addition to the mechanical recycling of plastic waste.

Chemical recycling uses dissolution, depolymerisation, and conversion as new recycling routes to transform plastic waste into secondary raw materials that can be used to produce new chemicals and plastics. As of now, **[…]**

One hope associated with chemical recycling is that it might allow to recycle plastic in “dirty” waste streams that include many impurities. By doing so, for some waste streams, **[…]**

More information is provided in the report



ecoprog's waste & bio Data

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This also includes our weekly updated WtE Project Tracker and the list of currently active plants in MS Excel.

Price and product information

You can order the market report on ecoprog.com

Pricing model: One-time purchase

- Single-user version: 4,200.– €*
- Company version: 8,400.– €*
- Corporate version: Price on request

Product information:

Single-user copy: personal copy (personalised and password-protected PDF file)

Company version: company-wide copy (legal entity), PDF file

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

Includes 12-month access to **waste & bio Data** (WtE module) with WtE Project Tracker + list of active plants

Subscribers to our weekly published waste & bio Infrastructure Monitor will receive a discount of 600.- € (1,200.- € discount in case of a company version of the report).

Pricing model: WtE Package (subscription)

- Single-user version: 3,300.– €* per year
- Company version: 6,600.– €* per year
- Corporate version: Price on request

The WtE Package includes:

a. Market study “Waste to Energy”, updated annually
b. w&b Monitor (sent weekly) plus access to the w&b online archive with more than 54,000 news items
c. Access to waste & bio Data (WtE module) and WtE Project Tracker + list of active plants

The minimum subscription period is 2 years. The subscription will be renewed for another year if it is not cancelled at least 4 weeks before the expiration date.

Options (for both pricing models): Additionally, on a one-off basis, you can order all data on plants and projects in MS Excel (only in combination with a company or corporate version): 4,200.– €*

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.