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1 Introduction on bio-waste management in Denmark

The waste hierarchy is the basis for the priorities of waste management: recycling ranks higher than incineration with energy recovery and landfilling ranks lowest. The total waste amount (not including soil) has been growing from 11.5 million ton in 2016 to 12.5 million ton in 2018.

The government launched in 2013 a strategy on resources called “Denmark without Waste”. Wastes are now seen as material resources that must be recovered and reused. For household waste the recycling target is set 50% in 2022. That target can only be reached if biogenic organic household waste is recycled. The recycling rate for household waste increased from 2016 being 46,7% to 48,2% in 2018. More municipalities have started separation of food waste and other fraction for recycling. Separate collection of food waste from households rose from 61.700 ton in 2017 to 95.300 ton in 2018.

The amount of green waste has increased from 751.000 ton in 2012 to 929.000 ton in 2018. It has been allowed to use the woody part as a carbon neutral energy, when incinerated. The target is that 25% of green waste will be used as fuel.

Anaerobic Digestion has a long tradition in Denmark in particularly for pig slurry, manure and sewage. Energy production from biogas rose from 12.2 GJ in 2016 to 20.5 GJ in 2018. This energy increase is coming primarily from agricultural residues, but to make the manure-based plants feasible more energy rich fractions like biogenic organic household waste is needed since food industry waste is already used to a large extend at the farm driven AD plants.

There is a specific focus on recycling of phosphor, which within a limited timeframe will become a scarce resource. This focus is broadened out for compost, sewage sludge and manure etc.

2 National concept/strategy on bio-waste management

2.1 Legal framework

The Statutory Order for Waste no. 224 (Ministry of Environment and Food - March 2019) regulates and describes waste definitions and waste types, the detailed yearly report on the amount of processed waste to the EPA, describes how the municipalities have to work out waste plans every fourth year with a twelve year perspective and a 6 year activity plan.

The Statutory Order regarding the application of waste products for the agricultural purposes No. 1001 (Ministry of Environment and Food - June 2018) regulates the agricultural reuse of the main types of biodegradable wastes (e.g. sewage sludge, compost.) and gives limit values for content of heavy metals and organic pollutants.

Rules for sales of fertilizers and soil improvers such as compost are laid down in the Statutory Order for fertilizers and soil improvers no. 862 given by Ministry for Environment and Food - August 2008.

Standards for sample taking and analysis of sewage sludge and compost are laid down in the Statutory Order for the control of the quality of sewage sludge and compost for agricultural purposes) no. 56 (Ministry of Environment and Food - January 2000).

Present average waste fees (2019) are: 50 - 90 EURO for incineration, 20-50 EURO for biological treatment of source separated food waste, 15 - 25 EURO for composting of garden waste and no fee for treatment of clean organic fraction when brought to a farm owned AD facility.

2.2 Waste management programs and strategy

Organic waste has been banned on landfills for many years. All organic waste must either be incinerated or recycled. The strategy "Denmark without Waste" focus on recycling.

60 % of all commercial organic waste must from 2020 be recycled. That target has been reached since the recycling rate was 68 % in 2014. 50 % of all household waste must be recycled on a national level (48,2% in 2018).

In general, the national level targets leave enforcement options toward individual municipalities, however they do seem to influent behavior. That has also been due to incentives like a fixed higher price for renewable energy (par example biogas from waste). It is for some fractions becoming cheaper to recycle than to incinerate. For private enterprises, the municipalities must demand recycling, but enforcement options are scarce.

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

Via the environmental permit given by authorities' guidelines will be given from an environmental perspective. There are standard conditions for biogas and compost plants in the "Statutory order regarding standard conditions, no. 1537 (Ministry of Environment and Food - December 2019)". The standard conditions have been created to give a faster and smoother permission procedure for new applicants that follow the standard methods described.

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

The national standard on compost and other products for soil amendment is given by legislation. All organic waste (biowaste, sewage sludge etc.) to be used on soil is regulated by the same legislation. Statutory Order No. 1001 (Ministry of Environment and Food - June 2018)

3 Source separated collection of bio-waste

At present (Autumn 2020) more municipalities are separating food from households than before. The amount of organic waste from households rose from 26.000 ton to 95.200 ton (2012 to 2018). That is still less than 20% of the potential. Organic waste from industry (primarily food production) rose from 92.000 ton to 158.000 ton (2016 to 2018). Organic waste from trade (supermarkets etc.) rose from 46.000 ton to 151.000 ton (2016-2018).

The major concern at present is investments in technology. Municipalities have either to tender out the waste treatment and collection or to tender out the building of waste treatment plants and collection equipment. Many municipalities have organized their waste management section via intermunicipal companies. Historically to be capable to build incinerators. Now incinerators are in lack of waste which is clearly seen in a rapid rise in import of waste for incineration. The consequence is low willingness from municipalities and intermunicipal

companies to invest in new recycling plants and short-term tenders on waste treatment of organic waste. That situation makes long term investments difficult.

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

Green waste is normally collected separate from other biowaste. The materials shredded and separated in coarse and fine fractions. The coarse fraction used as biofuel. The fine fraction is composted or spread directly on agricultural land.

Most separately collected organic waste goes to anaerobic digestion due to the need for renewable energy. Nutrients and the remaining organic matter are used in agriculture. The product is either fluid de-gasified manure or compost.

5 Application and market

For growth media and soil improvers the price level is from 45 to 15 euro per ton. Biowaste compost for agriculture application is sold for 6 euro per ton. A large portion of the biowaste is used by farm-based AD plants. The nutrients are therefore mixed up with a large portion of degasified pig or cow slurry. The norm is that farmers who owns the plants deliver fresh manure and take back degasified manure that will contain nutrients from biowaste as well.

6 Expected trends and developments

Biowaste amounts will increase over the next years due to national strategy. The plants will be treating both agricultural manure and residues from production, waste from food manufactures, from retail shops and separately collected biowaste from households.

7 Contacts and sources of information

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Legislation and rules can be found by searching number and year (given above) here: www.retsinfo.dk

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About Danish Biomass Recycling Association

Danish Biomass Recycling Association (in Danish: Genanvend Biomasse) - works to embrace academic as well as political issues and issues related to the promotion of recycling of organic waste products for agricultural purposes. The Association will promote knowledge about recycling of organic residues used for agricultural purposes.

The Association works on issues of importance to legislation in this area and ensure improved decision basis for public authorities and decision makers in ministries, local authorities and the EU. The association strives for representation from all table-to-soil chain.



About Solum Gruppen

Solum Gruppen composts green waste and sell growth media for many purposes based on green waste compost. Solum Gruppen holds the patent for the Aikan Technology®, that treats source separated organic household waste by a fully integrated AD and composting method.

