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1 Introduction on bio-waste management in the Netherlands

The compost sector in the Netherlands is organised around two separately collected categories of biowaste: green waste and household biowaste. Green waste includes organic residues from agriculture and green public spaces such as urban and nature parks, landscapes and roadsides. Household biowaste, also referred to as vegetable-, fruit-, and garden waste (in Dutch: gft-afval: groente-, fruit en tuinafval) comprises the organic part of household waste, which is separately collected by some municipalities.

In total, about 4,6 million tons of biowaste was collected in the Netherlands in 2018. The majority of this waste consists of green waste; amounting to 3,2 million tons in 2018. Municipality collected household biowaste amounts to 1,4 million tons. In addition, some 0,3 million tons of organic residues from industries were converted into biogas and compost.

2 National concept/strategy on bio-waste management

2.1 Legal framework

Separate collection and treatment of organic waste, and application of products thereof, is regulated in various legislative documents. The Dutch National Waste Management Plan ('LAP') sets out the minimum standards for the treatment of specific waste streams, including biowaste.

This plan specifies composting as the minimum standard for both green waste and biowaste streams, alongside options such as anaerobic digestion. Composting facilities are obliged to possess a permit under the Dutch Environmental Management Act ('Wet Milieubeheer'), and request permission when significant changes are made to the facility. Regulations in relation to the licensing of biowaste facilities have been specified in the Environmental Activities Decree ('Activiteitenbesluit'), which is part of the Environmental Management Act.

In relation to the required compost quality, the Fertiliser Decree under the Fertiliser Law ('Meststoffenbesluit') is relevant. The Fertiliser Decree specifies compost as a separate product category, for which certain quality requirements apply. The Decree specifies that compost consist of a minimum of 10% organic matter and that it has been subjected to a microbial decomposition process, so that the end product is 'biological stabile,' meaning that only slow decomposition processes of complex organic matter take place in the end product. Animal manure may not be present in compost. The Environmental Activities Decree also specifies that anaerobic conditions are not allowed in the composting process within facilities (that does not apply to the pre-digestion of household waste for biogas production), and that facilities have to turnover the material as often as required to prevent anaerobic conditions.

In addition to a minimum organic matter content of 10% (dry matter basis), the regulation sets out that heavy metal contamination in compost cannot exceed the levels as outlined in the following table:

Heavy metals	mg/kg dm ¹
Cd (Cadmium)	1
Cr (Chrome)	50
Cu (Copper)	90
Hg (Mercury)	0,3
Ni (Nickel)	20
Pb (Lead)	100
Zn (Zink)	290
As (Arsenic)	15
Organic matter	10 %
Impurities	0,5 %

2.2 Waste management programs and strategies

Refer to Section 2.1.

2.3 National standards and technical guidelines (collection, treatment and use)

Refer to Section 2.1.

2.4 Quality Assurance Scheme (QAS) and National Quality Assurance Organization (NQAO)

Today, most compost in the Netherlands is certified under the Keurcompost standard (www.keurcompost.nl). Keurcompost is a voluntary industry standard, containing requirements, further than legally required. The requirements are enforced by independent third party audits and accredited auditors.

Keurcompost requirements are on processing (time-temperature) in particular, quality management, and on impurities standards in compost (differentiated between glass, stones and others).

These requirements have been set in collaboration between the compost sector and organisations representing the agricultural food industry (agriculture and processing industry), in order to meet the industry's strict food safety requirements.

Keurcompost scheme management is executed jointly by BVOR and DWMA (contact details below). Members receive a yearly Keurcompost certificate after a successful audit, which is updated in an online, public registry.

3 Source separated collection of bio-waste

Green waste generally arises during maintenance activities of public green areas, roadsides, or landscape/nature elements. The contractor of the maintenance activities is held responsible for separate collection and delivery of the material to a licensed (composting) facility. This practice leads to a very high recovery rate (>90%).

An average Dutch citizen produces almost 500 kg of waste annually. About 50% of this waste is collected and treated separately. Separate biowaste collections amounts to about 83 kg/person/year, whereas households totally produce about 150 kg/person/year. Challenges are contamination of the waste with plastics, for

¹ Dry matter

instance, and motivating citizens to separate their waste, especially in larger cities and tower buildings. Many municipalities are implementing new financial or logistics incentives to stimulate more waste separation. An example is a differentiated payment plan per household, where households do not pay a generalized waste tax, but pay per kg or volume of non separated waste. Other municipalities stop collecting residual waste door-to-door, but only collect separated waste streams and make waste collection points for non separable waste, in order to facilitate and stimulate waste separation..

4 Bio-waste treatment (recycling, material/energy recovery)

Green waste is typically composted in open windrow composting facilities, whereas part of the woody material of this waste stream is also used for bio-energy production. The green waste composting infrastructure constitutes of approximately 100 licensed facilities, with capacities ranging from a few 1,000 tonnes/annum to more than 100,000 tonnes/annum.

Separately collected household biowaste are composted in enclosed vessel composting systems. In recent years, the majority of these composting facilities have added an anaerobic digestion step prior to the composting plant. The anaerobic digester produces biogas, which is either converted to natural gas or used for power and heat production. Approximately 21 household biowaste facilities are present in The Netherlands.

5 Application and market

The table below shows the markets to which certified Keurcompost was distributed in 2018. These numbers do not include non-certified compost, but we expect that these show a similar distribution.

	Green waste compost	Household biowaste compost
Agriculture	55,0%	76,9%
Horticulture (greenhouses)	1,4%	0,2%
Gardening (professional and consumers)	3,3%	5,8%
Municipalities (public green areas)	2,5%	0,5%
Potting soil substrates and soil supplementing	22,6%	15,2%
Specific soil-compost mixtures (e.g. for trees in urban areas)	10,9%	0%
Civil construction sector (e.g. roadworks)	1,5%	0,4%
Export	0%	0,5%
Other	2,7%	0,5%

Another application from green waste that is worth mentioning, are wood chips or shreds. Part of the woody material from green waste is shredded and used for energy production (incineration or biogas conversion), this amounts to 400 kton of biowaste. However, as producers are not obligated to register the production of such chips, this figure will be higher in practice.

6 Expected trends and developments

An important trend to mention in the Netherlands is the increasing interest in manufacturing high value end products from biowaste; e.g. bioplastics, fibre and proteins. Many developments are currently in the pioneering research of pilot scale phase. The technical and economic perspective of these applications will be become more clear in the next few years. In the foreseeable future it is likely that compost production will remain the most significant recycling route for biowaste.

7 Contacts and sources of information

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