

Statement of Verification



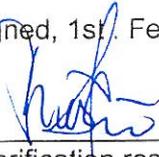
EU Environmental Technology
Verification pilot programme

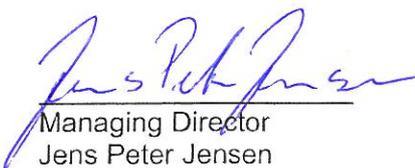


Technology:	ECOGI
Registration number:	VN20160011
Date of issue:	1st . February 2016

Verification Body		Proposer	
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Signed, 1st. February 2016.


Verification responsible
Thomas Bruun


Managing Director
Jens Peter Jensen



Reg. Nr. 9099

This Statement of Verification summarises the main results from the verification of ECOGI.

The verification was performed under the EU Environmental Technology Verification (ETV) Pilot Programme. The EU ETV Pilot Programme was established to help innovative environmental technologies reach the market by providing a framework for independent evaluation of the performance of such technologies.

This verification was undertaken by the Danish verification body, ETA-Danmark A/S. ETA-Danmark is accredited by the Danish Accreditation body, DANAK, according to EN 17020 for performing environmental technology verifications. This Statement of Verification is available on the website of the EU ETV Pilot Programme: <http://iet.jrc.ec.europa.eu/etv/verified-technologies>

1. Technology description

The process is a pulper/separator for extraction of organic waste from pre-sorted household waste containing packaging material and other residues.

A DANETV verification exist for an earlier version of ECOGI (statement dated 6.th may 2013) but without verification of the performance of the new dewatering system.

The operation is a batch process. The waste is introduced to a pulper with initial addition of water. After approx. 30 minutes pulping the material is transferred to a reject separator which produces an organic pulp (biopulp) and a solid fraction with all solid particles larger than 6 mm. The pulp is then concentrated using a screw separator. The solid fraction consisting of plastic bags, plastic packaging, glas, metal and some organic material larger than 6 mm is washed in the reject separator before transferring to a container for further treatment. Water from washing and screw press is recirculated for use in the next batch production of biopulp.

The principle is shown in Figure 1 with the pulping step, reject separation, washing and dewatering of solid fraction. All these components are used in the test for recovery and purity of the biopulp. In normal operation the water from the screwpress (thickener) is used for pulping of the next batch. The water obtained from dewatering of the reject is also reused in the process.

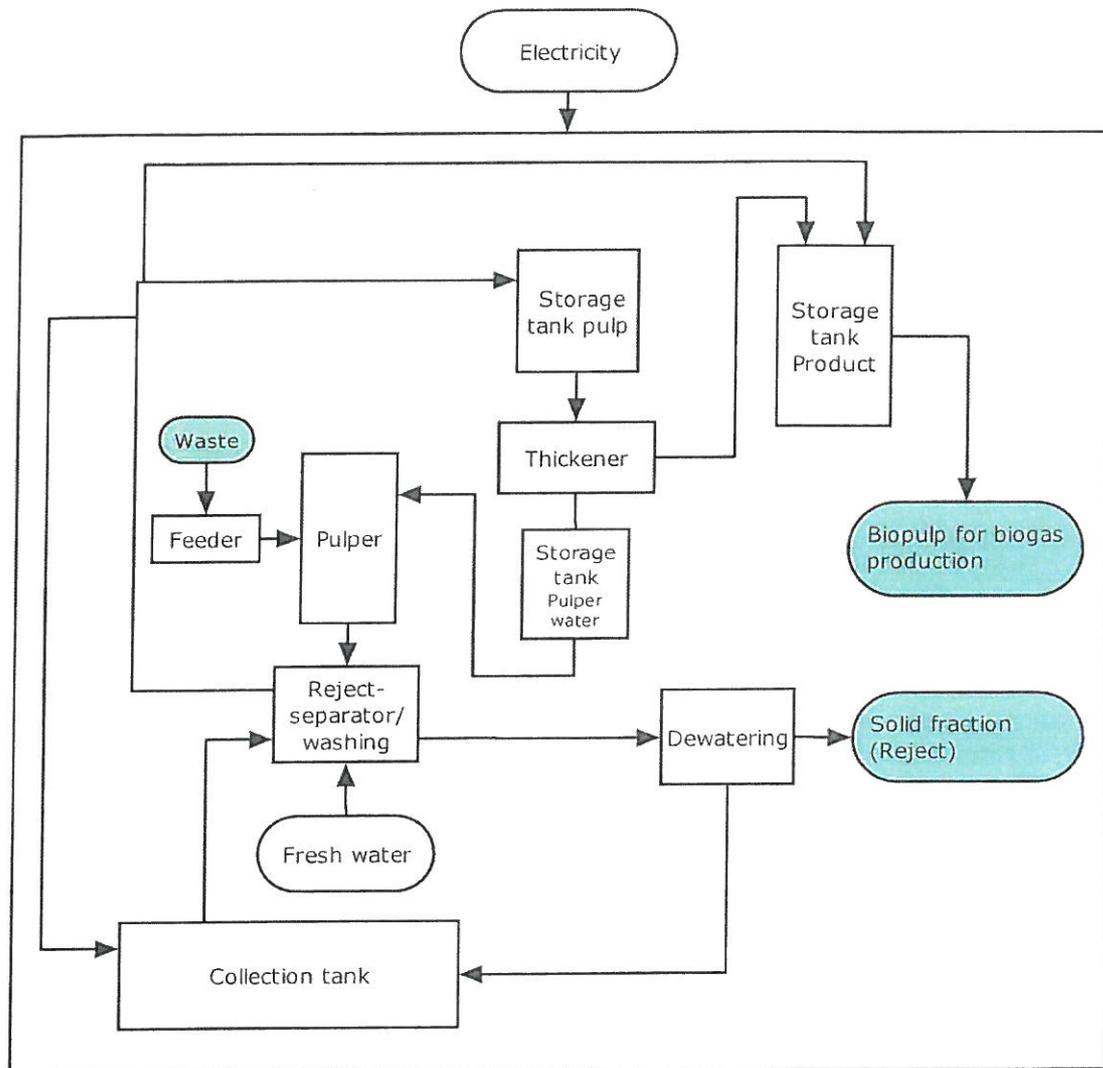


Figure 1. Principle of the ECOGI process, showing inputs and outputs

2. Application

2.1. Matrix

The ECOGI process is a mechanical pretreatment of separately collected organic household waste into a biopulp and a reject with content of non-biodegradable materials like plastics, metals, glass. The biopulp can be used for anaerobic digestion.

2.2. Purpose

The overall purpose of ECOGI is mechanical pre-treatment and separation of organic waste from households to obtain pulp with high purity suitable for bio gasification and to ensure a high recovery of organic material.

2.3. Conditions of operation and use

ECOGL was tested and verified under normal conditions of operation similar to what can be expected of the plant in future application.

2.4. Verification parameters definition summary

Performance parameters are defined taking into account e.g. regulatory requirements, application based needs, and state of the art performance. For the verification of the ECOGL Technology the following 4 performance parameters have been defined:

- Recovery of organic matter in pulp
- Purity of organic matter in pulp
- Energy consumption per ton waste
- Water consumption per ton waste

Operational parameters, which was measured include:

- The amount of added biomass for each test run and the time used for the test run
- The amount of added water for each test run
- All other added or removed amounts either through weighing or from calculation
- Electricity consumption for each test run

In Table 1 below the performance parameters for this specific verification are presented. The figures mentioned in the Value-column refer to the performance claims of the proposer.

Table 1: Parameter definition table

Parameter	Value
Recovery of organic matter in pulp (excluding wood >5*5*5 mm)	>90% based on dry matter
Purity of organic matter in pulp	>95% based on dry matter
Electricity consumption	<50 kWh/ton treated organic waste
Water consumption	Depends on produced dry matter content in the pulp. Will be measured for given dry matter content

3. Test and analysis design

3.1. Existing and new data

No existing data has been used in the present verification.

3.2. Laboratory or field conditions

A full scale version of ECOGL was used for the test. The test took place in a closed building at Komtek Miljø af 2012 A/S. The site is a plant that performs composting operation with a separate treatment of organic waste using the developed ECOGL process.

3.3. Matrix compositions

The ECOGL process is verified on separately collected organic household waste collected in plastic bags.

3.4. Test and analysis parameters

The test is based on specially developed procedures for analysing purity and recovery as described in the test plan.

3.5. Tests and analysis methods summary

Three test runs of the ECOGI process for the test waste were undertaken. Each test run consisted of 3 batches. Samples from the 3 batches were combined to one test run sample. Approximately 2-3 tons of waste was processed per batch. After each test run the recovery of organic matter as well as the purity of biopulp was determined. Furthermore, the electricity and water consumption was measured for each test run.

3.6. Parameters measured

In addition to the performance parameters listed in section 2.4 the capacity of ECOGI expressed in terms of tons of waste treated per hour in operation was measured.

4. Verification results

4.1. Performance parameters

In Table 2 the verified performance is presented as a mean value together with the respective 95 % confidence intervals.

Table 2. Verified performance parameters for purity of products and recovery of organic waste

	Average %	Standard deviation %	(95% confidence interval)
Purity of product (all impurities, 100% dry matter)	99.76	0.06	99.61-99.91
Purity of product (all impurities, 17% dry matter)	99.96	0.01	99.94-99.98
% Recovery of organic waste	92.96	0.77	91.1-94.9

4.2. Operational parameters

The electricity and water consumption of ECOGI is shown in Table 3.

Table 3 Electricity and water consumption during test run. Average values of three test runs.

	Average	Standard deviation %	(95% confidence interval)
Electricity consumption kwh/ton waste added	35.71	2.00	30.7-40.7
Water consumption ton water/ton waste added	0.72	0.06	0.57-0.87

4.3. Environmental parameters

The relevant environmental parameters are included as performance and operational parameters.

4.4. Additional parameters

In addition the capacity of the plant was measured in each the test run as well as the dry matter of the products.

The results are shown in the table below:

Table 4. Capacity and Dry matter of produced biopulp. Average values of three test runs are shown

	Average	Standard deviation	(95% confidence interval)
Waste added tons/hour (Capacity)	6.54	0.6	5.1-8.0
Dry matter of produced pulp	16.5	0.4	15.5-17.5

5. Additional information

Additional information is found in the verification report.

6. Quality assurance and deviations

The test and verification activities were planned and undertaken to satisfy the requirements on quality assurance described in the General Verification Protocol developed for the EU ETV Pilot Programme.

The test activities were undertaken by Danish Technological Institute Test Centre (test body). DTI has a quality management system covering ETV test activities that follows the principles of EN ISO 9001. It is judged that the quality management system fulfils the requirements of the General Verification Protocol (Chapter C.III) and thereby DTI Test Centre is qualified for participation in the EU ETV verification process.

An external review was performed for the specific verification protocol and the verification report. The external review was done by Arne Grønkjær Hansen from Agrotech.