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WASTEANDBIO

Picture credit: bottom: biomass power plant in Turku, Finland, by courtesy of Valmet Corporation, upper left: biomass grate incineration, with courtesy of Standardkessel Baumgarte Holding GmbH, upper right: biomass power plant in Grubišno Polje, Croatia, with courtesy of KPA Unicon Group Oy.

Biomass to Power

Extract

The World Market for Biomass Power Plants 2019/2020

10th edition, 2019

ecoprog GmbH

Biomass to Power 2019/2020

The leading **standard reference for the Biomass to Power sector**. On about **1,200 pages** the **10th edition** provides up-to-date information and analysis:

- specific data on more than 3,900 units in more than 3,650 biomass power plants
- details on more than 950 projects worldwide, including developer, status, fuel type and commissioning date
- worldwide market development forecast 2019-2028, by country, including new constructions, shutdowns and investment volumes based on 690 cost examples
- analysis of the existing plants by country, e.g. age, feedstock, capacities and competition
- biomass electricity generation subsidisation (feed-in tariffs, quota systems and auctions), by country, for the world's most important markets
- market factors, fuels, treatment technologies as well as investment and operational costs and revenues with an exemplary calculation
- description and market shares of the important operators and technology providers

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Background

In early 2019, there were nearly 4,000 active biomass power plants (BMPPs) worldwide, reaching an installed electrical capacity of around 67.7 GW_{el}. We expect the plant portfolio to increase to about 5,550 BMPPs with a capacity of around 89.4 GW_{el} by 2028. The subsidisation of renewable energies and the development of domestic energy sources from existing waste material, e.g. wood waste or bagasse, are the most important reasons for this growth.

Argentina

Update: 11-2019

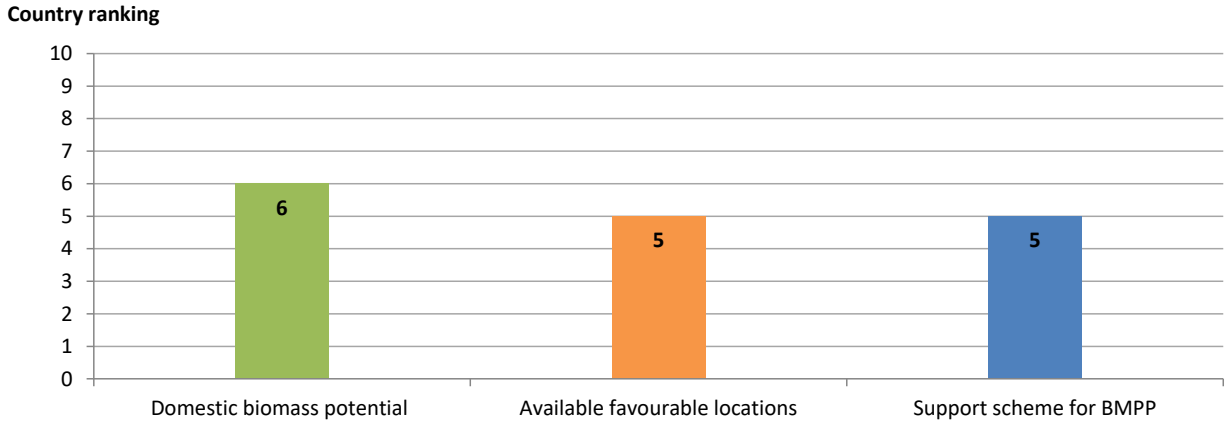
Inhabitants [million in 2018, est.]	44.7	Number of BMPPs	28
Goal: RE share 2022* [%]	10	Installed electrical capacity [MW_{el}]	160
Electricity from biomass 2016 [GWh]	1,711	Share of total electricity generation 2016 [%]	0.10
Forecast 2019-2028 Total invest market [mn EUR]		*Forecast 2019-2028* Capacity of new commissionings [MW_{el}]	

**wind, solar and biomass only*

Management summary

The BMPP development in Argentina is currently benefiting from the RenovAr tendering scheme. As of 2019, the scheme is capped at only 25 MW_{el} for solid biomass. It is so far not determined whether the auction will also take place under the new government that is to be elected in October 2019. Either way, Argentina will continue to offer a great biomass potential for further projects.

Figure 286: Ratings for the biomass market in Argentina



0-3= poor, 4-6 = average, 7-10 = high, Source: ecoprog

Electricity generation

About 70% of Argentina's electricity generation comes from using fossil fuels, with natural gas and petroleum being the most important among them.

Renewable energies only play a minor role for electricity generation. Within the segment of renewable energies, hydropower is pivotal, representing 94% of the electricity generated. Biomass is the second strongest segment, but representing only a 4% share. Figures from after 2016 will probably show an increase of the RES share, especially of solar and wind power, as a consequence of the RenovAr programme.

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Background / market factors / legal framework

[…]

In 2018, the market price for the REC amounted to 92,794 KRW/MWh (71.60EUR/MWh, exchange rate as of November 2019). The sale of the certificates on the market is a surplus payment on the electricity market price.

In 2015, South Korea launched its CO_2 certificate trading system. The system is part of the country's goal to reduce its greenhouse gas emissions by 37% below current levels by 2030. The certificates will make the burning of fossil fuels such as coal more expensive and favour renewables, e.g. the incineration of biomass. Between 2015 and 2018, the price level for CO_2 certificates increased from 12,029 to 22,237 KRW/Korean Allowance Units (1 ton of CO_2) (17.20 EUR/ton of CO_2).

Figure 95: Certificates for biomass energy

Certificates/MWh	Fuel	KRW/MWh	EURct/kWh
0.25	Palm kernel shells	23,199	1.79
0.5	Wood pellets, woodchips	46,397	3.58
1.5	Domestic wood (co-fired)	139,191	10.75
2.0	Domestic wood (dedicated biomass plants)	185,588	14.33

Source: Personal information of a local market insider, monetary figures based on the trading market price of REC in the period March 2018-February 2019 (92,794 KRW/REC), exchange rate as of November 2019).

Since the introduction of the RPS scheme and the CO_2 certificate trading system, the use of wood pellets in biomass power plants as well as the use of biomass for co-incineration in coal power plants have skyrocketed. Since South Korea's wood pellet production is limited, and they are mainly used for residential heating purposes, most of the wood pellets for BMPPs or co-incineration plants must be imported.

Therefore, South Korea is one of the largest wood pellets importers in Asia. In 2018, the country imported 3.4 million tons of wood pellets, which was 28 times the amount imported in 2012.

As a reaction to the massively increasing pellet imports, the government exempted new co-incineration facilities based on imported biomass from being eligible for incentives in 2018. This subsidisation stop is connected to the government's opinion that it is too easy for the coal power plant operators to fulfil their renewable power supply obligation, simply by co-incinerating imported biomass and that only small additional investment are being made within South Korea. The government is also considering to abolish or further reduce the incentives for existing co-incineration plants that mainly run on imported wood pellets.

Most of the large utilities are state-owned and therefore try to follow the governmental approaches by replacing wood pellets by sewage sludge or other domestic fuel and to further invest in solar and wind power.

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In terms of waste wood incineration, the annually increasing landfill tax (introduced in 1996) pushed the development of waste wood biomass power plants in the UK. In October 2018, the tax rates for 2019 and 2020 were published. In 2019, the landfill tax amounted to GBP 91.35/t, which is an increase compared to the GBP 88.95/t in 2018. From April 2020 onwards, the tax will amount to GBP 94.15/t. As a result, many waste wood incineration plants were planned in the past years, in order to benefit from the incentives under the ROC or CfD system as well as from the increasing disposal costs for waste wood.

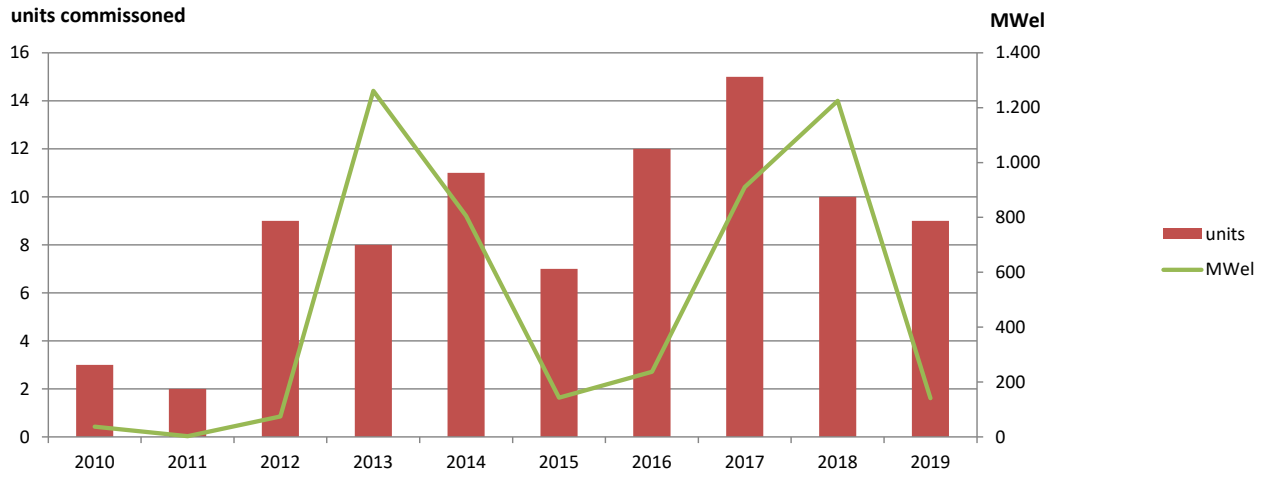
Plants

As of September 2019, we know of 103 operational biomass mono-incinerators with an electricity generation capacity of approximately 4,400 MW_{el}. In comparison to the last year's edition of this report, about 450 MW_{el} of capacity were added, 420 MW_{el} of which came from the commissioning of the Lynemouth conversion project.

In 2018 and 2019 (ongoing), 11 biomass units with a capacity of 1,264 MW_{el} were commissioned, including the fourth converted unit in Selby (645 MW_{el}).

The structure of the mono-incineration plants generally reflects the subsidisation policy. Eight facilities with a capacity of about 180 MW_{el} had been developed before the ROCs were introduced in 2002.

Figure 267: Commissioned biomass power plant units in the UK



Source: ecoprog 2019

As the British incentive schemes do not explicitly subsidise small-scale plants, the facilities in the country are quite large in a European comparison. They have an average size of around 16 MW_{el} (largeconversion projects excluded). As waste heat recovery only played a minor role for many years, heat recovery is low in the British plants. Some of them are power plants only.

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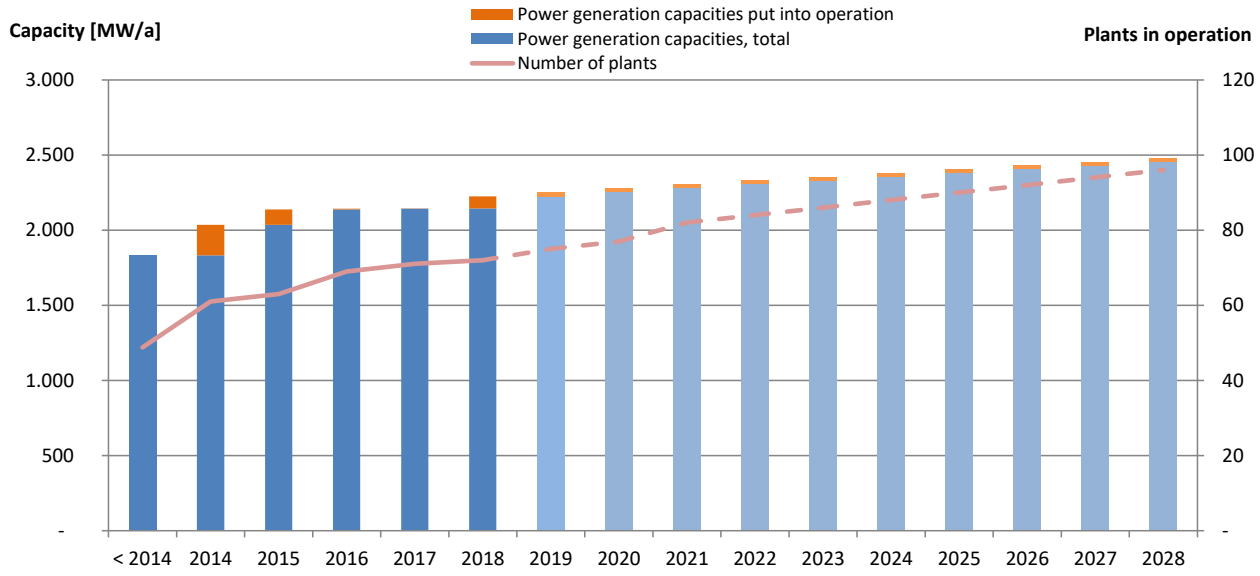
About 10 plants were commissioned since 2014, reaching an installed capacity of 500 MW_{el}, including the conversion project in Atikokan. Historically, this is quite a large, but still not extraordinarily large number. Quite unique is the fact that all plants together have a power production capacity of about 500 MW_{el}. This means that about 25% of all capacities from mono-incinerators in Canada were commissioned between 2014 and 2016. The reason for this was the high level of subsidisation at that time.

Figure 277: Market forecast Canada



Data estimated up to 2018, from 2019 on: forecast, source: ecoprog

Market development

We expect the market for biomass power plants to slow down in the years to come, because subsidies are lacking. Some market potential can be expected for small-scale plants in rural areas, where the Canadian government wants to reduce the use of diesel for electricity.

We currently know of 15 projects with a capacity of approximately 150 MW_{el}. Most of these projects are unlikely to be realised, as there has not been a status update for them for some years, but there are also projects that came up in 2018 and are more likely. For example, 4Leaf Corp together with Canadian timber company KPE Resource Management Inc. plans to develop the Robson Valley Energy Centre (RVEC) close to McBride, British Columbia, including a 15 MW_{el} biomass power plant and a 140,000 tpy torrefied pellet mill. In 2019, as of September, no new projects have been announced.

Another reason for a slowdown of the market can be that the sustainability of using wood as fuel is being discussed in Canada.

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Figure 204: Locations of plants and projects in the Netherlands

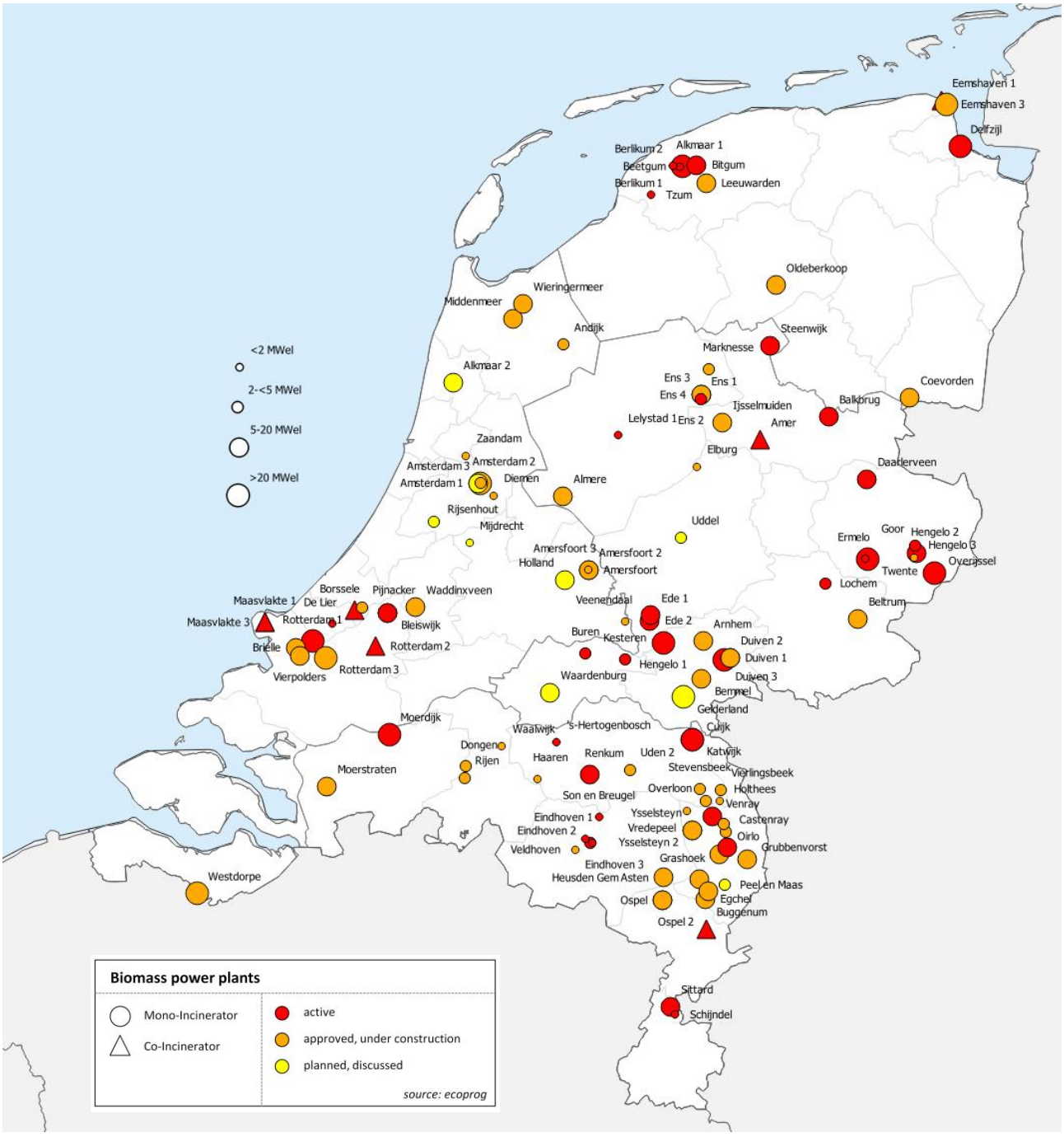

Figure 1: Project outlook Netherlands

Plant	Country	Type	Plant Unit	Cap. (MW_{el})	Start	Status
[…]						
Gelderland	Netherlands	mono-incinerator	1	24.4	n.a.	planned
Holland	Netherlands	mono-incinerator	1	0	n.a.	planned
Mijdrecht	Netherlands	mono-incinerator	1	1.95	n.a.	planned
[…]						

Plant and project details

[…]

Goldenstedt 1, Germany

BMHKW Goldenstedt GmbH
Arkeburger Straße 31
49424 Goldenstedt
Tel.: 04444-204860
Fax: 04444-204872
info@bmhkw-goldenstedt.de

Type: mono-incinerator
Status: active
Start of operation: 2009

Unit: 1 (active) mono-incinerator
Start of operation: 2009
Fuel: wood, wood chips
Gross heat production [MW]: 11.0
Electricity generation capacity [MW]: 1.7
Heat production capacity [MW]: 7.9
Incineration mode: grate
Manufacturer furnance: Kablitz
Power generation technology: ORC
PGT manufacturer: Turboden
Remarks: Model: T1500

Goldenstedt 2, Germany

BMHKW Goldenstedt GmbH
Arkeburgerstr. 31
49424 Goldenstedt
Tel.: 04444-204860
Fax: 04444-204872
info@bmhkw-goldenstedt.de

Type: mono-incinerator
Status: active
Start of operation: 2012

Unit: 1 (active) mono-incinerator
Start of operation: 2012
Fuel: wood, lop
Electricity generation capacity [MW]: 1.9
Heat production capacity [MW]: 7.8
Manufacturer furnance: Turboden
Power generation technology: ORC
PGT manufacturer: Turboden
Remarks: Model: TURBODEN 18-CHP Split

Gößweinstein, Germany

Type: mono-incinerator
Status: planned

Remarks: As of January 2019, the plant is planned to be built between Gößweinstein and Stadelhofen, Bavaria. It should supply heat to public and private buildings in Gößweinstein. Pellet producer Bio Energie Neuner GmbH plans to develop the project and informed the community that it wants to rededicate the zoning plan of its existing property. The Community Council has approved the rededication as well as the also necessary establishment of a new land-use plan that paves the way for concrete planning for the owner. However, Gößweinstein also wants to carry out a feasibility study of the project.

Unit: 1 (planned) mono-incinerator

Göttingen, Germany

Type: mono-incinerator
Status: under construction

Remarks: As announced in June 2019, Luxemburg-based gasification company Boson Energy will install a biomass gasifier at the new bio-heat centre of Stadtwerke Göttingen. With the project, Boson Energy intends to demonstrate the commercial performance of its H3TAG biomass gasification technology developed in cooperation with Swedish KTH Royal Institute of Technology. It can provide around 2,000 households with power. The project will be fuelled with woodchips as well as waste wood from local companies.

Unit: 1 (under construction) mono-incinerator
Fuel: woodchips, locally sourced waste wood
Electricity generation capacity [MW]: 1.0
Heat production capacity [MW]: 1.5
Incineration mode: gasification
Manufacturer furnance: Boson Energy SA

Grassau, Germany

Agnion Technologies GmbH
Löwenstraße 11
85276 Pfaffenhofen
Tel.: +49 0 8441 40 847 0
Fax: +49 0 8441 40 847 20

Type: mono-incinerator
Status: active
Start of operation: 2011
Capacity [t/a]: 2,500

Unit: 1 (active) mono-incinerator
Start of operation: 2011
Fuel: wood chips
Electricity generation capacity [MW]: 0.4
Heat production capacity [MW]: 0.6
Incineration mode: gasification
Manufacturer furnance: Agnion Technologies GmbH
PGT manufacturer: 2G Energy GmbH

Großaitingen, Germany

Veolia Umweltservice GmbH
Ährenstr. 26
86845 Großaitingen
Tel.: +49 8203 963636
Fax: +49 8203 963682

Type: mono-incinerator
Status: active
Start of operation: 2002
Capacity [t/a]: 40,000

Remarks: Energy provider Steag New Energies GmbH (SNE) owned the plant. As of December 2018, waste disposal firm Veolia Umweltservice GmbH is the new owner and operator. The facility is allowed to combust waste wood of the categories A1 to A3, but has also obtained a permit for the co-incineration of waste following the German regulation 17. BImSchV. The plant will no longer be subsidised under the

[…]

Plant and project details

[…]

Funing 1, China

Jiangsu Huaxia Environmental Energy Limited
Funing county Yilin town Yi Lin Road, No. 11
224421 Yancheng
Tel.: +86 515 87788987
Fax: +86 515 87788985

Type: mono-incinerator
Status: active
Start of operation: 2010
Capacity [t/a]: 1,200,000
Electricity generation capacity [MW]: 30

Unit: 1 (active) mono-incinerator
Start of operation: 2010
Electricity generation capacity [MW]: 15.0
Incineration mode: vibrating grate
Manufacturer furnance: Huaxia Environmental Energy Limited
Remarks: Input: 75 t/h

Unit: 2 (active) mono-incinerator
Start of operation: 2010
Electricity generation capacity [MW]: 15.0
Incineration mode: vibrating grate
Manufacturer furnance: Huaxia Environmental Energy Limited
Remarks: Input: 75 t/h

Funing 2, China

Type: mono-incinerator
Status: approved

Remarks: Chant Group has announced on 7 August 2018 that the project has been approved by the Yancheng Development and Reform Commission.

Unit: 1 (approved) mono-incinerator
Electricity generation capacity [MW]: 35.0
Power generation technology: pumping-type steam turbine
Remarks: The furnace has a capacity of 140 t/h.

Fuquan, China

Type: mono-incinerator
Status: approved

Remarks: The project has been approved by the Guizhou Energy Administration in November 2018. The project, to be developed by Fuquan Huadian Jinrui Biomass Power Co Ltd, will be equipped with a 140 tph furnace and a 30 MW generator.

Unit: 1 (approved) mono-incinerator
Electricity generation capacity [MW]: 30.0
Remarks: 140 tph furnace

Fusui County, China

Type: mono-incinerator
Status: active
Start of operation: 2018

Remarks: Plant developer: Shandong Qiquan Group. The plant produces 300 million kWh of electricity annually.

Unit: 1 (active) mono-incinerator
Start of operation: 2018
Fuel: straw
Electricity generation capacity [MW]: 40.0

Fuxin City 1, China

Huinong Biomass Cogeneration Co Ltd

Type: mono-incinerator
Status: active
Start of operation: 2017
Capacity [t/a]: 200,000

Unit: 1 (active) mono-incinerator
Start of operation: 2017
Electricity generation capacity [MW]: 48.0

Fuxin City 2, China

Type: mono-incinerator
Status: active
Start of operation: 2017
Capacity [t/a]: 278,400

Remarks: The project wasexpected to generate 320 million kwh. Construction works started in June 2016.

Unit: 1 (active) mono-incinerator
Start of operation: 2017
Fuel: straw
Electricity generation capacity [MW]: 18.0

Fuyu, China

Heilongjiang Qinghequan Biomass Combined Group Company

Type: mono-incinerator
Status: active
Start of operation: 2015
Capacity [t/a]: 380,000

Unit: 1 (active) mono-incinerator
Start of operation: 2015
Fuel: rice husks and penaut shells
Electricity generation capacity [MW]: 20.0

Fuyuan, China

Harbin Electric Company Limited

Type: mono-incinerator
Status: planned

Remarks: As announced in September 2019, CEEC Heilongjiang Power Construction Co Ltd has secured the EPC contract for the project to be developed by Harbin Electric Co Ltd in Fuyuan City. The plant will consist of a 130 tph

[…]

Plant register

[...]

Price and product information

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