Interreg Baltic Sea Region

Co-funded by the European Union

CIRCULAR ECONOMY
CiNURGi

Mapping of Residual Biomasses in Skive Municipality

Prepared by ConTerra

November 2024

Janni Thuesen, Johannes A. Larsen, Poul E. Larsen, Knud Tybirk & Louise Albeck

Energibyen Skive.dk

SKIVEKOMMUNE

ConTerra
Arealanalyse og Kortlægning

This project is part of the EU-funded Interreg Baltic Sea Region (BSR) core project #C049, titled CiNURGi, under the 2021-2027 PROGRAMME, Priority 3: Climate-Neutral Societies, Objective 3.1: Circular Economy.

Organizations from the following countries are collaborating to make it possible: Sweden (LP), Denmark, Estonia, Finland, Germany, Latvia, Lithuania, and Poland.

Project homepage: https://interreg-baltic.eu/project/cinurgi
Project LinkedIn-page: https://www.linkedin.com/showcase/cinurgi

Mapping of Residual Biomasses in Skive Municipality

Janni Thuesen, Johannes A. Larsen, Poul E. Larsen, Knud Tybirk, og Louise Albeck.

Recipent:
Skive Kommune
Business and Development, Energibyen Skive
Torvegade 10
7800 Skive

Prepared by:
ConTerra ApS
Agro Business Park
Niels Pedersens Allé 2
8830 Tjele

Subcontractor: Food and Biocluster Danmark

Date:
22-11-2024

Prepared by:
Janni Thuesen
Biologist
ConTerra

Johannes A. Larsen
Nature geographer
ConTerra

Poul E. Larsen
Land Surveyor
ConTerra

Knud Tybirk
Biologist
Food and Biocluster Danmark

Louise Albeck
Cand. Scient Pol.
Food and Biocluster Danmark

Janni Thuesen; Johannes A. Larsen; Poul E. Larsen; Knud Tybirk; Louise Albeck. 22-11-2024. Mapping of Residual Biomasses in Skive Municipality. Report from the CiNURGi project, Interreg BSR #C049.

Foreword

CiNURGi (Circular Nutrients for a Sustainable Baltic Sea Region) is an Interreg BSR Core Project dedicated to advancing circular economy for nutrients within the Baltic Sea Region. By enhancing infrastructure, technology, and policy the project seeks to improve nutrient recovery from biomass and resource streams originating from agricultural, municipal, and industrial sources. This endeavor aligns with several regional and European strategies, including the HELCOM Baltic Sea Regional Nutrient Recycling Strategy, the EU's Circular Economy Action Plan under the Green Deal, and the Integrated Nutrient Management Action Plan of the Farm to Fork Strategy. The CiNURGi is ongoing from November 2023 to October 2027.

This report pertains to Task A.1.1. – Assess potential for nutrient recycling (NR) to improve national and regional nutrient balances in Work Package 1: Piloting Solutions. The focusing of Task A.1.1. is to formulate the current basis for promoting nutrient recycling in the BSR by quantifying recyclable biomasses and identifying regions with nutrient surplus (hotspots) and deficits. The findings and activities detailed herein contribute directly to CiNURGi's overarching goals by contribution to understanding an area (Skive Municipality) with a nutrient surplus.

We acknowledge the collaborative efforts of our consortium, comprising 24 partners and 13 associated organizations from Denmark, Estonia, Finland, Germany, Poland, Latvia, Lithuania, and Sweden. Their dedication and expertise are instrumental in driving the project's success.

For more information about CiNURGi and its initiatives, please visit our project homepage https://interreg-baltic.eu/project/cinurgi/

September 2024

Erik Sindhöj & Cheryl Cordeiro, CiNURGi Project Coordinators

RISE – Research Institutes of Sweden

List of content

Abstract

In order to gain an overview of the available residual biomasses in Skive Municipality, a mapping of these and their current uses has been carried out for the four main sources: "Crop Production," "Animal Husbandry," "Municipal Supplies," and "Businesses."

The mapping clearly shows that agricultural residual biomasses are the most significant, both in terms of quantity and the number of producers. Residual biomasses from animal manure are used for agricultural purposes or in biogas production, with deep litter being more likely to be gasified than slurry. Straw from cereal production dominates the residual biomass from crop production and is primarily used as bedding or animal feed by livestock producers. Some crop producers use straw in straw-fired heating systems for their own heating. The use of straw in biogas production is increasing, and there is growing focus on incorporating straw into the soil by crop producers to enhance soil fertility. Grasses from connected lowland areas have potential for use in biogas production. Agricultural residual biomasses are also either stable in storage or produced year-round, while biomasses from businesses show significant fluctuations in quantity and availability over time.

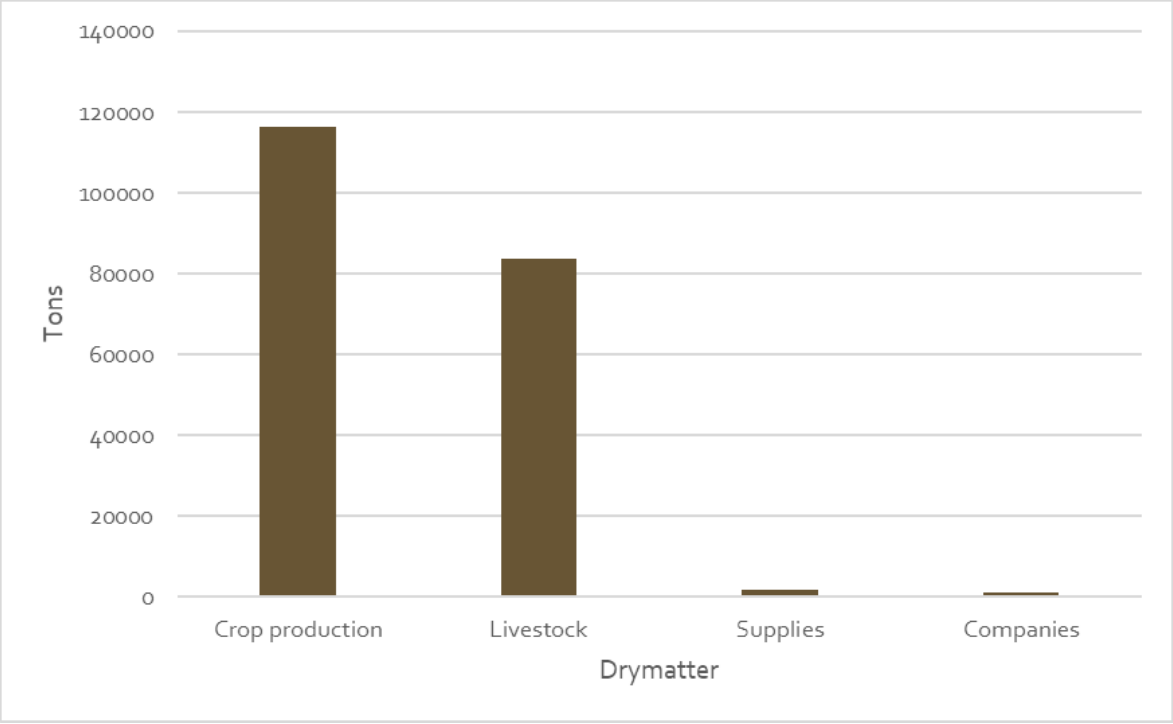


Figure 1. Distribution of biomass types across producers

As shown in Figure 1, the amount of nutrients in agriculture (crop production and animal husbandry) is significantly greater than in the other two groups. Figure 2 presents the total amount of nitrogen and phosphorus from the four surveyed producer groups, where the total

amount of nitrogen and phosphorus from animal husbandry and, subsequently, crop production are the largest. From municipal supplies, the largest nitrogen and phosphorus resource is sewage sludge from Skive Vand (a municipal owned water treatment facility), which is used for agricultural purposes. The nitrogen amount from municipally collected organic household waste is also significant.

Biomasses from companies are currently primarily used for animal feed and biogas production. The self-reported figures from the companies are estimated to account for 18.5 tons of nitrogen and 3.2 tons of phosphorus per year. However, there is a lack of knowledge regarding the business sector.

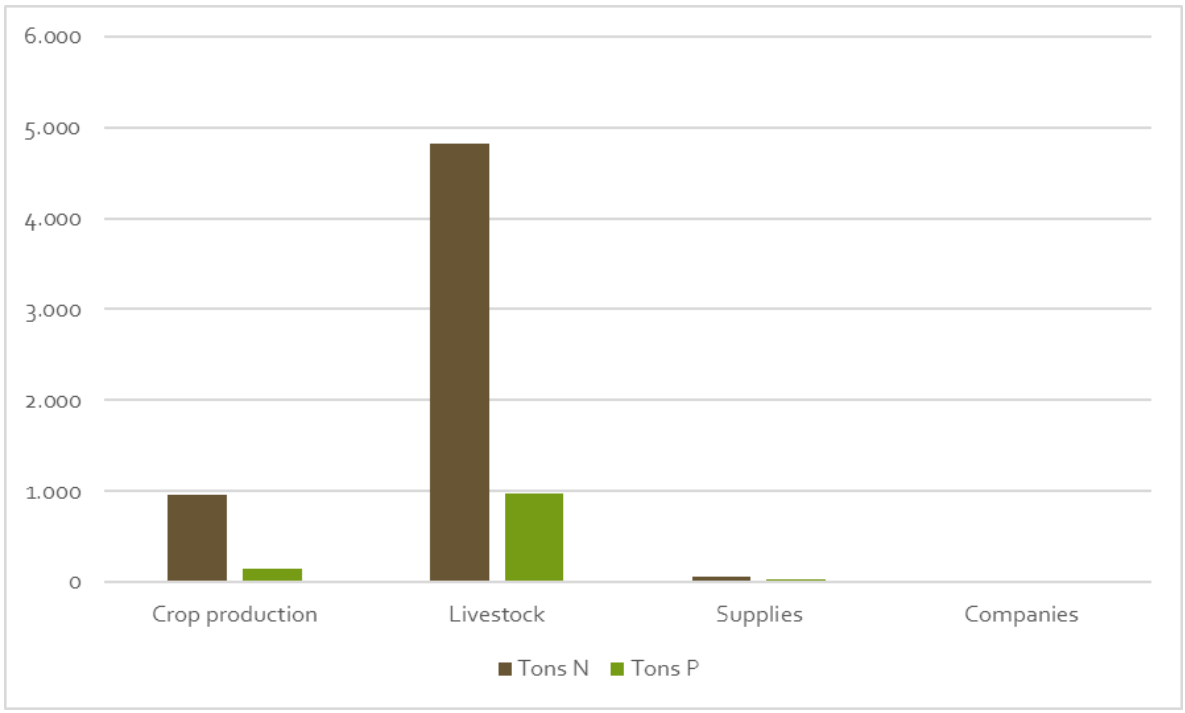


Figure 2 Distribution of nitrogen and phosphorus produced from producers' residual biomass

1 Introduction

In Skive Municipality's 2050 Climate Action Plan, land use is described with the aim of ensuring synergy with significant agricultural production and improvements in the aquatic environment.

Due to its location, Skive Municipality impacts the aquatic environment, as the municipality is bordered by the Limfjord, Venø Bay, and Hjarbæk Fjord. The location, with its fjords and coastal landscapes, is a defining feature of the municipality. There are over 190 km of coastline, and no point is more than 12 km from the nearest coast.

In the 2050 Climate Action Plan, Skive Municipality describes its land use as follows: We are a municipality with a strong agricultural presence, where pig and cattle farming dominate. Agricultural areas make up 74% of the municipality's land use, and the consequences of high agricultural activity can be seen in CO2e emissions from agriculture and are also felt in the water environment through the release of nitrogen and phosphorus into the water bodies surrounding Skive Municipality. We see a connection between the development of climate-friendly agriculture and improvements in the water environment.1

As part of working with Skive Municipalities Climate Action Plan, Energibyen Skive (a development team in Skive Municipality) wants an overview of residual biomasses in the municipality. To meet this need, the tender "Procurement of Consulting Services for Mapping of Residual Biomasses in Skive Municipality" was issued in relation to CiNURGi project, which is an EU-funded Interreg Baltic Sea Region (BSR) core project #C049, under the 2021-2027 PROGRAM, Priority 3 Climate-Neutral Societies, Objective 3.1 Circular Economy

The project website is: https://interreg-baltic.eu/project/cinurgi/

Based on this tender, ConTerra prepared this report on the key residual biomasses, their current uses, and the resulting nutrient flow.

The tender outlined four main areas where the residual biomasses should be described: residual biomasses from animal husbandry, crop production, municipal supplies, and businesses.

ConTerra involved Food & Bio Cluster Denmark A/S (FBCD A/S) as a subcontractor, due to their extensive experience with interview surveys and operate a business network within the field of bioresources.

This report outlines the methodology and data basis. The detailed results are presented in the attached spreadsheet, Appendix 1. The results are also summarized for the four aforementioned areas of residual biomass. Data sources are further described in Appendix 2.

2 Residual biomasses from animal husbandry

2.1 Residual Biomasses from animal husbandry and their current uses

[1] skive-2050-klimahandlingsplan-for-skiveegnen-enkeltsidet-04112022.pdf

Residual biomasses from animal husbandry are primarily animal manure, which has traditionally been spread directly on farmland. In recent years, there has been an increasing use of animal manure in biogas plants before it is applied to agricultural fields.

Animal manure appears in different forms depending on the type of barn and animal species. For cattle, animal manure consists of either deep litter (straw mixed with manure) or slurry, which is liquid. In some older barns, solid manure and "ajle" (a type of manure) are also produced. In these cases, solid manure is stored under the deep litter. For pigs, animal manure primarily consists of slurry, with varying water content depending on the type of pig. The relatively few large poultry farms in Skive Municipality produce deep litter.

Horse farming can be an alternative source of animal manure, especially for smaller operations, as these often do not have associated spreading areas. In horse farming, shavings and wood pellets are used to some extent as bedding instead of straw. In Skive Municipality, there are 223 horse farms, but only 13 of these are included in the manure accounting system, so only these have manure data. Of these, only 6 farms produce enough manure to deliver a truckload, and only one of these delivers deep litter, while the rest provide what is interpreted as shavings or wood pellets.

Animal manure used in biogas production must be relatively fresh, as otherwise, excessive evaporation occurs. For all types of animal manure (slurry), is characterized by a high water content. As a result, transport costs for animal manure are high, and it is crucial that it is possible to collect entire loads. In the analysis, we have based our calculations on the quantities specified in Table 1, which need to be available.

Table 1. Minimum amounts of animal manure

Type	Shape	Frequency	Min. Quantity per pickup	Min. Quantity per year
Cattle - Slurry	Liquid	Every 3rd week	30 tons	520 tons
Pig - Slurry	Liquid	Every 3rd week	30 tons	520 tons
Cattle - Deep litter	Solid	Annually	15 tons	15 tons
Deep litter other (poultry)	Solid	Annually	15 tons	15 tons

2.2 Nutrient content and dry matter percentages

In Aarhus University's annual publication: Normtal for husdyrgødning (Norm values for animal manure) it is specified which dry matter percentage and nutrient content can be expected in animal manure for a given housing system. However, experience also shows that, in practice, there is more water in the animal manure than the individual norms indicate, and this will vary depending on the farm. In the following Figure 3, the distribution of nutrient production is shown for Skive Municipality.

Figure 3. Production of nutrients (N and P) from animal husbandry in Skive Municipality (2023)

The dry matter and nutrient content in the calculation will be a weighted average of the animal species and housing systems included.

The quantities above represent total production. In practice, there will also be production cases that are too small to be economically viable for utilization.

2.3 Estimated value/cost

Animal manure has a fertilizing value equivalent to 50 to 100 Danish kroner per ton of manure, to the extent that it is applied to agricultural land directly2.

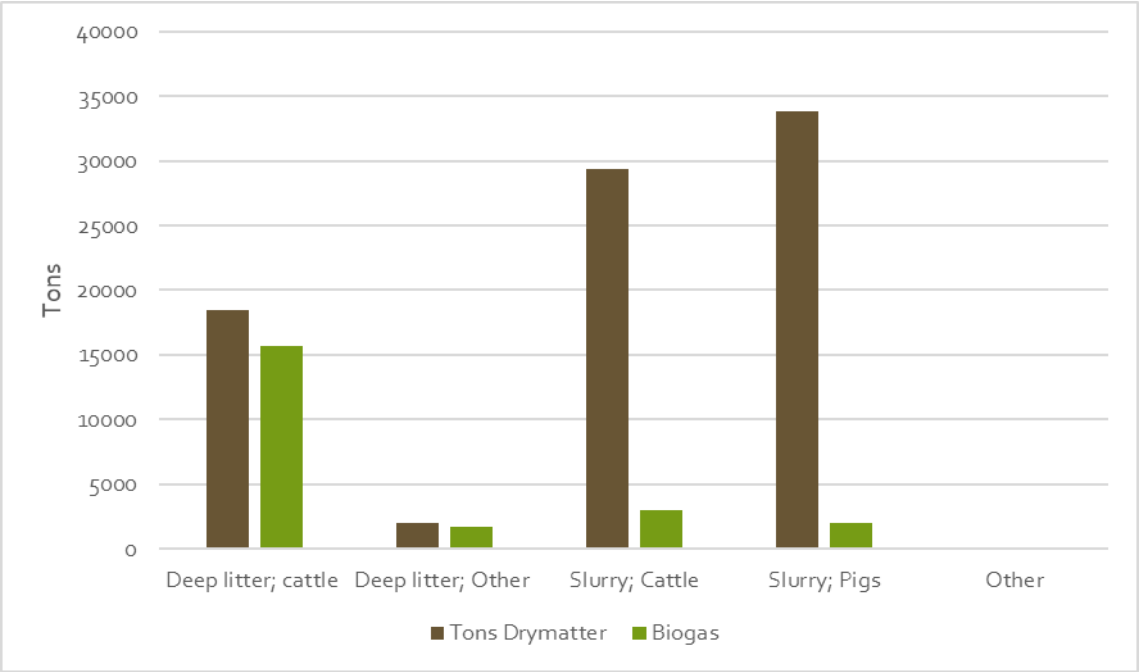
When delivered to biogas plants, the price ranges from 0 Danish kroner (in some cases negative) to a small positive amount3. However, typically, degassed biomass is returned in an amount corresponding to the delivered animal manure. Pricing agreements between farmers and biogas plants are, however, very difficult to access.

2.4 Biomasses and nutrients

Based on the established criteria for minimum quantities, a total of 83,680 tons of biomass dry matter (DM) is available in Skive Municipality. However, a portion of this is less relevant, either because the dry matter content is very low, as in the case of pig slurry (7,412 tons), or because cattle slurry contains sand (11,010 tons). Cattle slurry with sand presents challenges in biogas plants and is therefore rarely used for biogasification. The distribution between the different types of animal manure is shown in the following Figure 4.

[2] HTTPS://WWW.SAGRO.DK/LANDBRUGSRADGIVNING/DELTIDSLANDBRUG/LYNVEJLEDNINGEN/LOVE-OG-REGLER/NATUR-OG-MILJOE/HUSDYRGOEDNING.

[3] HTTPS://LANDBRUGSAVISEN.DK/ANALYSE-GYLLE-TIL-BIOGAS-BURDE-KOSTE-EN-TIER-PR-TON-MINDST



Figur 4. Fordelingen af tilgængelig husdyrgødning i Skive kommune (2023)

As mentioned earlier, the only non-agricultural use of animal manure at present is degassing in biogas plants. As shown in Figure 4, a large portion of deep litter is degassed, while only a smaller portion of slurry goes through a biogas plant.

3 Residual biomasses from crop production

3.1 Residual biomasses from crop production and their current uses

In crop production, straw from cereal cultivation is the dominant form of residual biomass. The calculation also includes straw from seed grass production and straw from pea and rapeseed cultivation. Straw is used as bedding and feed in livestock operations. As the number of livestock producers decreases and the number of animals per producer increases, the use of straw for bedding has been reduced.

Intensive crop cultivation results in the transfer of large amounts of carbon from the soil. Some farmers therefore view straw as a carbon resource, which, when incorporated into the soil, adds carbon and helps preserve soil structure.

Most crop farmers have a straw-fired boiler, where straw is used for their own heating. Deliveries for combustion in communal energy production facilities have not been identified among crop farmers in Skive.

In recent years, there has been an increased use of straw for biogas production, as the use of resources like maize (corn) for biogas will no longer allowed as of 2025. This development has only marginally been reflected in the registers, but we expect the input of straw into biogas production to increase in the future.

Since straw is stable for storage and can be kept in field stacks with relatively little space, there are no time constraints for pickup. A minimum threshold of 18 tons of material will be set, which corresponds to approximately one truckload.

In Skive Municipality, there are about 2,600 hectares of lowland areas with a carbon content of 6% or higher. These areas are expected to be taken out of normal agricultural production in the coming years (to reduce greenhouse gas emissions). However, there will still be areas that need to be maintained, where the harvested material can be used for biogas. These areas will typically be unfertilized, but will still receive nutrients through runoff from surrounding fields. ConTerra has developed a model in the GUDP (Danish Green Development and Demonstration Program) project "Høsttek" (Harvest Tech) to estimate the yield potential of these areas. Based on this model, the potential of harvested material from lowland areas is calculated. Harvesting from wet lowland areas involves high initial costs, so only areas with at least 5 hectares of continuous lowland will be considered.

3.2 Estimated value/cost

Straw for combustion and biogas is estimated to be sold at a price between 500 and 1000 Danish kroner per ton, depending on the type and delivery conditions. Certain groups of crop farmers (The Association for Reduced Tillage) have started to assign value to the soil improvement benefits and the nutrient value from incorporation into the soil. This value can be approximately at the same level, primarily in areas with low livestock density.

3.3 Biomass types and nutrients

Straw is a resource that can theoretically be used in many contexts. So far, the largest use of straw for non-agricultural purposes has been combustion, either in private straw boilers or in communal plants. However, this is not a significant activity in Skive Municipality, where, as previously mentioned, there are no communal straw-fired plants.

As shown in the figure below, only a small portion of the straw is utilized. However, it is expected that in the coming years, there will be an increase in the use of straw for biogas production. The utilization of straw is highest for spring cereals. The reason a larger portion of spring cereal straw is used is that it is primarily grown by dairy farms, which require a spring crop in their rotation. At the same time, there is also the greatest need for bedding.

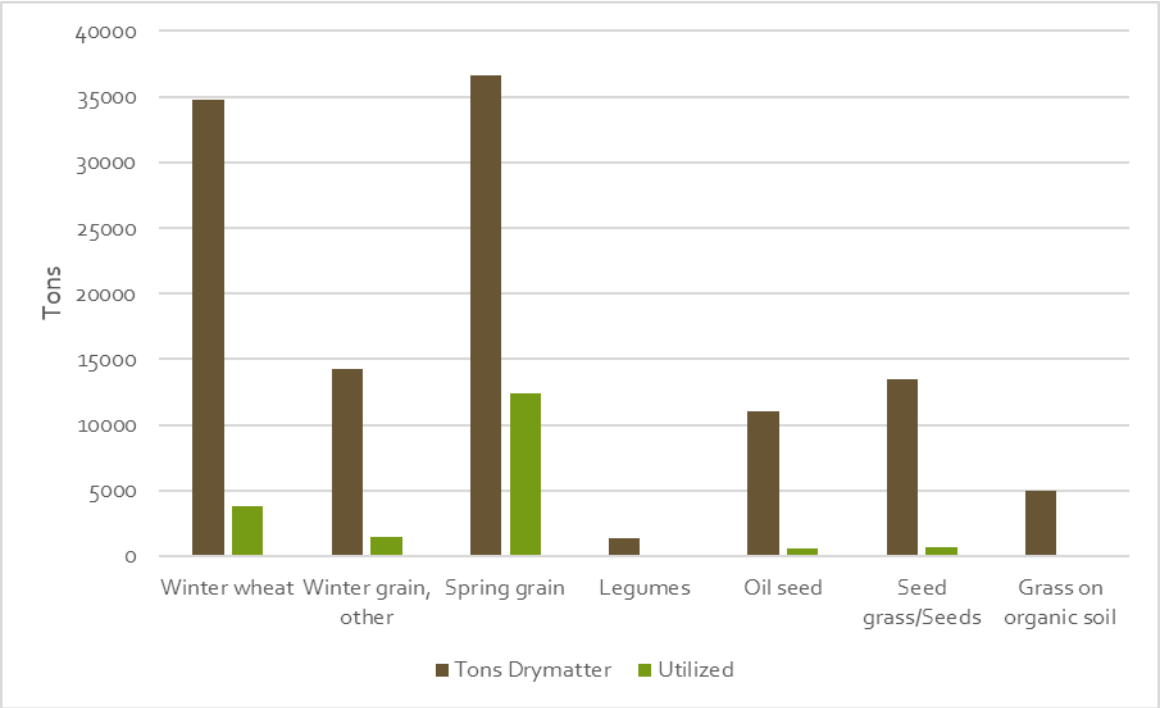


Figure 5. Production and use of straw

When assessing the residual potential, it is important to keep in mind that an increasing number of crop farmers are focusing more on soil fertility, with the incorporation of straw into the soil as a key factor.

4 Residual biomasses from municipal utilities

4.1 Residual biomass from utilities and their current uses

Residual biomasses from municipal utilities in Skive Municipality refers to collected organic household waste from residences and businesses, as well as sewage sludge from municipal wastewater treatment plants. In Skive Municipality, Nomi4s is responsible for collecting food waste and organic residual waste. The waste is transported to preprocessing facilities, where it is prepared for biogas production, and subsequently transported to biogas plants to be converted into energy and fertilizer. The nutrient content in food waste and organic residual waste is similar to that of livestock manure, although the dry matter content can vary significantly.

The sewage sludge included in this inventory originates from the municipality's wastewater treatment plants. Sewage sludge in Skive Municipality is primarily used for agricultural purposes following short or extended preprocessing.

4.2 Nutrient content and dry matter percentages

Based on nitrogen and phosphorus values, as well as dry matter percentages from residual biomass from municipal utilities, from analysis data collected from Skive Vand (wastewater treatment plant) and bio-pulp analysis from Gemidan Holsted, a summary of nitrogen and

phosphorus quantities is presented in Figure 6. The dry matter percentage of organic household waste depends on its exact composition and will vary based on its source. The dry matter percentage from the bio-pulp analysis (Gemidan) conducted in July 2024 has been used in this report. According to the waste data system, the registered amount of organic household waste collected from residents exceeds the amount collected from businesses.

fggffddFigure 6 shows that the largest quantity of wastewater sludge from Skive Municipality undergoes treatment at the Skive wastewater treatment plant. The Skive plant is equipped with a centrifuge, ensuring a high dry matter percentage in the wastewater sludge. Sludge from the Skive plant is either transported directly for agricultural use or sent to a sludge mineralization facility, from which it can also be used for agricultural purposes after a storage period. Sludge from the Fur, Selde, and Harre-Vejle treatment plants are utilized for agricultural purposes, with the total production volume being lower than that of the Skive wastewater treatment plant.

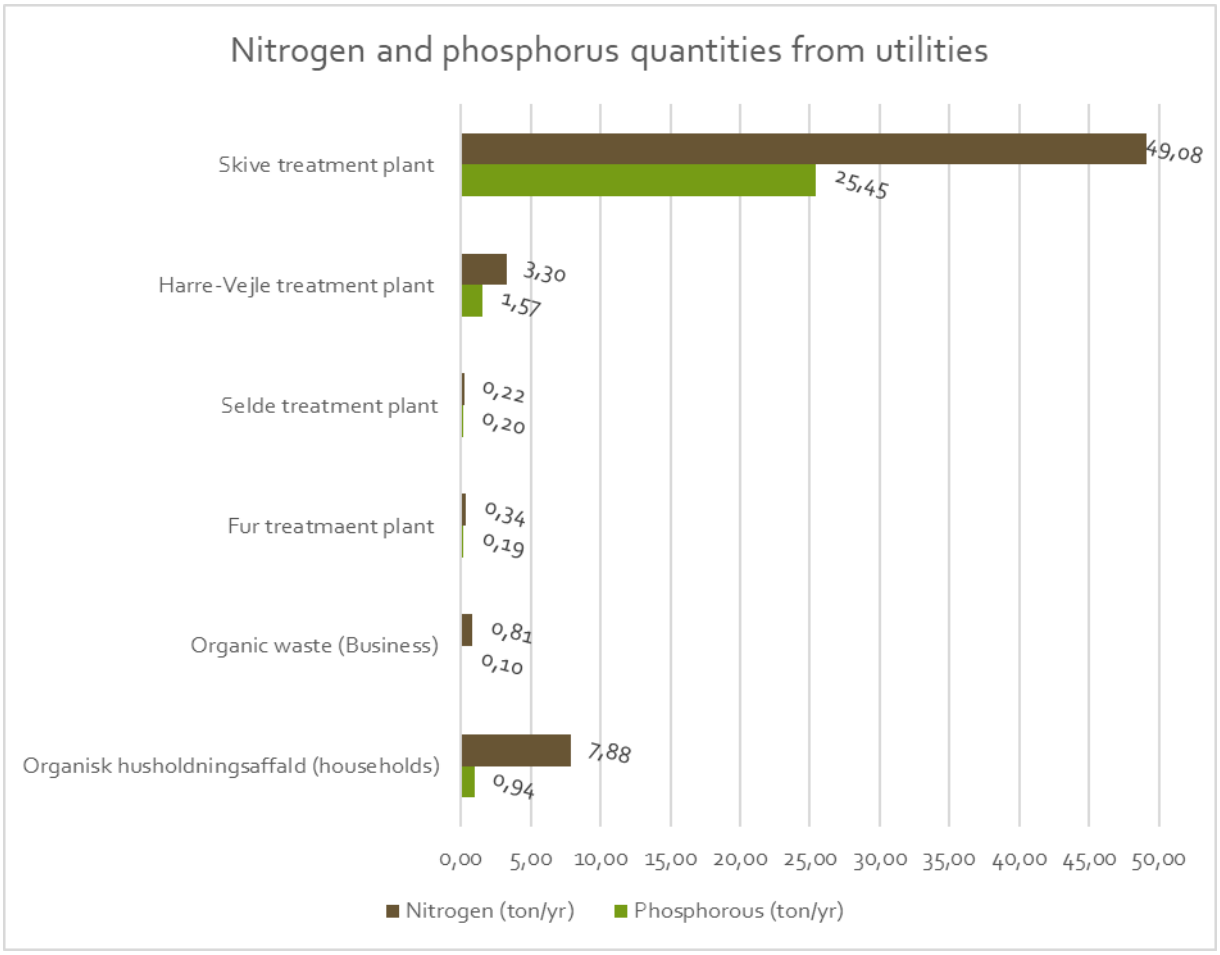


Figure 6: N and P Quantities (tons/year) of residual biomasses from municipal utilities (wastewater treatment plants and organic household waste)

4.3 Estimated value/cost

Nomi4s collection and transportation of food waste and organic waste are associated with transportation costs. Additionally, the waste must be pretreated in a pulping facility. There is economic value tied to the energy production in the biogas plant and the fertilizer value of the waste after pretreatment and biogas production. According to analysis data from Gemidan, the biogas potential is 500 Nm^3 CH_4/ton TS of organic material.

The cost of collecting and disposing of wastewater sludge for agricultural purposes varies based on transportation distance, the quantity of sludge, and potential environmental requirements, such as the need for specialized equipment for certain sludge types. Most wastewater sludge from Skive Vand is allocated for agricultural use. Approximately 60% of the wastewater sludge from the Skive treatment plant undergoes treatment at a mineralization facility before being applied to farmland. The Skive treatment plant is equipped with a centrifuge, and centrifuged wastewater sludge has a high dry matter content (around 20%), which makes the residual product more compact and heavier. This results in higher transport and handling costs.

In 2022, the costs for transportation and disposal were 127.70 Danish kroner/ton wet weight from facilities like the Fur treatment plant, whereas the cost from the centrifuge at Skive treatment plant was 365 Danish kroner/ton wet weight.

5 Residual biomasses from Businesses

5.1 Residual biomasses from businesses

Food and BioCluster Denmark (FBCD) conducted structured telephone interviews with businesses identified as potential suppliers of residual biomass. The purpose of these interviews was to collect precise and comparable data regarding the companies' available residual biomass resources.

For businesses that could not be reached by phone, the interview questions were sent via email. This approach allowed for the collection of a larger volume of data than would have been possible through telephone interviews alone.

To ensure consistency and comparability across interviews, an interview guide was developed. This guide included six questions, which were asked during all interviews and also sent via email.

5.2 Selection of businesses for interview

The selection of companies for interviews was based on two selection processes. Initially, a longlist of 122 companies was compiled from CVR.dk. The list was selected based on companies within Skive Municipality's primary and secondary industry codes. The selected industry codes are listed below:

- 16100 Agricultural services related to crop production
- 16200 Agricultural services related to animal husbandry
- 16300 Crop processing after harvest
- 16400 Processing of seeds/cereal grains for sowing
- 31100 Marine fishing

- 32100 Marine aquaculture
- 32200 Freshwater aquaculture
- 101300 Production of meat and poultry products
- 102020 Processing and preservation of fish, crustaceans, and mollusks, excluding fishmeal
- 103200 Production of fruit and vegetable juices
- 103900 Other processing and preservation of fruits and vegetables
- 105100 Dairy products and cheese manufacturing
- 107120 Manufacturing of fresh bakery products
- 108500 Manufacturing of prepared meals
- 110300 Production of cider and fruitwine
- 110500 beer production

I In the initial screening, it was determined that there are no residual biomasses for the groups 16100, 16200, 16300, 16400, other than what is already identified under crop production. The list was then further screened, including based on previous contact with FBCD, as well as the company names and industry codes. As a result, 30 companies with potential residual biomasses were identified.

The companies were unable to provide information on dry matter content, nitrogen (N), and phosphorus (P), so we calculated the values based on the most comparable values primarily from the (feed table) -fodermiddeltabel[4] and Rubæk et al 2018. The feed table specifies the percentage of protein, which is converted to kg of nitrogen by multiplying by 0.16.

5.3 Results

A total of 21 interviews were conducted, 12 of which were via phone and 9 via email. It was not possible to establish contact with 8 companies, and one company declined to participate in the survey. This results in an overall response rate of 70% from the contacted companies. The quality of the data varies considerably, as not all interviewed companies have in-depth knowledge of their residual biomass.

In general, there is significant variation in the amount of residual biomasses reported by the surveyed companies. Ten of the companies state that they have no or only negligible residual biomasses. For some of these companies, this is due to being newly established or having only a small department where no residual biomass is generated. Eleven of the surveyed companies report having residual biomasses, in larger or smaller amounts. Of these, one company states that its residual biomass is manure, which has already been accounted for under the data for animal manure and is therefore not included in this section.

It is important to note that all the collected data is self-reported by each company and therefore may consist of estimates and more or less precise figures for the reported amounts of residual biomasses.

[4] https://www.klimafoderdatabase.dk/Sammenlign/

Overall, the 21 surveyed companies can be categorized into three groups:

1. Beer and beverage production
2. Dairy and food production
3. Other

We have also contacted some companies in category 4) Fish and seafood – but they have stated that they no longer have any production – and therefore no by-products – in Skive Municipality. Today, there are only offices located in Skive Municipality.

5.4 Conclusions

With these numerous caveats, we can collectively estimate that there are approximately 18.5 tons of nitrogen and 3.2 tons of phosphorus in the three categories for which data on residual biomass types have been found in Skive Municipality. These are currently used as animal feed or input for biogas plants.

	Tons DM	tons N/ år	tons P/ år
Total	**991,6**	**18,5**	**3,2**

It is important to keep in mind that all collected data are self-reported by each company and may therefore consist of estimates and more or less precise figures for the reported amounts of residual biomass.

It has been surprising how little systematization and knowledge companies have about their side streams/by-products. It is expected that larger companies will soon begin to gain a better overview in relation to ESG reporting (including for subcontractors).

Appendix

Appendix 1: Attached spreadsheet with summaries

The attached Excel spreadsheet describes the collected data.

Appendix 2: Data basis

In this annex, the registers used specifically in the sections on Animal Husbandry, Crop Production, and Utilities to describe operations are outlined.

Data livestock farming

The reports are based on data from the General Animal Husbandry Reports (GHI) for 2023. However, data from GHI 2019–2022 is also included for mapping the development of the quantities of produced animal manure. All animal production facilities from farms required to submit manure accounting reports are included. This excludes animal holdings that are only registered in the Central Livestock Register (CHR). The latter typically refers to smaller livestock holdings, which have no significant impact on the estimation of manure quantities for potential biogas production. This includes, for example, holdings of horses, sheep, goats, etc.

The GHI includes information such as livestock species and type, number of annual animals, and stable type. These details are recorded at the CHR number level, which means that farms (CVR number) may be listed with multiple entries in the GHI. The information at the CHR level is linked with data from the annually updated standard figures for manure quantities, grouped by livestock type and stable system, developed by Aarhus University-DCA[5]. Data from this source reflect the standard production per annual animal and are calculated for defined production conditions (weight limits, milk yield, etc.). Animal farms provide correction values in the GHI if the production conditions at the CHR site deviate from the standard data. These values are used at the CHR level to adjust the quantities of produced animal manure. The calculated manure quantities are then summarized at the CHR level.

Data on the delivered quantities of animal manure for biogas production is taken from an underlying register behind the GHI, the "supplier register." Here, delivered manure quantities are specified by type, but unlike the data for produced animal manure, the data is provided only at the CVR level. The delivered quantities for biogas production are given as totals for the manure year. Data at the CVR number level for exported animal manure to biogas production are therefore allocated to the associated CHR sites tied to the CVR number.

[5] Børsting, C. F., & Hellwing, A. L. F. (2024). Normtal 2023/2024 - Tabeller for næringsstofudskillelse. Aarhus University. (https://anivet.au.dk/forskning/sektioner/husdyrernaering-og-fysiologi/normtal

Data crop farming

Farmers are required to report the size, location, and crop of each field annually as part of the subsidy payment process. These reports are combined with soil maps, ensuring that each individual field is associated with its size, crop, and soil conditions.

The Danish Agricultural Agency and Aarhus University maintain an annual overview of standard yields for specific crops on various soil types, covering both cereals and straw.

This data is combined with ConTerra's database, CTzoom, which contains information on all farms in Denmark, including their annual crop reports (most recently from the 2024 harvest year). For clarity, straw is categorized as follows:

- Winter wheat
- Other winter cereals
- Spring cereals
- Rapeseed and pea straw (in a combined group).

Data on straw deliveries for biogas production is sourced from an underlying register behind the General Livestock Reporting System (GHI), known as the "supplier register." This register records the quantities of straw delivered at the CVR level. Similarly, it will also indirectly reflect if farms have delivered straw for collective burning.

Data utilities

The data regarding residual biomass from the municipal utilities is sourced from the data sources described in the section below.

The waste data system

The waste data system -Affaldsdatasystemet (ADS-portal) The Waste Data System is a web-based database that collects information about waste streams in Denmark. Companies responsible for waste treatment are required to report to the Waste Data System. When reporting, the origin of the waste and the method of treatment must be specified. A range of waste data is publicly available. Companies can view and edit their own data, but data displayed publicly on the website https://www.ads.mst.dk/ consists of aggregated reports, as company-level data may be considered commercially sensitive. The data in this report is from 2022.

Waste water data

The wastewater data has been collected from Skive Vand and pertains to Fur, Selde, Harre-Vejle og Skive wastewater treatment plant. The compilation is based on Skive Vand's quantity information on sewage sludge and the analyses conducted in 2022 and 2023. The compilation of residual biomass from municipal utilities includes the residual biomass from treatment plants that could typically be used for agricultural purposes.

Bio-pulp data

Gemidan in Holsted Prepares source-separated organic waste products from households and businesses for bio-pulp, which is used for biogas production. The bio-pulp must be declared and analyzed according to:

Executive order no. 1001 of 27.06.2018 on the use of waste for agricultural purposes and Executive order on supervision of sewage sludge etc. for agricultural purposes no. 56 of 24.01.2000. Analysis data from July 2024 is used in this calculation.