ecoprog

Extract

Picture credits: right: Yellow Boat-stock.adobe.com; top left: luchschenF-stock.adobe.com; bottom left: nordroden-stock.adobe.com

Market Report Chemical Recycling 2024

Plants & Projects - Technologies - Players - Trends

3rd revised edition, April 2024

ecoprog GmbH

Market Report Chemical Recycling 2024

Chemical recycling is a major hope for the future of plastics recycling, potentially offering the production of high quality recyclates, fighting downcycling and enabling the recycling of additional waste streams. The technology could be the key to complying to stricter rules in the circular economy such as the EU`s Packaging and Packaging Waste Regulation (PPWR) recyclate quotas. Chemical recycling therefore has the potential to impact plastic production worldwide.

However, so far, the market environment for this technology remains unclear. Most countries lack dedicated regulations for chemical recycling; as a result, the overall recognition and recycling performance that can be considered are unknown. Within regulation discussions chemical recycling is often opposed due to its high energy demand and CO_2 footprint.

Against this background, chemical firms, waste disposers and start-ups started to plan and construct chemical recycling facilities, offering different technologies for different kinds of plastics, waste streams and recycling products.

Based on its long-time monitoring of the global waste business and its expert network within waste management, ecoprog edited its 3rd annual survey on the dynamic chemical recycling business.

The Market Report Chemical Recycling 2024 includes:

- A description of the technologies and implementation of chemical recycling.
- An analysis of key factors and trends in the global plastic production and recycling market with regard to chemical recycling.
- A detailed analysis of single country markets.
- An account of more than 150 chemical recycling plants and projects worldwide, including capacities, inputs and technologies (as far as known).
- An outlook in terms of their market regions and an analysis of the key competitors in this market.

  In addition, you will get access to w&b Data (Chemical recycling module) **for 1 year.**

  The database contains information on all plants and projects, including capacity, status, start of operation, technology, and more. This also includes a weekly updated project tracker and a list of active plants.

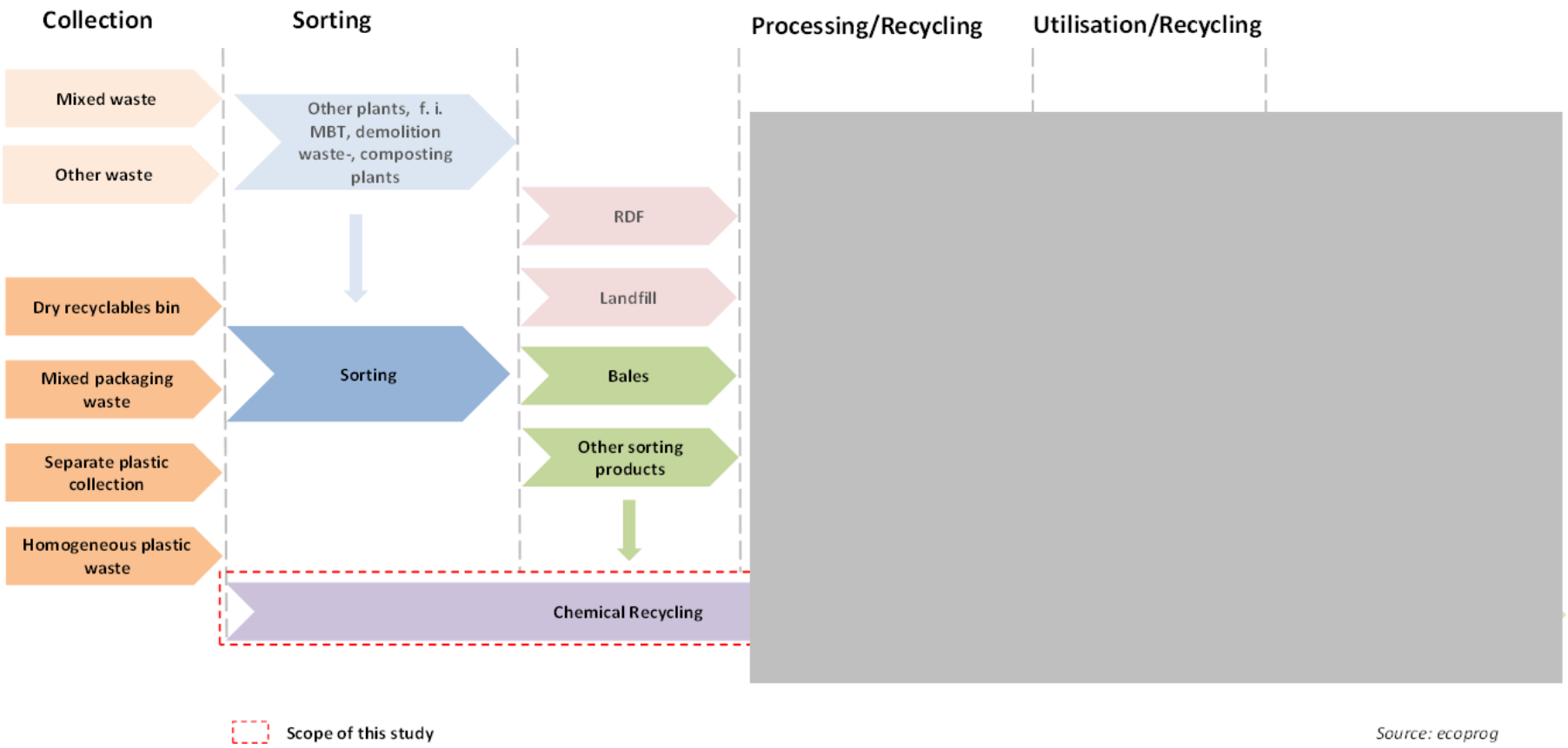
The study is available **at a price from 3,400.– € plus VAT.** Subscribers of our waste & bio Infrastructure Monitor will receive a discount of at least 600.– €. **Please find detailed price and product information at the end of this extract.**

Contact:
Jonas Havel
ecoprog GmbH
+49 221 788 03 88 16
j.havel@ecoprog.com

Content

List of figures

Figure 3: Value chain of plastic recycling, overview



Dissolution is also a solvent-based technology, but the polymer is not broken down into its building units. The treated plastic waste is dissolved in the suitable solvent, while the additional components of the plastic waste, which need to be removed from the stream to reach virgin quality, remain undissolved and can subsequently be filtered out and therefore separated from the targeted polymer. These can include additives, pigments and other polymers. This process is rather a physical recycling process than a chemical one, as the polymer remains intact.

Figure 9: Chemical recycling technologies

Technology	Targeted Polymers	Characteristics
Pyrolysis	Polyolefin rich plastic waste streams (PE/PP)	+ Can treat mixed and hard-to-recycle plastic streams - [redacted]
Gasification	[redacted]	- [redacted] - [redacted] - [redacted] - [redacted]
Solvolysis	[redacted]	- [redacted]
Dissolution	[redacted]	- [redacted]
Enzymolysis	[redacted]	- [redacted]

The main targeted polymer so far is PP, but also further types such as PS or PC can be treated.

Australia

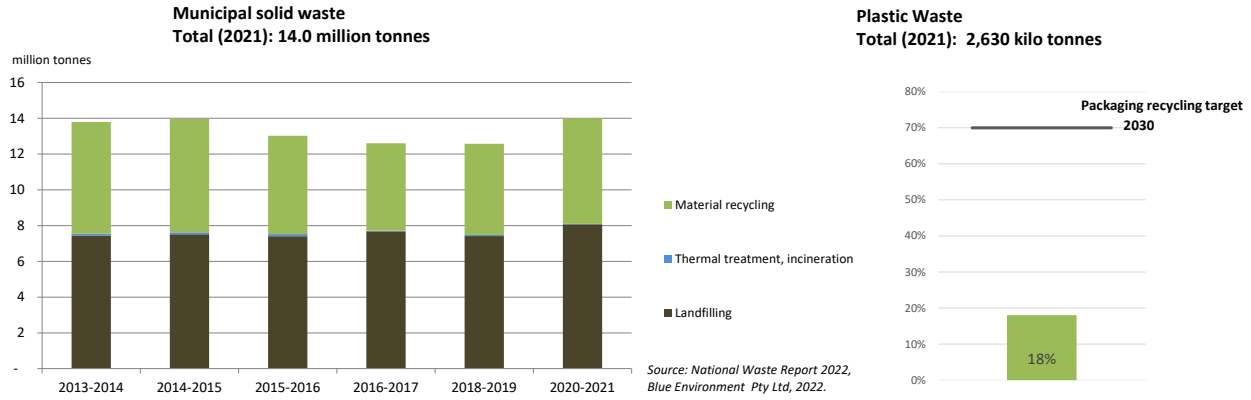
Inhabitants [million]	25.69	Municipal waste [1,000 t/a]	14,000
Total plastic waste [1,000 t/a]	2,630	Current MSW recycling rate [%]	42%
Number of plants	2	Number of projects	3

Management Summary

Australia still heavily relies on landfilling, also for its plastic waste, and is far from reaching its recycling targets. Next to one operational small-scale plant, there are 2 projects aiming at commercial operation, one of them being an enzymolysis project.

Waste Management

Figure 61: Waste management by operation in Australia



For its waste management, Australia relies heavily on landfilling. According to the latest data, in the 2020-2021 period, more than 57% of MSW were landfilled, while about 42% were recycled – thermal treatment of waste does not play a role in Australia.

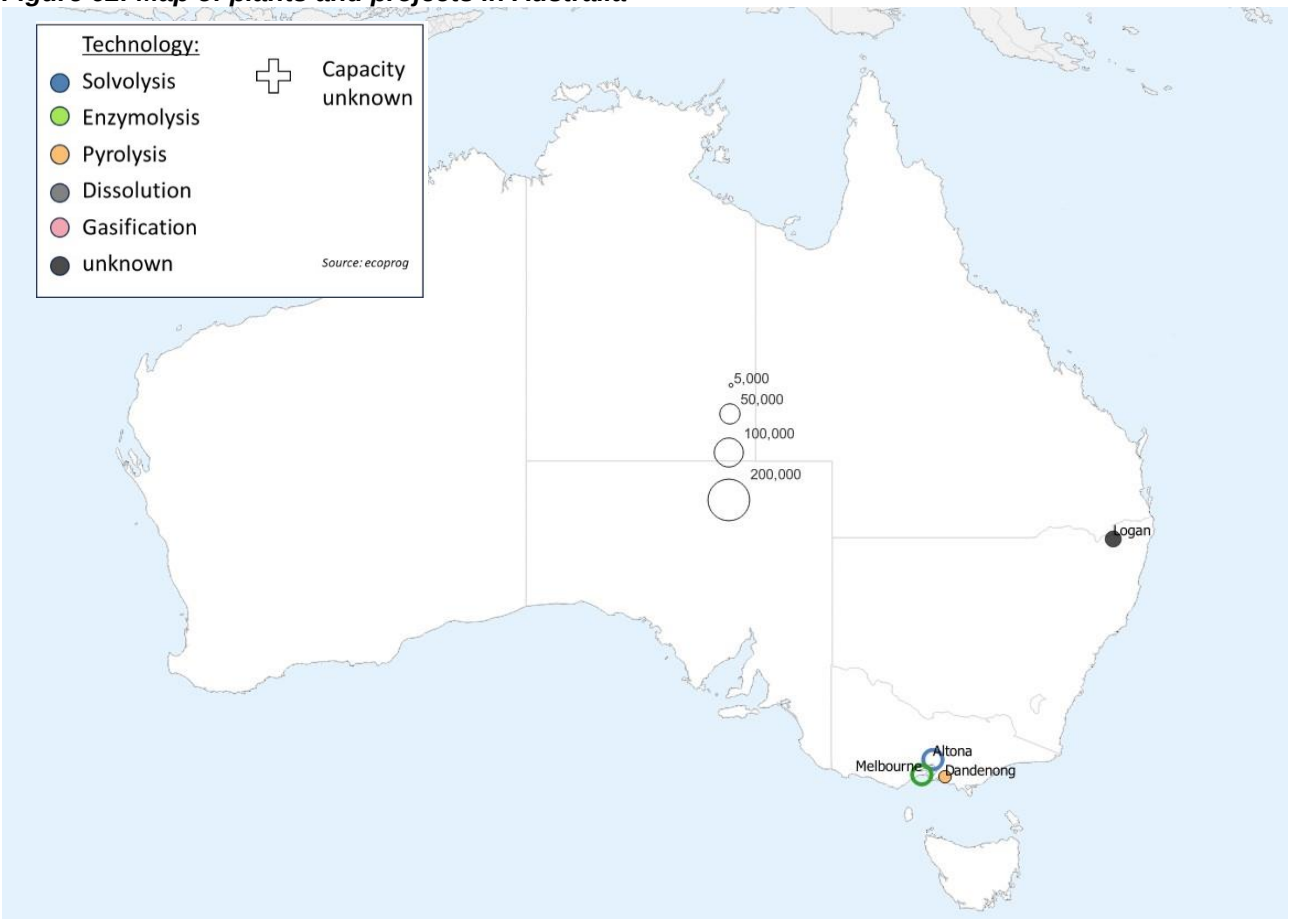
In 2019, Australia issued the National Waste Policy Action Plan, which sets the targets to reduce waste amounts per capita by 10% and reach an 80% recycling rate of MSW until 2030.

Regarding recycling of waste, the Chinese waste import ban in 2018 was a turning point in Australia. Australia used to ship large parts of its recyclables to China. Consequently, the development of recycling targets became a short-term target. Under the Recycling Waste and Reduction Act 2020, Australia in turn agreed on an export ban on different recyclable waste streams, including plastics.

For 2025, Australia has set the target to recycle (or compost) 70% of its plastic packaging. For the 2020-2021 period, the overall recycling rate for all types of plastic waste was only 18%, while the rest was landfilled. The total amount of plastic waste generated was 2.63 million tonnes, with about half of it coming from the Construction and Demolition waste stream.

In general, recyclables including plastic waste are collected through kerbside collection in a dry recyclables bin. However, soft plastics are not collected through that bin, but there are programs such as supermarket drop-offs for that type of plastic waste. The local governments are responsible for the waste collection services.

Figure 62: Map of plants and projects in Australia



Plants

As of February 2024, there is one operational small-scale plant in Australia. Most likely, there are additional lab or pilot-scale plants which are not listed here.

Australian recycling company APR Plastics has installed a 365 t/a modular pyrolysis plant by German technology provider Biofabrik. Through its sister company APR Kerbside, the company is also involved in the collection of plastics.

Furthermore, Australian textile recycling company Blocktexx is operating its textile waste recycling plant in Logan. The company claims to use a chemical process to separate different fibres, i.e.

cotton and polyester, in a chemical process while they are mechanically recycled afterwards. Therefore, Blocktexx is not considered a chemical recycling company in the sense of this study.

Figure 63: Chemical recycling plants and projects in Australia

Name	Plant / project	Operators / Partners	Start	Capacity (tpy)	Input / Output	Technology	Scale	Status
Dandenong	plant	APR Plastics	2022	365	mixed PC plastics to oil	Pyrolysis	Commercial	active
Logan	plant	BlockTexx	2024	10,000	other single streams to unknown	Unknown	Commercial	active
Altona	project	Licella	2024	20,000	mixed PC plastics to oil	Solvolysis	Commercial	approved
Melbourne	project	Samsara Eco	n/a	20,000	single PC plastics to (intermediate) chemical product	Enzymolysis	Commercial	planned

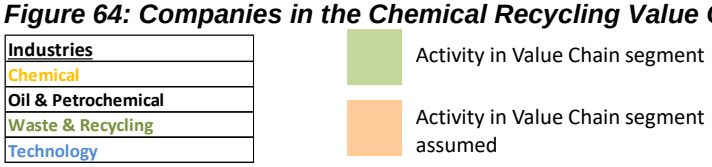
Projects

As of February 2024, we know of 2 ongoing projects in Australia.

In Altona, near Melbourne, Australian technology company Licella Holdings plans to build a chemical recycling facility based on its catalytic hydrothermal reactor technology. Licella is founded by the inventor of this technology, while British company Mura Technology is a licensee of the technology platform. In October 2023, packaging producer Amcor as well as food company Mondelez have invested an undisclosed amount in Licella to realise the construction of the facility, which could be scaled up to a capacity of 120,000 t/a in the future. Already in December 2022, Licella received the development approval from the Environmental Protection Agency Victoria. Considering these factors, realisation of this project is highly likely.

Additionally, Australian technology company Samsara Eco plans to build a 20,000 t/a enzymolysis facility in Melbourne (only Carbios in France is also planning to apply enzymolysis technology). In November 2022, the company announced it had collected AUD 54 million (EUR 32.6 million, exchange rate as of February 2024) from different investors for the construction of the facility.

Figure 64: Companies in the Chemical Recycling Value Chain in Australia



Company	Project development	Feedstock provision	Technology	Upgrading	Output purchaser / processor	Plants / Projects
Licella Holdings	■		■	■		Altona
APR Plastics	■	■			■	Dandenong
Samsara Eco	■		■	■		Melbourne
Amcor					■	Altona
Biofabrik			■	■		Dandenong

Details on plants and projects

Note: This is just a snapshot. This data is continuously updated and accessible online at www.ecoprog.com. Customers of this report have access to this online data and downloads for 12 months.

Altona, Australia

Status: approved
Input capacity (t/a): 20.000
Start of operation: 2024
Input: Packaging and plastic waste
Output: Oil (Plasti-crude) and gas
Operator: Licella
Technology: solvolysis
Technology provider: Licella
Remarks: 08/23: Swiss packaging company Amcor Limited and US-based food company Mondelez International, Inc. have signed investment agreements on the plant. It is to initially process up to 20,000 tpy of waste and is expected to be scaled up to 70,000 tpy. A chemical recycling facility is being planned, with backing from producers like Amcor, Coles, iQ Renew, LyondellBasell and Nestlé. (…)

Dandenong, Australia

Status: active
Input capacity (t/a): 365
Start of operation: 2024
Input: waste plastics
Output: oil
Operator: APR Plastics
Technology: pyrolysis

Technology provider: Biofabrik Group.

Remarks: The unit supplied (WASTX P1000) by German company Biofabrik Group will implement pyrolysis to process LDPE, HDPE, and PP wastes. APR Plastics has installed the unit in its Dandenong South facility, Victoria. The company is planning to further upgrade and purchase new units from 2023 onwards.

Logan, Australia

Status: active
Input capacity (t/a): 10.000
Start of operation: 2024

Input: textile waste

Operator: BlockTexx
Investment: EUR 3.5 million

Technology: unknown.
Remarks: The chemical recycling plant should start operations within three years. The Queensland and the Federal Government each provided AUD 1 million, while the remaining AUD 3.5 million were raised from private investors.The company developed its process in partnership with the Queensland University of Technology. Blocktexx, as the source further indicates, has already started works on the project.

Melbourne, Australia

Status: planned
Input capacity (t/a): 20.000

Input: waste plastics
Output: monomers

Operator: Samsara Eco
Investment: AUD 6 million

Technology: solvolysis
Technology provider: Samsara.

Remarks: With their own developed enzyme-based technology, the start-up will be able to process plastic materials back into their monomers, which can later be upcycled. Samsara had raised AUD 6 million (EUR 4.06 million) for the construction of the facility from investors.

Parkes, Australia

Status: planned
Input capacity (t/a): 200.000
Start of operation: 2025

Input: waste plastics
Output: renewable fuels and wax

Operator: Brightmark
Investment: EUR 172.4 million

Technology: pyrolysis
Technology provider: Brightmark
Remarks: To be constructed in the Parkes Special Activation Precinct. Brightmark will use a thermo-chemical recycling technology to recycle plastics.

Prices and product information

You can order the study at ecoprog.com

Prices:

- Single-user version, 3,400.– €*
- Company version, 6,800.– €*
- Corporate version, price on request

Product information:

Single-user version:	Personal copy (personalised and password-protected PDF file, sent via email).
Company version:	Company-wide copy (legal entity), PDF file, sent via email.
Corporate version:	Copies for different, but legally connected companies (e.g. sister companies, investments abroad). The price depends on the number of companies and persons.

Add-on:

Includes 12-month free access to waste & bio Data (Chemical recycling module) with Excel downloads of Project Tracker + List of Active Plants.

Subscribers of ecoprog's waste & bio Infrastructure Monitor will receive a discount of 600.– € (1,200.– € for company versions).

Options:

Additionally, you can order all detailed information on plants and projects in MS Excel (only in combination with a company or corporate version): 3,400.– €*

Additionally, you can order a printed copy: 150.– €*

Find all our prices at a glance, including all discounts here.

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

ecoprog GmbH ● Krefelder Str. 18 ● 50670 Cologne, Germany ● +49 221 788 03 88 0 ● District Court Cologne, # HRB 56660 ● VAT ID: DE814576618 ● info@ecoprog.com ● www.ecoprog.com