Picture credits: left: biomass power plant in Jyväskylä, Finland, by courtesy of Sumitomo SHI FW (Amec Foster Wheeler), upper right: biomass power plant in Brigg, United Kingdom, by courtesy of BWSC, lower right: wood biomass fuel, by courtesy of Frédéric Douard, CNIM.

Biomass to Power

The World Market for Biomass Power Plants 2021/2022

Extract

12th edition, 2021

ecoprog GmbH

Biomass to Power 2021/2022

The leading standard reference for the global Biomass to Power industry. The updated 12th edition includes:

- An analysis of more than 4,500 biomass power plants and about 1,000 planned projects worldwide.
- Global market development forecast 2021-2030, including new constructions, shutdowns and investment volumes based on more than 800 cost examples.
- Country level analysis of market factors, support schemes and existing plants and projects for 52 of the world's most important biomass markets.
- Investment and operational costs and revenues with an exemplary calculation.
- Important operators and technology providers and their market shares.
- **In addition to the report, purchasers of the market study will get free access to our BtP database for one year.** Find detailed data on all plants and projects, including capacity, status, start of operation, technology, fuel, manufacturer and operator, and more. Current projects are described within the scope of a project tracker. All these data are updated on a weekly basis.

The study is available in English language, starting from 3,400.- €*. **Please see the end of this extract for detailed price and product information.**

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

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Contents

Indonesia

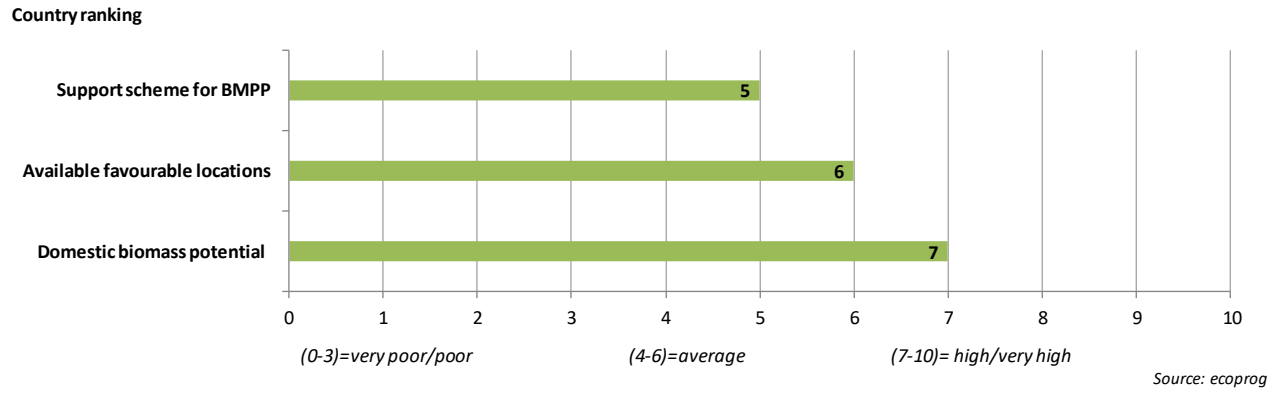
Update: 10-2021

Key figures			
Inhabitants 2020 [UN est. in million]	270.63	Number of BMPPs	6
Goal: biomass capacity in 2050 [GW_{el}]	13	Installed electrical capacity [MW_{el}]	40
Electricity from biomass 2019 [GWh]	11,329	Share of total electricity generation 2019 [%]	3.93
Forecast 2021-2030 Total invest market [mn EUR]	323	*Forecast 2021-2030* Capacity of new commissionings [MW_{el}]	155

Management summary

The market conditions for biomass incineration are dynamic in Indonesia. Ambitious political targets for electricity generation from biomass, a new incentive scheme for renewables and a vast biomass potential indicate an increasing biomass market. However, the even higher targets for co-incineration and the dominant position of state-owned grid operator PLN could be inhibiting factors and hinder the development, especially of larger biomass facilities. In the years to come, we expect several plants to be developed, and most of them will be based on agricultural fuels.

Figure 80: Ratings for the biomass market in Indonesia



Source: ecoprog

Background, market factors, legal framework

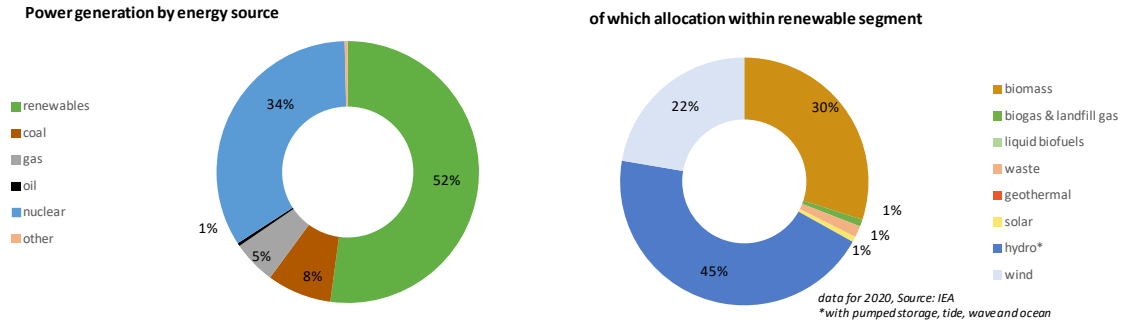
Electricity generation

- Indonesia has large oil, natural gas and especially coal resources. Therefore, electricity generation is mainly based on these fossil energy sources. According to IEA information, in 2020, Indonesia was the […]

[…]

- Apart from renewable energies and nuclear power, electricity generation from coal and gas also plays a role in the energy mix. This is particularly remarkable because Finland only has few energetically usable raw materials and must therefore import the energy sources.
- However, both RE and nuclear energy should be used to further minimise the use of fossil energy sources. In 2020, nuclear power had a significant share of one third in the Finnish power production. There are 4 operational nuclear plants in Finland, with a capacity of 2.8 GW_{el}. It is envisaged to reach an electricity generation from nuclear power of around 60% to replace coal and gas.
- Finnish nuclear company Teollisuuden Voima Oyj and French nuclear power engineering company Areva are building a new 1,600 MW nuclear power unit in Olkiluoto. Initially, commissioning was planned for May 2005. After several delays, the start of operations is now planned (as of August 2021) for June 2022. Another 1.1 GW_{el} unit is planned in Hanhikivi, with official commercial operations planned to begin in 2029.

Figure 176: Electricity generation in Finland



Market factors

- Finland has one of the largest biomass potentials in the world and is one of the most well-wooded European countries with intensive forestry. Therefore the country is also one of the world's most important locations of the pulp and paper industry. Hence, a very large amount of black liquor can be used energetically. However, the pulp and paper industry also utilises most of the limited tree harvest quota.
- In February 2019, the Finnish government approved to ban the use of coal by March 2029. Biomass is considered to be the most economic fuel to replace coal, especially in the heating sector, where coal currently accounts for 20% of the household's heating supply. According to Finnish engineering and consultancy company Pöyry, the ban could lead to a 70% increase in the biomass fuel demand. In this case, Finland would even have to import biomass fuel. Furthermore, shipping fuel from neighbouring countries is cheaper than transporting domestic fuel from the Northern, more forested and less populated part of Finland.
- […]

[…]

Support scheme

- Since 2011, renewable energy is subsidised through the competitive SDE+ programme (*Stimulering Duurzame Energie*, English: stimulation of renewable energy). The scheme was often subdivided into a spring and autumn tendering round. The last SDE+ tendering round took place in spring 2020, with 20 awarded biomass projects. As heat-only as well as CHP facilities are awarded in the same auctions, it is not always possible to identify the projects as CHP facilities or not.
- In autumn 2020, the new tendering scheme SDE++ 2020 was applied for the first time. The subsidy calculation is now based on the saved CO_2 emissions rather than on the generated energy.
- Biomass projects are still eligible to receive incentives under the new scheme, although it is still being discussed to phase out the subsidies from energy production from biomass. In the current SDE++ structure, biomass projects must satisfy sustainability criteria.

Figure 221: SDE++ subsidy structure 2021

Phase	Start and end date	Subsidy intensity phase limit (€/ton CO_2) in 2020	Subsidy intensity phase limit (€/ton CO_2) in 2021
1	5 October 09:00 to 11 October 17:00	65	60
2	11 October 17:00 to 25 October 17:00	85	80
3	25 October 17:00 to 8 November 17:00	180	115
4	8 November 17:00 to 11 November 17:00	300	300

Source: RVO - Netherlands Enterprise Agency 2020/2021

- The scheme is extended to include emission-saving technologies other than renewable energy, such as carbon capture and storage (CCS) and heat pumps.

Figure 222: Categories in the SDE++ incentive scheme in 2021

Main Category	Subcategory
Renewable electricity	Osmosis Hydropower Wind Solar PV
Renewable heat and CHP	Biomass fermentation **Biomass combustion** Composing mushroom compost Geothermal (deep and ultra-deep) Solar thermal energy

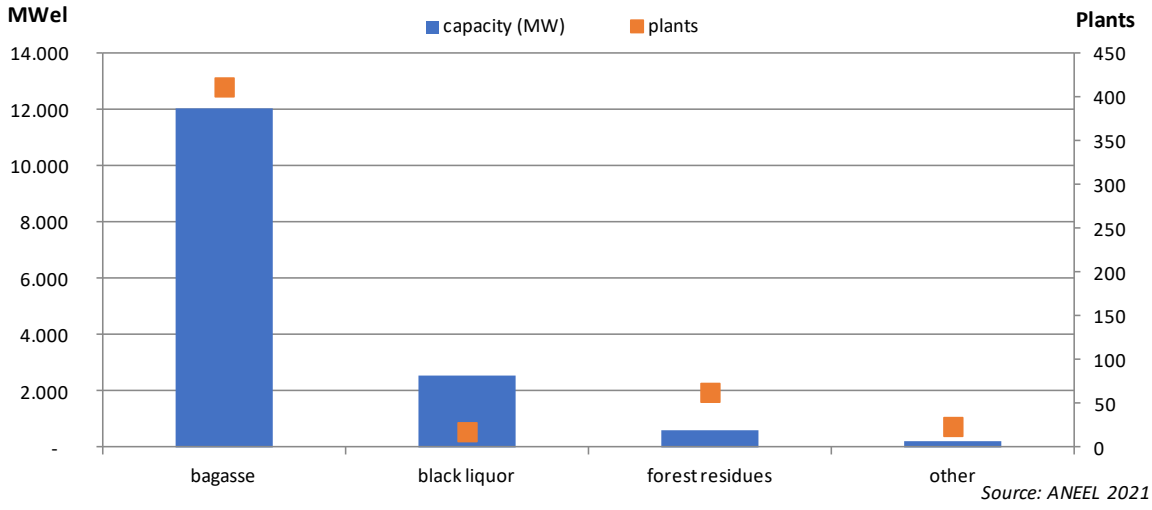
[…]

[…]

Plant asset

- According to the official data by state authority ANEEL, Brazil currently has 514 active biomass power plants with an installed capacity of 15.4 GW_{el}.
- The country thus has the world's largest electricity generation capacity from biomass. With an average capacity of 29.6 MW_{el}, the plants are among the largest in this study.
- […]
- Almost all BMPPs are installed at industrial enterprises. 80% of the plants and the installed capacities are installed in the sugar industry that has many sites in Brazil, mainly for producing ethanol. The paper industry has considerably less sites, but by far larger plants with an average capacity of 141 MW_{el}. Further locations can for instance be found in the wood processing industry and the rice industry.
- As the energetic use of black liquor and bagasse is oftentimes profitable without state subsidies, it is used for many years already. According to Brazilian statistics, around 20% of the plants were constructed more than 20 years ago. The large average plant size of 29 MW_{el} also reflects a market that has mainly developed favourable locations in agriculture and forestry.
- Most Brazilian BMPPs are located in the federal states of São Paulo, Minas Gerais and Paraná.

Figure 328: BMPPs in Brazil by fuel



- […]

Market development

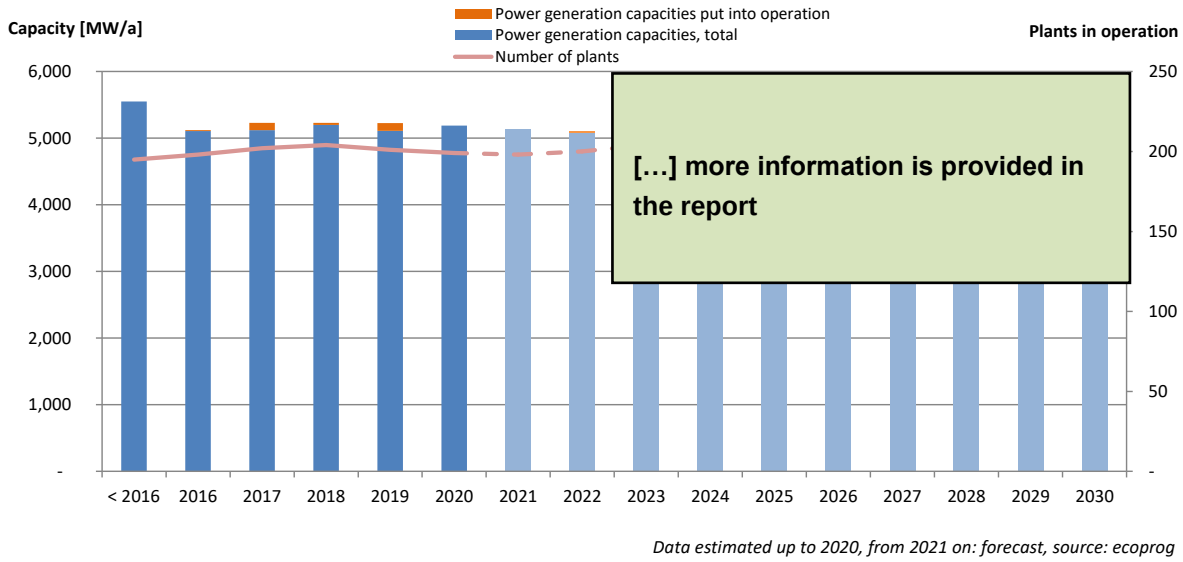
Projects

- […]
- 95% of the 30 MW_{el} BMPP in Pepeekeo, Hawaii, is completed. However, the project has been put on hold as the PPA with utility Hawaiian Electric Co. was first cancelled in May 2019. As of August 2021, the Public Utilities Commission will reconsider the PPA. However, a nearby solar project can deliver the same amount of energy at significantly cheaper prices.
- Especially when compared to Europe, there are considerably more independent power producers, […]
- Since the last update of the report, 5 new projects have been announced:
  […]

Forecast

- […]

Figure 308: Market forecast USA



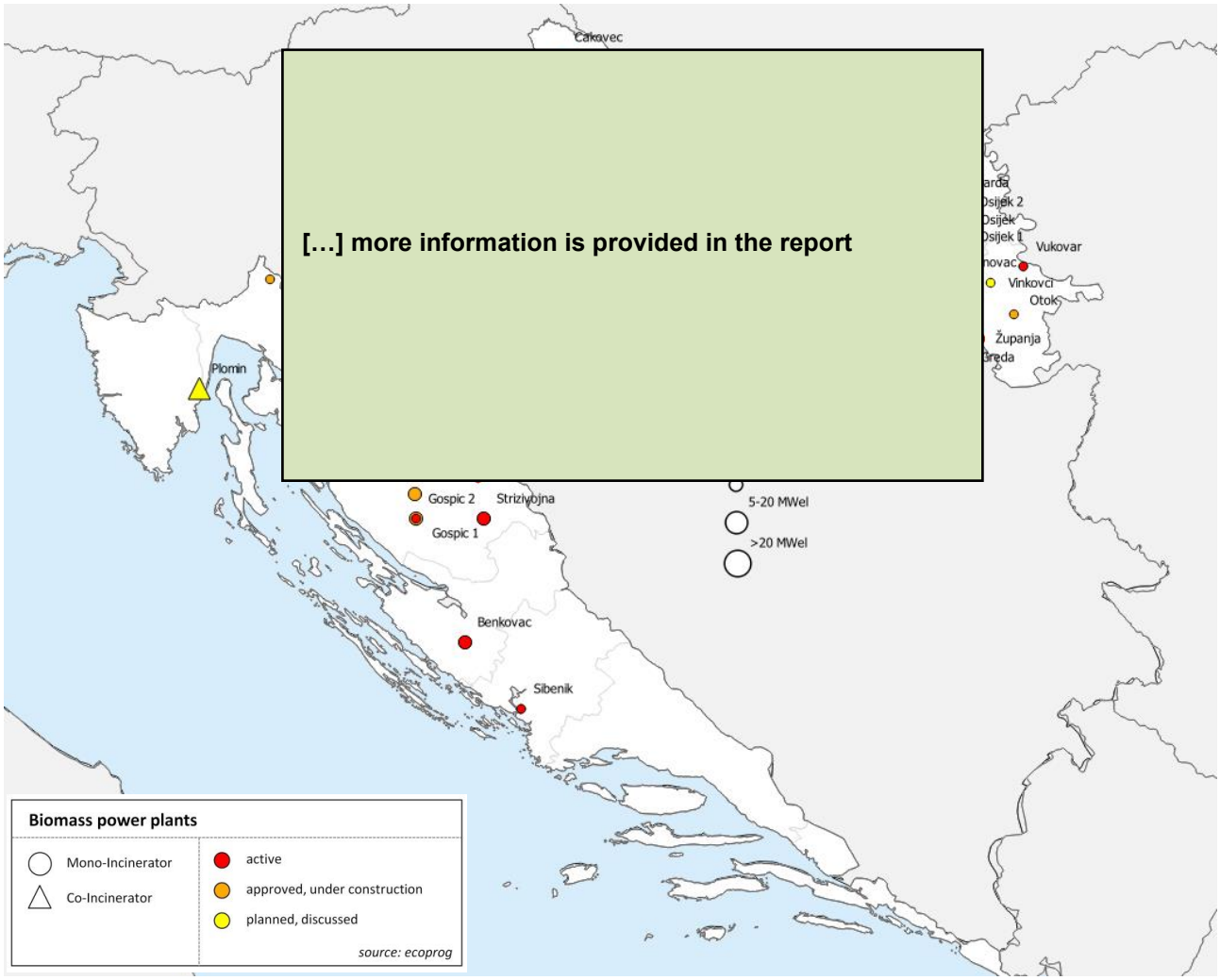
Data estimated up to 2020, from 2021 on: forecast, source: ecoprog

Competition

- Companies from the paper and forestry industry (such as Georgia Pacific and Sierra Pacific Industries) play an important role as BMPP operators in the USA. Another group of plants is operated by companies that are close to the disposal industry. For example, Veolia North America operates the twin plants in Georgia that went operational in 2019.

[…]

Figure 157: Locations of plants and projects in Croatia



[…] more information is provided in the report

[…]

Figure 158: Project outlook Croatia

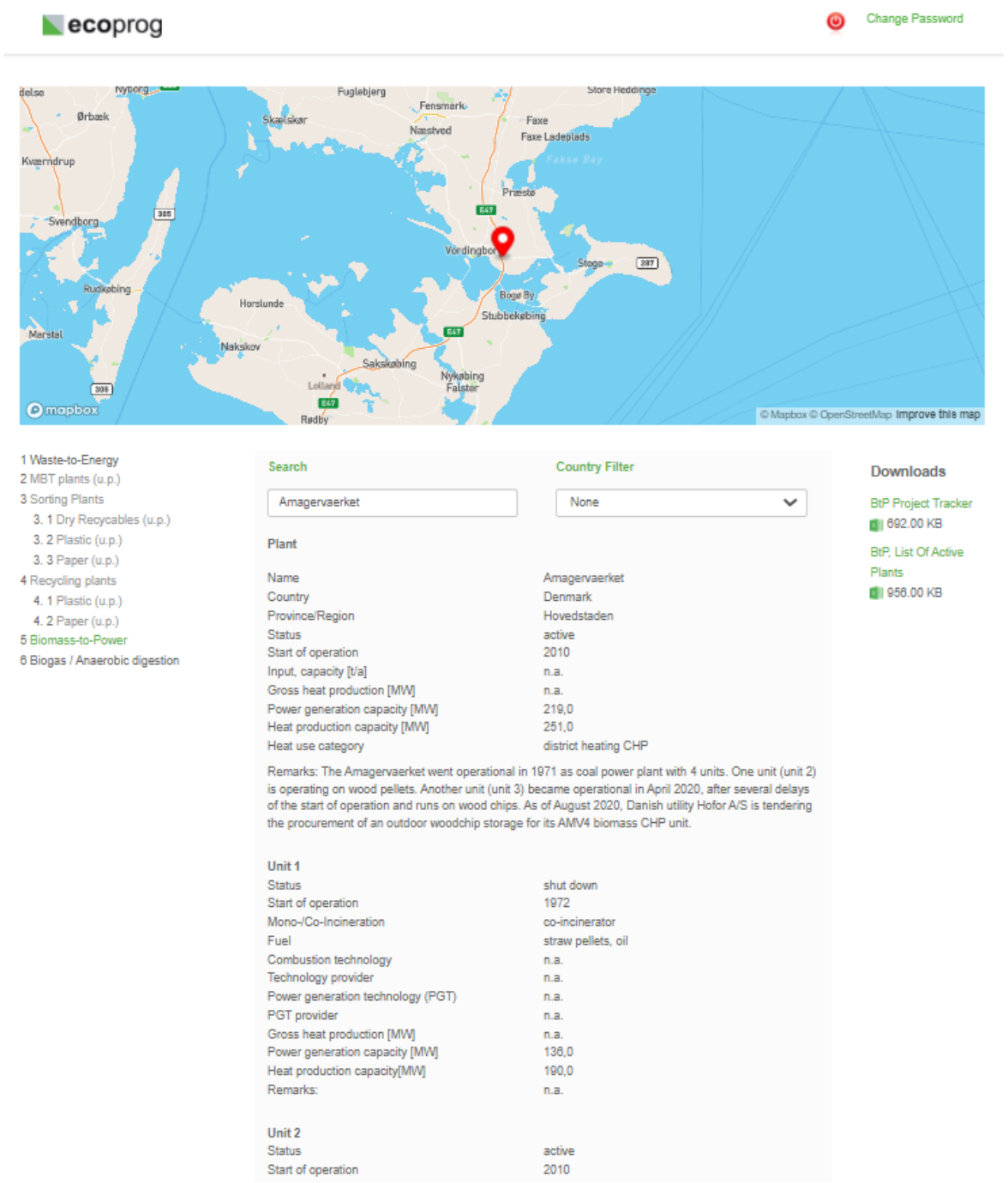
Plant	Type	Plant unit	Cap. (MWel)	Start	Status
Karlovac 1	mono-incinerator	1	1,2	2022	under construction
Čabar	mono-incinerator	1	1	n/a	under construction
Otok	mono-incinerator	1	1	n/a	under construction

[…] more information is provided in the report

Active Plants

You can find further information on all plants, such as specifications on technical equipment, manufacturer, or fuel for 12 months at https://data.ecoprog.com/ecopr/. This database is updated every week. Please use the username and password that have been sent to you by email.

Name	Operator	Capacity (MWel)	Type	Start
Aarhus	Burmeister & Wain Scandinavian Contractor A/S	37	mono-incinerator	2017
Amagervaerket	HOFOR	219	mono-incinerator	2010
Asnæs	Ørsted	25	mono-incinerator	2019
Assens	Assens Fjernvarme A.m.b.a.	5	mono-incinerator	1999
	[…] more information is provided in the report			



In addition to the report, you will get 12-month access to waste & bio Data (BtP module).

This is where detailed data on the biomass plants and projects is available, related to, for instance, capacity, status, start of operation, technology, flue gas cleaning, plant manufacturer and operator.

Current projects are described within the scope of the BtP Project Tracker. All these data are updated on a weekly basis. Please find a trial version of w&b Data on our website.

Price and product information

You can order the market report here:
https://www.ecoprog.com/publications/energy-management/biomass-to-power.htm

Price model: One-time purchase

- Single-user version: 4,400.- €*
- Company version: 8,800.- €*
- 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

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

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- Company version: 6,800.- €* per year
- Corporate version: Price on request

The BtP Package includes:

a. market study „Biomass to Power", updated annually
b. w&b Monitor (sent weekly) plus access to the online archive with more than 42,000 news items
c. access to waste & bio Data (Biomass to Power module) including BtP Project Tracker

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 (both price models): Additionally, you can order all detailed information on plants and projects in MS Excel (only available in combination with a company or corporate version): 4,400.- €*

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.

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