



*Picture credits: left: AD plant in Middlesborough, United Kingdom © Bioconstruct New Energy Ltd.; top right: biowaste © Bildagentur PantherMedia / lightsource; bottom right: dry digestate © Hitachi Zosen Inova AG.*

# Market Study Biowaste AD in Europe

Plants – Projects – Players – Trends

**Extract**

**April 2022**

ecoprolog GmbH

## Market Study Biowaste AD in Europe

As current main drivers on the market, the EU legislation on waste and renewable energies have created a new boom of the fermentation of biowaste in Europe. EU waste legislation provides for the introduction of mandatory separate collection for biowaste in the EU from 2024.

Simultaneously, according to the 2018 amendment of the EU Waste Framework Directive, at least 55% of municipal waste must be recycled by 2025. This target increases to 60% by 2030 and 65% by 2035. The expansion of organic household waste collection is one of the most important instruments for implementing recycling targets in practically all EU countries.

The second important driver is EU policy and the expansion of renewable energies, with biomethane playing a vital role. While biogas is conventionally used to generate electricity, the importance of biomethane as a fuel and on the heating market has increased in recent years. Unlike in the electricity market, alternatives to fossil sources for fuel are limited, which had already been proven true before new changes in the political landscape resulting from the war of aggression in Ukraine.

In light of these developments, ecoprolog has decided to update its biowaste study from 2014.

### The „Market Study Biowaste AD in Europe“ contains:

- A detailed analysis of all major political, economic, operational and technical trends in the construction and operation of biowaste AD plants.
- An overview of cost and revenue structures of biowaste AD plants.
- A country-specific estimate of the addition of biowaste AD capacities in the municipal market up to and including 2030 based on a transparent and comprehensible methodology.
- A competitive analysis at the level of operators and technology providers/EPC contractors in the European biowaste AD market.
- A representation of more than active 950 biowaste AD plants and a project list of more than 250 new projects, of which more than 40 are under construction and more than 200 are planned or under discussion.
- **In addition, purchasers of the study will get 12-month access to our [Biogas database](#).** Find detailed data on all biowaste AD plants and projects (as far as known), for example in terms of input capacity, energy generation capacity, operators or equipment suppliers.
- Our weekly updated database [waste & bio Data](#) (biogas module) contains information on more than 8,400 biogas plants and more than 1,700 biogas projects worldwide, including Excel downloads of active plants and the biogas project tracker.

The study is available starting at 4,200.- € plus VAT. Clients of our waste & bio Infrastructure Monitor receive a discount starting at 600.- €. **Please find detailed price and product information at the end of this extract.**

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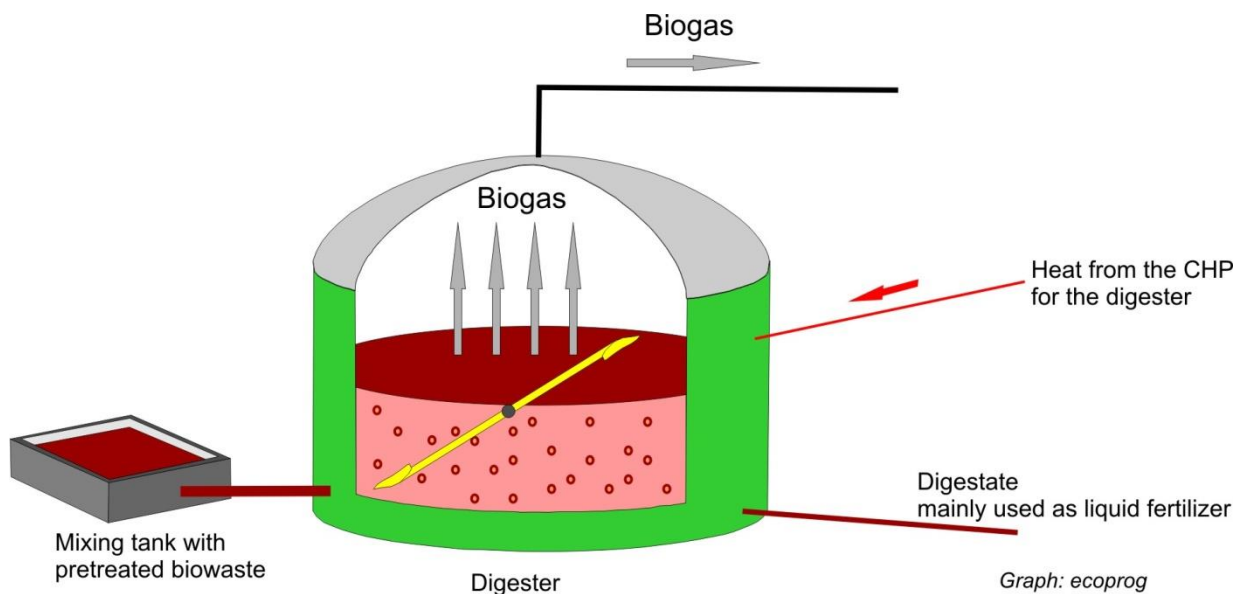
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desired temperature. Both the isolation and the heating system is installed in the fermenter's walls and, partly, in its pipe systems.

Depending on the type of biomass, different types of fermenters work better or worse for a smooth use. Fermenters can mainly be differentiated by the mixing degree of the fermentation material. Solid state fermentation technologies with a low mixing degree work best for fermenting biowaste. Wet fermentation, which is very common in the agricultural sector and has a high mixing degree, only works with an extensive pretreatment or by blending the heterogenic biowaste.

We will present the four most common types of fermenters for fermenting biowaste in the following:

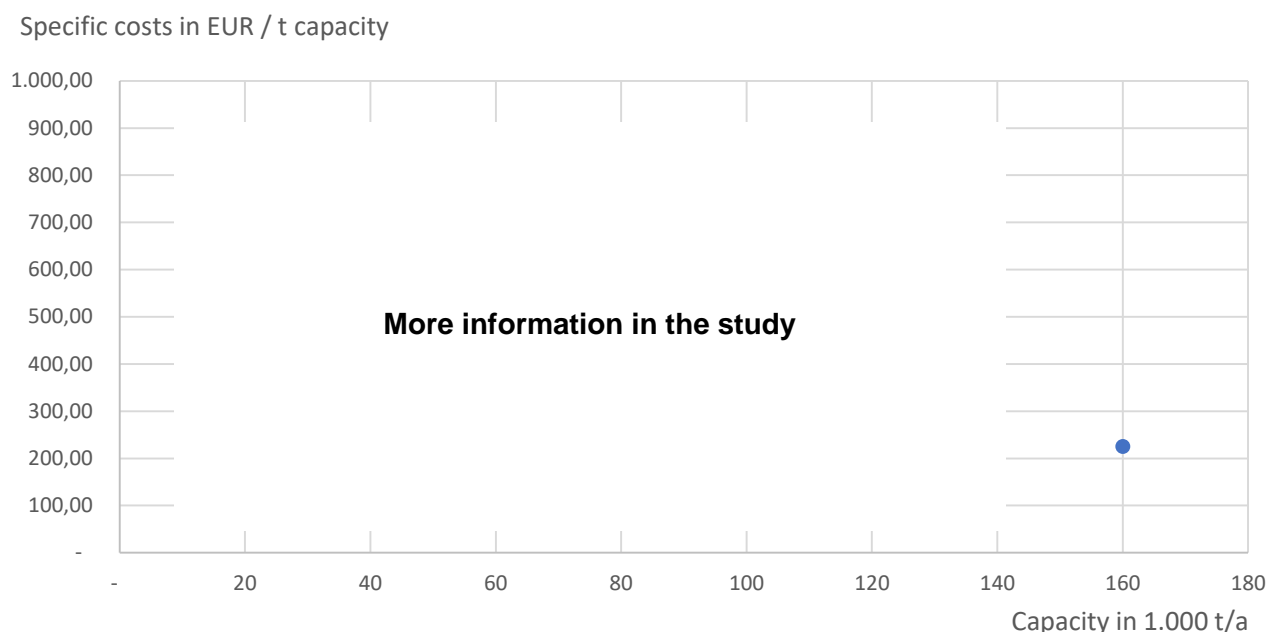
**Figure 1: Cylindrical digester**



### Cylindrical fermenter (CSTR)

Biogas plants with a cylindrical fermenter using a continuous stirred-tank reactor (CSTR) are the most common. This fermenter works especially well for fermenting mainly wet substrates. A stirrer mixes the fermentation material completely. When using biowaste, which is a heterogeneous substrate, this can result in problems. The biowaste therefore has to be pretreated extensively and homogenised before it can be pumped into the fermenter as a fermentation material. In many cases, the biowaste is mixed with other, oftentimes more liquid, substrates in order to make the material pumpable and mixable.

**Abbildung 12: Evaluation of investment costs**



However, the costs do not only depend on the size of a plant, but also on the country a plant is located in. The average costs in Germany, where composting of the digestate is mandatory, amount to between EUR 600 and EUR 700/t. In France, on the other hand, most of the (few) cost examples are between EUR 300 and EUR 400/t.

In principle, costs can be expected to increase further in the future. This is not only due to the general increase in raw material and material prices since 2020, but also to standards that continue to increase. In Germany, for example, the TA Luft and the Bio-waste Ordinance have resulted in increased standards for exhaust air purification and pre-sorting. In the future, costs of up to EUR 1,000/t cannot be excluded.

**Abbildung 13: Examples of investment costs of biowaste AD plants**

Name	Country	Status	Capacity, kt	Start	Biogas/ Biomethane	Invest, EUR/t
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	<b>More information in the study</b>			...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...

Source: various, mainly press releases

## 1.1 Estonia

Population [million]	1.33	Number of plants	2
Total biowaste [thousand t]	n/a	Fermentation capacity [thousand t]	80
Biowaste per inhabitant [kg/inhab.]	n/a	Power generation capacity [MWel]	1
Max. biogas remuneration [EUR/MWhe]	53.70	Average age	12

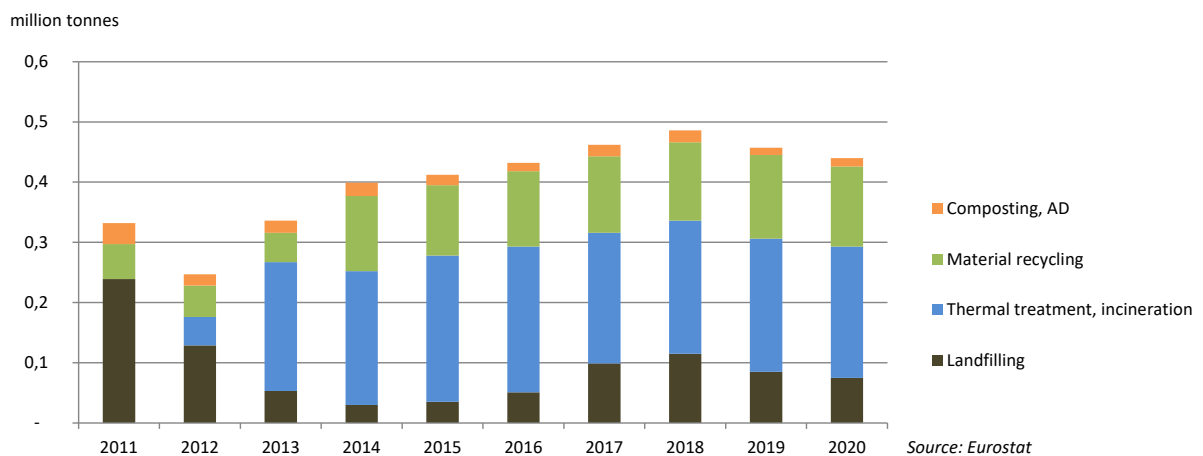
### Management summary

As an alternative to landfilling, incineration has increased in recent years in Estonia. Estonia has a large WtE and three MBT plants, and therefore high capacities for the treatment of municipal waste. Today, separately collected biowaste from households mainly goes to composting; two biowaste AD plants are under construction and in the planning phase, respectively.

### Background waste management

In Estonia, the municipalities are responsible for organising the municipal waste collection, which is then carried out by private waste disposal companies. The kerbside collection of biowaste is especially well-organised in urban areas, where the biowaste is mostly collected from several blocks of houses.

**Figure 126: Disposal of municipal waste in Estonia**



According to the European Commission's Environmental Implementation Review 2019, separate collection is not efficient in Estonia. The kerbside collection of municipal waste has not been implemented consistently enough, says the report. Furthermore, even though there was an obligation to collect food waste separately, many exceptions existed.

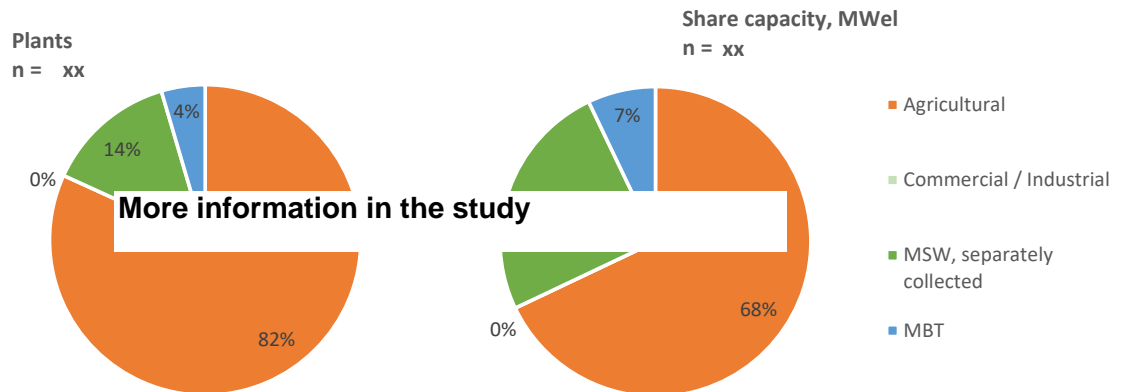
(...)



Plants

According to our data, **XX** biogas plants were active in Ireland in early 2021. **XX** of them mainly accept biowaste and **XX** of those process separately collected biowaste from households. One of these biowaste AD plants treats sewage sludge as well. The fourth plant mainly handles MBT waste and smaller amounts of separately collected household biowaste.

**Figure 126: Existing biogas plants in Ireland**



Source: ecoprog, missing data and data for biomethane plants were interpolated

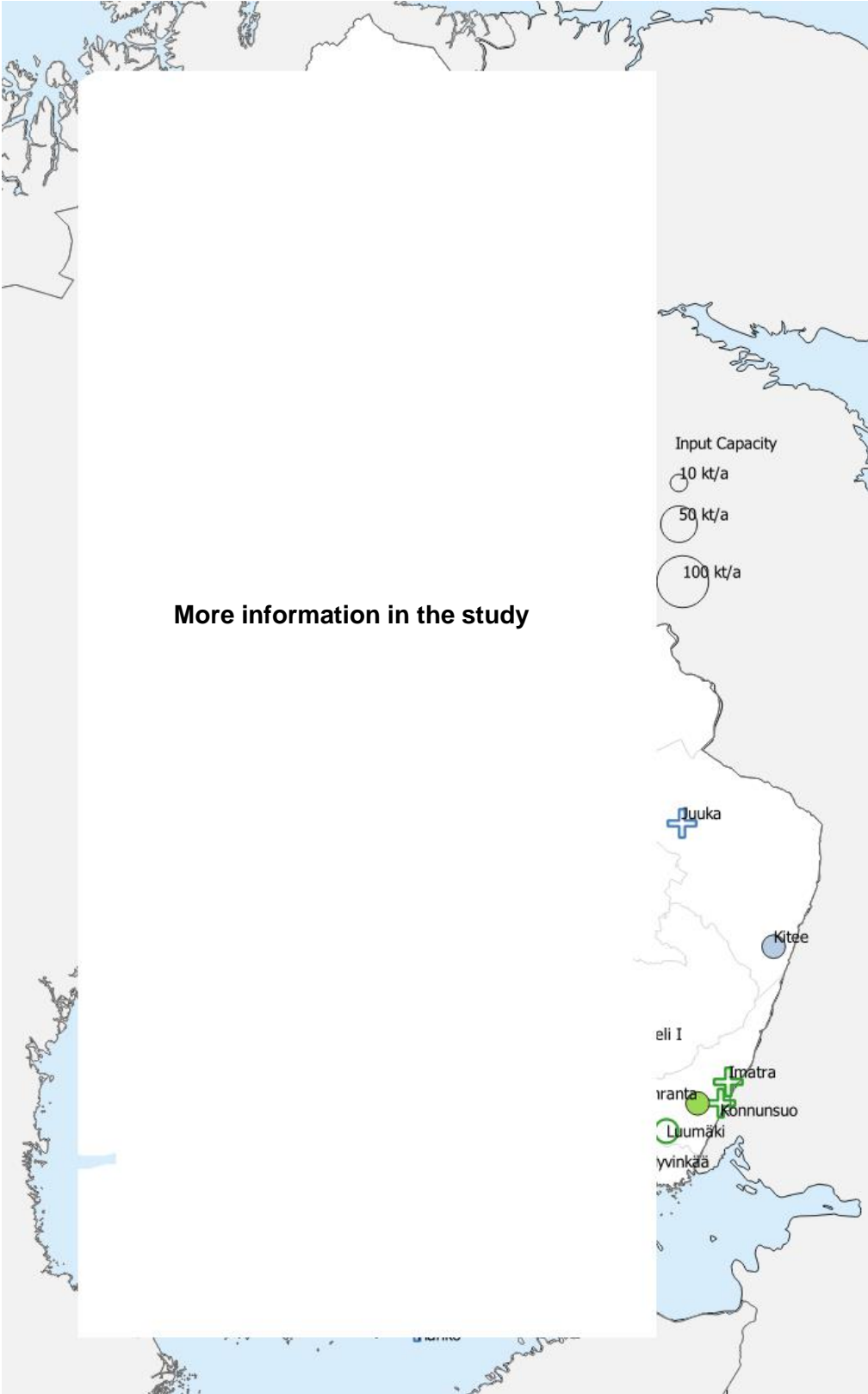
The oldest of the four plants went into operation in 2012 and is located in **XXXX**. It co-ferments MBT residues. The other three plants went into operation between 2017 and 2019. The plant in **XXXX** has a total capacity of **XX** kt/a, approximately **XX** kt/a comes of which from an MBT plant and **XX** kt/a are separately collected biowaste, and is therefore similar in size to the **XXXX** plant, which also has a capacity of around **XX** kt/a. We are not aware of the capacities of the other two plants. All plants have estimated electrical outputs between **XX** and **XX** MWel. The **XXXX** plant also produces biomethane.

Market development

Since 2017, activities on the market for biowaste AD plants have been increasing. **XX** plants were commissioned in the past 3 years, mainly because of the increasing implementation of the separate collection of biowaste in recent years. Another major project, an **XX** kt/a biomethane plant, is currently being developed (as of October 2021) in **XXXX**.

(...)

Abbildung 51: Locations of plants and projects in Finland



Another facility is planned in **XXXX**, which was originally planned to start operations in 2021. However, we do currently not know whether this has already happened. The feasibility of the project in **XXXX** with a capacity of 50 kt/a will be reviewed on behalf of the City of Prague.

**Figure 126: Czech Republic, projects for biowaste AD plants**

#	Plant	Status	Start	Input Type	Input (t/a)	kWel
1	Line	Under construction	n. a.	Mun.	n. a.	Biomethane
2	...	<b>More information in the study</b>			...	...
3	...				...	...
4	...	...	...	...	...	...

*Details per project and the project tracker are available as download in MS Excel and are available online in the w&b Data module; By buying the study, you have access to these data for 12 months.*

Assuming a volume of about 50 kilograms of biogas per inhabitant in the Czech Republic in the medium term, this would be a quantity of about 530 kt/a. How much of this is currently already being treated in biogas plants, is not known; however, it is presumably significantly less than **XXX** kt/a.

Our market forecast assumes a potential of **XXX** kt/a by 2030. This already includes the projects mentioned.

### Competition

Competition in the market for biogas plants mainly takes place in the area of agricultural plants. Many operators are agricultural cooperatives or companies, but also fertiliser manufacturers.

Different companies from the energy and waste management sector operate the AD plants for separately collected biowaste, e.g., the waste disposal company Depos **XXXX** or the company **XXXX**, which has been part of the **XXXX** since 2019. Of the operators we are aware of, most are private companies.

The plant manufacturers are mainly known to us in the agricultural sector. These include companies such (...).

### Existing plants

*Details on plants and projects and the download of certain data in MS Excel are available online in our online database waste & bio Data (Biogas module); by buying the study, you have access to these data for 12 months.*

#	Plant	Type	Energy	Capacity, t/a	Capacity, Mwel	
1	Bzenec	Ind./Comm.	Electr.	k. A.	k. A.	
2	...	...	...	...	...	
3	...	<b>More information in the study</b>			...	...

## Price and product information

You can order the market report here:

<https://www.ecoprogram.com/publikationen/energiewirtschaft/vergaerung-von-bioabfaellen-in-europa.htm>

### Price models:

- 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, sent via email)

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

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