

Pre-treatment of packaged organic/food waste

Gemidan A/S



From waste to a sustainable, green resource

Gemidan A/S

- Established in 1988
- Development of waste handling activities:
 - Composting
 - Shredding/screening (mobile)
 - Baling
 - Trading
 - Organic Waste treatment
 - Incineration (hazardous waste)
- Turnover (2024): >27 mio €
- Appr. 45 employees
- Certified (ISO 9001, ISO 14001 and ISCC)



 SUSTAINABLE DEVELOPMENT GOALS



Pretreatment of Food Waste

"Ecogi" Process

Ecogi-anlæggets opbygning

Anlægget behandler madaffald fra private husstande og organisk affald fra erhverv og industri. Robuste komponenter sikrer, at urenheder som plastposer, metaldåser, plastflasker og anden emballage sorteres fra.

Et bæredygtigt element i anlægget er genanvendelse af overskudsvand og brugen af overfladevand fra et større opland ved anlægget. Vandet samles i et bassin og renses, inden det indgår i processen. Dermed sparer anlægget hvert år mere end 25.000 kubikmeter grundvand.

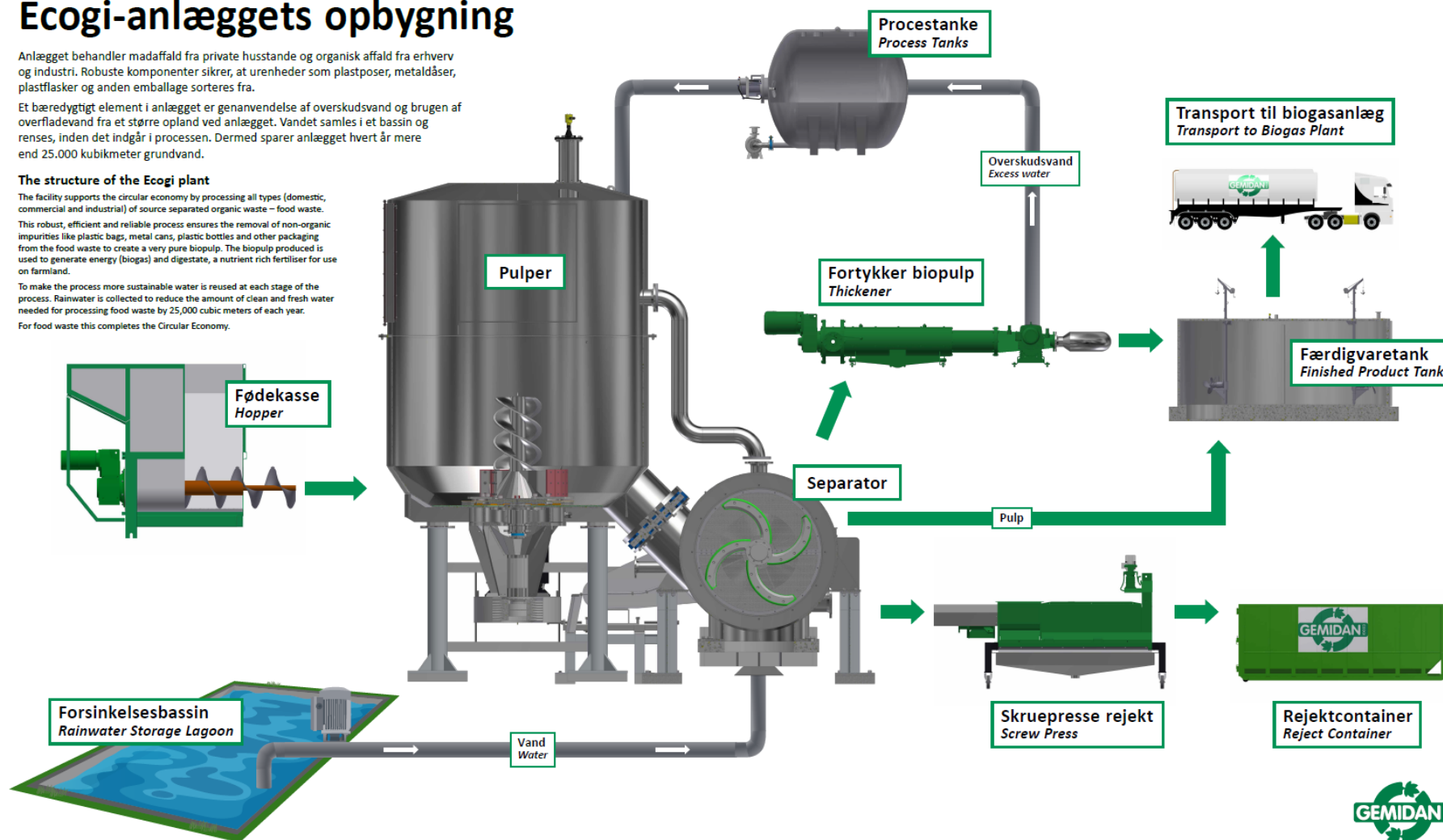
The structure of the Ecogi plant

The facility supports the circular economy by processing all types (domestic, commercial and industrial) of source separated organic waste – food waste.

This robust, efficient and reliable process ensures the removal of non-organic impurities like plastic bags, metal cans, plastic bottles and other packaging from the food waste to create a very pure biopulp. The biopulp produced is used to generate energy (biogas) and digestate, a nutrient rich fertiliser for use on farmland.

To make the process more sustainable water is reused at each stage of the process. Rainwater is collected to reduce the amount of clean and fresh water needed for processing food waste by 25,000 cubic meters of each year.

For food waste this completes the Circular Economy.



Ecogi plants in Denmark



Ecogi Video

- Click on the link below and learn more about the Ecogi proces

<https://www.youtube.com/watch?v=ketdoOAsw50>





Flexibility – Paper, Cans, Glass, Plastic, Cardboard

*The Ecogi system can handle **all types of packaging***



Flexibility due to contaminated waste (full capacity up to 20% contamination)

*The Ecogi system can handle **all types of waste***



Pureness of the Biopulp

- The system was designed to meet the demand of Danish farmers for high-quality organic fertilizer and strict Denmark/EU regulations.
- The pureness of biopulp is "second to none."
- The Ecogi process is the **only** food waste pre-treatment system to obtain **ETV certificate**
 - documents the pureness and the recovery of the potential methane in the waste
- **Environmental Technology Verification** – a global, third-party verification program for environmental technologies.



Pureness of the Biopulp

Results from the ETV Certificate:

Table 2 Analysed purity of products (17% dry matter)

	Test run 1%	Test run 2%	Test run 3%	Average %	Standard deviation %
Purity product all impurities (17% dry matter)	99.948	99.967	99.960	99.96	0.01
Purity mix plastics (17% dry matter)	99.992	99.995	99.996	99.996	0.002

Quality control

Regulation on monitoring biopulp from organic household waste and waste from service sector.

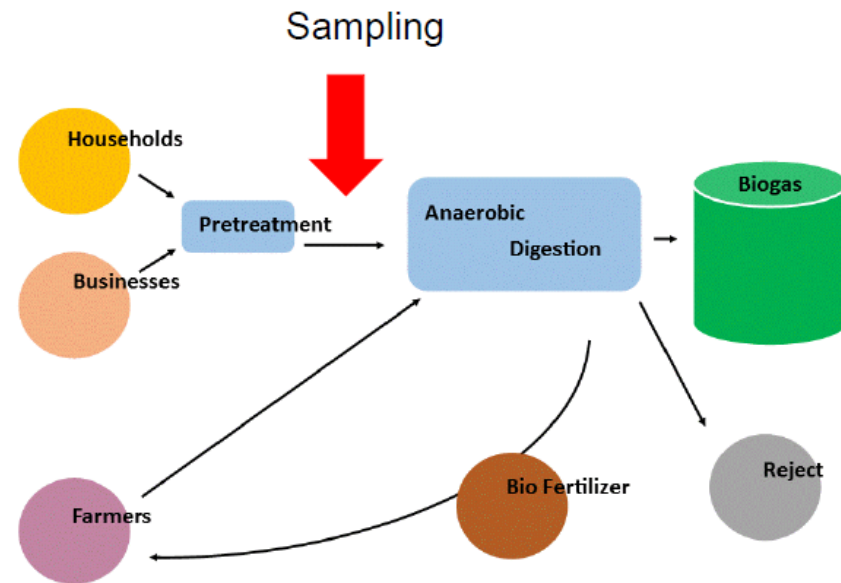
Guidance on sampling for physical impurities in the pretreated biopulp of 24th July 2018.

Daily sampling mixed to monthly sample.

Content limits:

Plastic, glass og composit materials, > 2 mm:
0,5 weight % of dry matter

Plastic, > 2 mm: 0,15 weight % of dry matter
& 1 cm² / % dry matter in 1 liter biopulp.



Declaration of the Biopulp

BIOPULP

Clean biofuel for biogas plants

Produced by:

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Declaration

70999-15

06. Nov. 2019

Biopulp from source-sorted organic residual materials (waste) from public, private, retail and industry. Approval number DK-06-03-intp-051 to handling of animal by-products in category 3 material for organic biomass.

Product description:

Biopulp is an energy source for use in biogas plants for the production of biogas.

The product is produced from source-sorted household waste and other organic materials from both retail and food industries in cat. 3 in accordance with the animal by-products regulation.

The product is characterized by the majority of the organic particles being very small, most of which are less than 0,1 mm, and is easily marketable to biogas plants. Biopulp is a very homogeneous product with a very low level of impurities like plastic, glass, stone and metal.

Biopulp is produced on KomTek's Ecogi plant that uses wet-pulping technology with subsequent effective separation of rejection of undesired substances.

Danish legislation applicable:

Biopulp must be declared after Requirements described in Order No. 1001 og 27-6-2018 on the use of waste for agriculture purposes.

Calculated specs from analysis with 17% dry matter		Analyses		
		Latest	Average	
Total N	4,2	24,7	28,3	kg/ton dry matter
Phosphorus (P)	0,56	3,3	4,2	
Magnesium (Mg)	0,83	4,9	3,4	
Potassium (Ca)	1,33	7,8	8,5	
Sulfur (S)	0,46	2,7	3,0	
Biogas (calculated)	119	m³ biogas		

Purity of biopulp	Limits	Latest analysis 19-30067	Average
Area covered in plastic: cm² per% TS	1 cm² per% TS measured in one liter of biopulp	0,20	0,32
Plastic in dry matter% in TS	Plastic > 2 mm is 0.15% by weight per dry matter	0,012	0,015
Physical impurities in dry matter% in TS	Plastic, glass and composite materials > 2 mm is 0.5% by weight / dry matter	0,100	0,124

mg/kg dry matter	Limits	Latest analysis 19-30068	Average
Lead (Pb)	120	3,3	4,4
Cadmium (Cd)	0,8	0,07	0,12
Chromium (Cr)	100	1,4	4,3
Chromium 6 (Cr)	-	0**	0**
Copper (Cu)	1000	97	76
Nickel (Ni)	30	2,2	4,0
Zinc (Zn)	4000	448	347
Mercury (Hg)	0,8	0**	0,03
PAH	3	0**	0,73
NPE	20	1,50	0,9
DEPH	50	0**	3,7
LAS	1300	0**	158

**Concentration 0 are values "non-measurable"



Pureness of the Biopulp

Purity of biopulp	Unit	Limits value	Latets analysis 22-03747	Average monthly from aug. 2018
Area covered in plastic	cm ² pr.% TS	1 cm ² per% TS measured in one liter of biopulp	0,27	0,29
Plastic in dry matter	% i TS	Plastic > 2 mm is 0.15% by weight per dry matter	0,006	0,014
Physical impurities in dry matter	% i TS	Plastic, glass and composite materials > 2 mm is 0.5% by weight / dry matter	0,043	0,100

Pureness of the Biopulp

Parameters	Unit	Limits value	Limit value ecology	Latets analysis 22-03748	Average quarterly from aug. 2018
Lead (Pb)	mg/kg dry matter	120	45	0,7	2,3
Cadmium (Cd)	mg/kg dry matter	0,8	0,7	0**	0,05
Chrome (Cr)	mg/kg dry matter	100	70	1,3	2,9
Copper (Cu)	mg/kg dry matter	1000	70	9,8	72,1
Nickel (Ni)	mg/kg dry matter	30	25	0,9	3,0
Zinc (Zn)	mg/kg dry matter	4000	200	29	357
Mercury (Hg)	mg/kg dry matter	0,8	0,4	0,1	0,01
Chrome 6 (Cr)	mg/kg dry matter		**	0**	0*
Environmental substances	Unit	Limits value		Latets analysis 22-03748	Average annual from jan. 2018
LAS	mg/kg TS	1300		190	87,5
PAH	mg/kg TS	3		0,03	0,4
NPE	mg/kg TS	10		0**	0,45
DEPH	mg/kg TS	50		0**	0,43

Gaspotential in the Biopulp

results for the fermentation test (VDI 4630)

sampling date: November 2021

sample ID	sample description	dry matter	organic drymatter	specific methane yield			SD	biogas yield
		(% FM)	(% oDM)	Nm ³ CH ₄ /kg oDM	Nm ³ CH ₄ /t FM	CH ₄ [%]	%	Nm ³ biogas/t FM
S34276	Biopulp	18,9	90,5	0,498	85	58	0,8	148

test number: 21_25

number of repetitions: 3

period: 35 Tage

temperature: 37 °C

DM dry matter

oDM organic drymatter

Nm³ norm cubic metre

CH₄ methane

SD standard deviation of the repetitions

comment:

The material has a good DM content, oDM is also okay. The fermentation process shows that the material outgasses very quickly. Overall, the specific methane yield of 0.498 Nm³ is in a good range. The methane yield per ton of fresh matter is also good at 85 Nm³. Bugdahl



Transport of food waste

- Waste or ABP?
 - Definition is key
 - 2 different legislations
 - ABP is over Waste (legal)
 - EU regulation vs EU announcement
 - ABP (regulation)
 - EU 1069/2009 → 1097/2012
- What to do?
 - Approval for reloading of food waste
 - Food Authority (Germany)
 - "Zulassungsnummer"
 - → trading document (Handelspapier)
 - System works as Annex 7 (waste)



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