- Full view -

WASTE_ESQRS_A_SE_2022_0000

National Reference Metadata in ESS Standard for Quality Reports Structure (ESQRS)

Compiling agency: Swedish Environmental Protection Agency

Eurostat metadata
Reference metadata

1. Contact	
1.1. Contact organisation	Swedish Environmental Protection Agency
1.2. Contact organisation unit	Environmental and Waste Analysis Unit
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2. Statistical presentation
2.1. Data description
See section 3.1
2.2. Classification system
See section 8.1
2.3. Coverage - sector
See section 6. Accuracy and reliability.

2.4. Statistical concepts and definitions
See section 6. Accuracy and reliability.
2.5. Statistical unit
See section 6. Accuracy and reliability and annex 2
2.6. Statistical population
See section 6. Accuracy and reliability.
2.7. Reference area
Sweden
2.8. Coverage - Time
Reference year 2020, for comparability over time see section 8.2
2.9. Base period
NA

3. Statistical processing

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3.1. Source data

12.1.1 Institutions involved and distribution of tasks

Table 1 shows the institutions involved and distribution of tasks within WStatR2022.

Table 1. Institutions involved and distribution of tasks.

Name of institution	Description of key responsibilities
Swedish Environmental Protection Agency (EPA)	Responsible for producing, publishing and reporting national waste statistics. Responsible for the Swedish Portal for Environmental Reporting (SMP). The register covers all activities that have permission to environmentally hazardous activities according to the Environmental Code and is updated continuously by the county administrations. At the portal yearly environmental reports from facilities are available.
SMED consortium	SMED is an acronym of "Swedish Environmental Emissions Data", which is a collaborative consortium involving the four organizations IVL Swedish Environmental Research Institute, Statistics Sweden, Swedish University of Agricultural Sciences and Swedish Meteorological and Hydrological Institute. The waste statistics and documentation have been produced by SMED (only IVL Swedish Environmental Institute and Statistics Sweden have been involved) at commission of the Swedish EPA.
Other primary data collectors	Organisations, enterprises, agencies, etc. have made own inquiries or surveys from their members. SMED has collected data from them and compiled the data to reporting format.
• Swedish Waste Management (Avfall Sverige)	Swedish Waste Management is the trade association for municipal waste companies and municipalities. They make yearly surveys of household waste generation and treatment through inquiries to municipalities. In

	addition, domestic hazardous waste is included in their survey.
• Material companies for packaging	Companies working with collection and recycling of packages according to the producer's responsibility legislation. They have provided data concerning generated and treated packaging.
• El-Kretsen	El-Kretsen is responsible organisation for collection and recycling of electric end electronic products. They collect and publish data about collection of WEEE.
• Swedish Tyre Recycling Association (SDAB, Svensk Däckåtervinning)	Swedish Tyre Recycling Association is a producer's responsibility organisation responsible for collection and recycling of tires. They collect and publish data about collection and treatment of scrap tyres.
• Board of Swedish Industry and Commerce for Better Regulation (NNR)	Specification of requirements for inquiries, e.g. recommendation of scope and layout of inquiries.

In preparation for the current reporting, the work has been organised as in Figure 1.

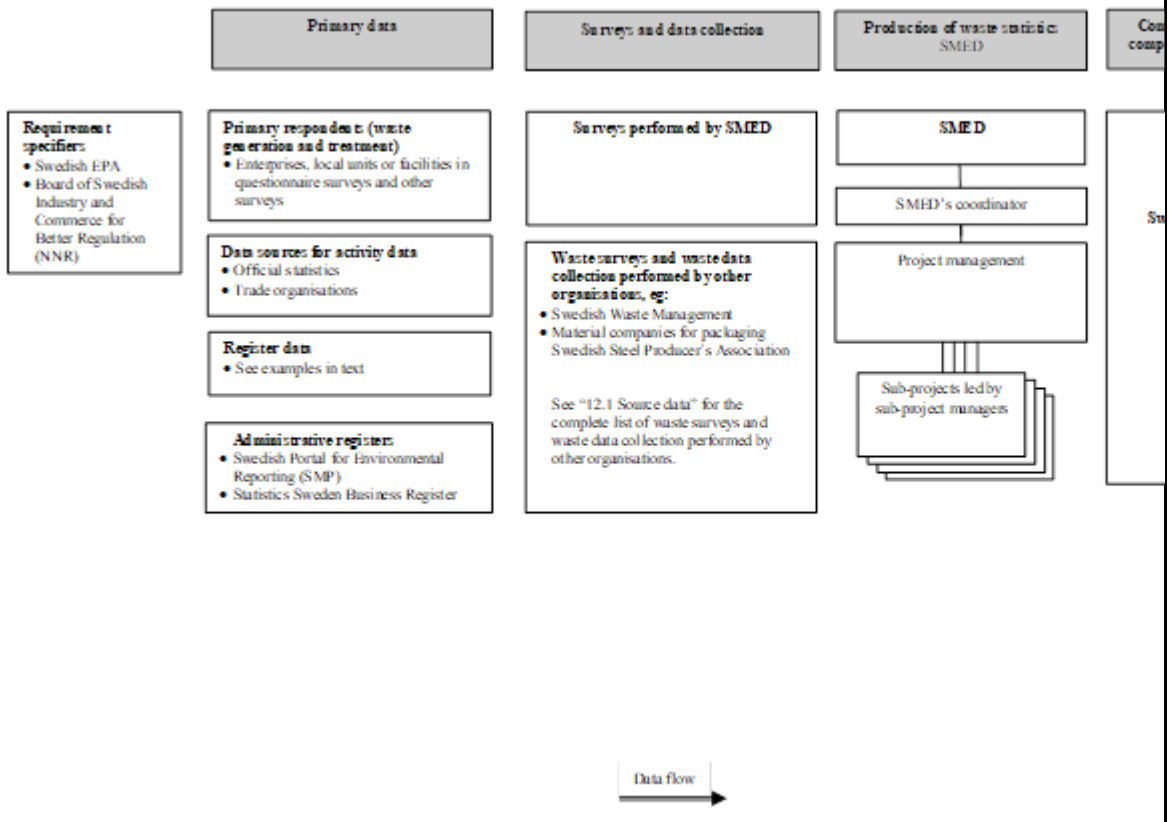

Figure 1. Description of the parties involved for data collection, processing and presentation.

General description of which methods are used in which part of the data set
Data set 1: Waste generation by waste category (EWC-Stat) and economic activities (NACE)

General description of methodology

Several methods have been combined to collect data. When selecting methods, a starting-point has been to prioritise good quality of statistics for flows of hazardous waste and large flows of waste that have been associated with environmental or resource issues. Another starting point has been to reduce the burden of respondents.
Data on waste generation and waste treatment has as far as possible been checked against other administrative data and other sources, e.g. Avfall Sverige (Waste Management Sweden), trade organisations, earlier surveys and other international reporting, such as packaging waste, ELV, dredging spoils, etc.
In the survey, environmental reports were used as a data source. The environmental report is a legal requirement, and it is one of the instruments that the authorities can make use of in order to inspect an environmentally hazardous activity. The information in the environmental report is expected to be of high quality and does not increase the burden of respondents. In addition to environmental reports web surveys are used for facilities in the manufacturing industries (NACE C that lack mandatory reporting to the Swedish Portal for Environmental Reporting (SMP (environmental reports)).

Table 12, Annex 1, gives an overview of the methodologies used to collect waste statistics. It should be emphasized that there are usually several methods used in each industry or sector. For example a web survey can be the main method, but model calculations are used for small enterprises (less than 10 employees). Some NACE sectors may also consist of several sub sectors, where different methods have been used for different sub sectors. The methods indicated in Table 12, Annex 1 are the major methods used.

Determination of waste generation in the economy on the basis of information on waste collection

Information from waste collection has not been used.

Determination of waste generation in the economy on the basis of administrative sources

Environmental reports

The most common administrative source in the WStatR-production work for Sweden is environmental reports. Statistics from different industries are based on the register of environmentally hazardous activities in The Swedish Emission Reporting Portal (SMP). It is operated by the county administrative boards and the Swedish environmental protection agency. It covers facilities with permits for environmentally harmful operations according to the Environmental Code. Facilities with permits for treatment of waste were selected from this database. Information on generation and treatment of waste was extracted manually from the text reports and registered in the WStatR production database. Obvious coding- and unit errors were corrected.

Facilities with permits for waste treatment have to make a separate report for received construction and demolition wastes (wastes according to chapter 17 in the list of waste). These separates reports include LoW codes for waste, treatment method (R- and D-code according to the Annex I and Annex II in the waste framework directive), and secondary wastes aroused during sorting, mechanical treatment and other pre-treatment.

Hazardous Waste Register

Hazardous Waste in NACE G-U excl. G46.77 is from WStatR 2022 collected from the hazardous waste-register (*Avfallsregistret*) managed by the Swedish Environmental protection agency. Businesses that generate hazardous waste should report to the register.

End-of-Life-Vehicle

Statistics Sweden and the Swedish Agency for Transport Policy Analysis publish statistics about registration of vehicles, including private cars, lorries, cars, buses, trailers, semi-trailers, caravans, motorbikes, mopeds class 1, tractors and snowmobiles. In addition, the organisation registration number (VAT number) of the owner, in the case of private car the birth registration number, is registered as well as the kerb weight of each vehicle. All changes in the ownership, as well as deregistering, are reported to the register continuously.

A search in the register was made to extract all information about all deregistered vehicles, including organisation registration number of the last owner and the kerb weight that were deregistered during 2020. It was assumed that the main reason for deregistering is that the deregistered cars have been handed over to an authorised car dismantling facility[1]. There may be some exceptional reasons for deregistering, e.g. export of private car, or sole use of the car on private property, but we have judged these occurrences negligible.

The organisation registration number was linked and matched with the business register. In this way, the weight of deregistered vehicles for each NACE was obtained, including households for vehicles owned by private persons.

Data sets 2 and 3: Waste treatment, general description of methodology

Waste treatment occurs in several economic sectors. The waste treatment in all sectors has been covered in a coordinated survey. The survey included facilities registered as waste treatment plants in the register of environmentally hazardous activities. In addition, industrial facilities with treatment of waste are included in the register. Environmental reports were used as data sources.

Identification of relevant treatment facilities

The registers used for identification of waste treatment plants are presented in Table 2. The register of environmentally hazardous activities is used as the main frame. The other registers have been used to check the completeness.

Table 2. Registers used for identification of waste treatment operations.

Identification of register(s) used	**Description of register**
Environmentally hazardous activities (responsible: Swedish EPA and the county administrative boards)	The register covers all activities that have permission to environmentally hazardous activities (according to the Environmental Code). The register is obtained through SMP The Swedish Portal for Environmental Reporting. It is updated continuously by the county administrative boards.
Facilities for household waste (responsible: Avfall Sverige /Waste Management Sweden)	Avfall Sverige (Waste Management Sweden) is a trade organisation where municipalities, municipality-owned waste companies and private waste companies are members. They keep a record of facilities that manage household wastes. The register covers all waste facilities that incinerate, compost, digest or landfill household waste. It is

	updated yearly through a survey to the municipalities. The register is voluntary.
Business Register (responsible: Statistics Sweden)	All types of legal forms with some kind of economic activity are included in Statistics Sweden's business register. Earlier surveys have shown that waste treatment facilities, especially facilities run by municipalities, often cannot be identified as waste treatment facilities from the register. (The municipal waste treatment plants are often incorporated in other municipal activities and difficult to identify).
Records from earlier WStatR surveys (responsible: SMED)	The databases from the earlier surveys contain the treatment plants that have been identified in the earlier surveys.

The waste treatment facilities were identified by their activity code in the register of environmental hazardous waste activities. Both primary codes and secondary codes were assessed. All facilities with incineration, landfilling and biological treatment of more than 50 tonnes per year are in the register as well as other treatment facilities for sorting, mechanical treatment and so on. Treatment facilities for household waste were also identified by information from the trade organisation Avfall Sverige (Waste Management Sweden), see Table 2.

Some types of waste are legally used as fuel in industrial or energy facilities or used as raw materials in manufacturing processes without waste treatment permits. These facilities cannot be identified by their activity code. Most of them have been identified in earlier surveys or in connection with the waste generation surveys, but there may be a few facilities that are not included.

From the registers 1959 facilities with potential waste treatment were identified. This includes 1 639 waste treatment facilities (in NACE E38 and E46.77) and 320 industry facilities that also treat waste. Pre-treatment plants and sorting plants were included in this figure. The register also contained some non-active facilities, for example older facilities that have closed down but still were registered, or new facilities with new permits or licenses that still were in the planning or construction stage.

The register of waste treatment plants included all facilities with a permitted or licensed treatment capacity of more than 50 tonnes/year of incineration, landfilling and biological treatment, and other treatment. Treatment plants with lower capacity have been excluded. Smaller plants that use soils and mineral waste for backfilling or for construction purposes are excluded. As already mentioned, there are also facilities in manufacturing industry that use different wastes or rest products as raw material in their production without being registered as waste treatment facilities. We have tried to identify as many as possible of these (for example in connection with the waste generation surveys), but there may still be under-coverage.

The register of all permitted or licensed waste treatment plants does not contain any facilities with permission to release waste to water. However, we have judged that release to water occurs mainly from facilities already in the register (for example landfills releasing leachate water), or from industries that are studied in the waste generation survey (in which also treatment not included in our register was looked for). There is also information from earlier surveys about facilities with release of waste into water.

Data collection on treated quantities

An overview of methods and sources for waste treatment is shown in Table 3.

Table 3. Determination of treated waste quantities.

Description of data sources and methods by treatment categories					
Item 1 Incineration (R1)	**Item 2 Incineration (D10)**	**Item 3a Recycling (R2 – R11)**	**Item 3b Backfilling**	**Item 4 Landfilling (D1, D5, D12)**	**Item 5 Other disposal (D2, D3, D4, D6, D7)**
Environmental reports Where needed, supplementary data for household waste facilities were obtained from Avfall Sverige (Waste Management Sweden)	Environmental reports	Environmental reports In a few cases, data were also obtained from the facility by telephone or mail contact. Where needed, supplementary data for composting and digestion for household waste facilities were obtained from Avfall Sverige (Waste Management Sweden)	Environmental reports	Environmental reports In a few cases, data were also obtained from the facility by telephone or mail contact when data were missing in the environmental reports. Where needed, supplementary data for household waste facilities were obtained from Avfall Sverige (Waste Management Sweden)	Environmental reports Other disposal of Dredging spoils: from the reporting according to Helcom and OSPAR

The data on treated quantities were collected as follows:

1. Data from the HELCOM and OSPAR reporting were used for dredging spoils dumped at sea. In connection with the HELCOM and OSPAR, reporting a special survey was made about other treatment of dredging spoils (backfilling and landfilling) which are not covered by environmental reports.
2. For all other treatment, environmental reports were used.
3. The environmental reports were available digitally through the Swedish Portal for Environmental Reporting (SMP). The content in the environmental report is regulated by a decree from the Swedish EPA. There is no standardized reporting of waste treatment, but the decree states that the environmental report shall contain "production data". Facilities that receive construction and demolition wastes (defined according to chapter 17 in the List Of Wastes) have to report treatment method (R and D code) and waste code (LoW) for the received CD waste).
4. If the environmental report was not available, or if it contained no usable data about treatment, we reused data from earlier environmental reports, or data from WStatR2020 (reference year 2018), and in some cases we contacted the facility.

When evaluating the environmental reports, the following information was extracted from the environmental reports:

- Treatment method and pre-treatment. The treatment “Other recovery than energy recovery” was divided into composting, anaerobic digestion, material recycling, use as construction material) and other recovery.
- Waste type (List of Waste) and quantity treated (in tonnes).
- Waste generated at treatment plant (used for the waste generation survey in NACE 38 and 46.77). Both primary and secondary wastes were investigated.
- All facilities were identified with a code giving the location on NUTS3 level.

  The amounts of treated waste and the capacity were then summarised. The number of plants in each NUTS 2 region was also counted.

  We have earlier found that it is difficult to survey recovery in manufacturing industries. The respondents often have a broad concept of "recovery", and in earlier questionnaire surveys, it was found that respondents often classify different kind of pre-treatment as "recovery" and "recycling". For the WStatR-production, statistics is classified as "final" recovery or recycling when the waste cease to be a waste and is transposed to a new product, material or construction. Often industries do not classify that as recovery or waste treatment, they regard it as use of secondary raw materials. Special efforts have been made to survey the real "final" recovery and recycling, and to exclude different kinds of pre-treatment and sorting.

Data collection on capacity of treatment facilities

The environmental report shall contain information about given permits and production data. However, the permits are usually expressed in terms that are difficult to convert to terms that are used on WStatR-production:

- Landfill capacity is often given as height of landfill, area of landfill, permission to landfill the waste that has been generated (for industrial landfills), allowed landfilling per year, etc.
- Some integrated plants with several treatment methods (e.g. landfilling, composting and sorting) sometimes have a permission to manage a certain amount of waste per year, without any specification on each treatment methods.
- For energy facilities, maximum quantity of supplied fuel in energy units (for example MW or MWh per year) is often used, which is not relevant to describe the annual incineration or use as fuel of waste at the facility.
- The following principles to estimate the capacity have been employed: It was assumed that the permitted capacity is approximately the same as the treated quantity, i.e. that the facilities receive close to the maximum quantity of waste allowed.

  The number of facilities in different regions has been retrieved automatically from the database.

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[1] Occasional deregistration is not included.

3.2. Frequency of data collection

Data on waste generation is collected every second year for households and most industries. However, a few industries which generate very small amounts of waste are surveyed less frequently, e.g. NACE 13-15, 16, 19, 20-22, 23, 26-30 and 31-33. All aforementioned NACE:s were surveyed regarding waste generation in 2020. Data on waste treatment is collected every second year.

3.3. Data collection

Prior to each WStatR-production round, all relevant data sources are listed, e.g. environmental reports and data from business associations. For the manufacturing industry, a sample survey is

also carried out as described in Annex 2 Waste generation in the economy – sample survey. In order to minimize response burden and optimize the use of resources, some industries are surveyed less frequently as described above. The data collection period for the web survey is mainly April-June, but a few facilities are given respite. Starting from waste generated in 2020 the local units included in the sample surveys are obligated to report generated waste according to a change in the Swedish legislation (SFS 2020:614). Data collection from environmental reports and other administrative sources takes place in April- February.

3.4. Data validation

In WStatR2022 Sweden implemented a data validation tool for generated waste, which compares the values for 2020 to previous years' values according to facility and waste type. The validation takes into account the impact of the change to the total value per waste type. This has been done in effort to use the labour resources most efficiently, and to objectively validate the data.
When external reference data sources have been available, these have been used for validation of WStatR data.

3.5. Data compilation

All input data is stored in a database. Estimation for each activity item is made by a standardized script. Statistical disclosure control is made when all data is in place.

3.6. Adjustment

No adjustments are made.

4. Quality management

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4.1. Quality assurance

See below.

4.2. Quality management - assessment

Relevance and accuracy
For most economic activities (NACE), relevance and accuracy are good. However, for a few activities data is more uncertain, which is indicated with the "E" flag in GENER.

Timelines
The timetable was set up in order to deliver data to Eurostat and Swedish EPA in time. The deadlines have been met.

Accessibility
The statistics is published in Statistics Sweden's Statistical database, which is open to the public. The quality report and the report "Waste in Sweden 2020" will be published by Swedish EPA in June 2022. Extracts from the statistics will also be published on the Swedish EPA's website. Information leaflets regarding waste statistics for certain NACEs and waste streams will also be available on the Swedish EPAs website in June 2022.

Comparability
The regulatory framework and guidelines from Eurostat have been followed as far as possible. This should guarantee that the statistics are comparable with corresponding statistics from other member states. The current survey WStatR2022 is essentially comparable to the prior surveys from WStatR2020 to WStatR2012. Methodological changes are marked with B for break in time series in the delivery file.

Coherence
The Swedish official statistics on generated and treated waste are based on the same general statistical information, same general methods, scopes and limitations as other statistics that are reported to Eurostat.

5. Relevance

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5.1. Relevance - User Needs

There are many different users of waste statistics - citizens, politicians, municipal, regional and national authorities, central government offices, industry, researchers, press reporters, the public, etc. The needs differ depending on type of user. Some users are interested in the total numbers from the statistics, whereas others are interested in certain NACE or sub-categories of NACE, or certain waste types.

5.2. Relevance - User Satisfaction

Apart from the reporting obligations to the EU in accordance with the waste statistics regulation, statistics on waste generation and recovery and disposal of waste are needed in Sweden for the follow-up and development of environmental policies, the 16 national environmental objectives, the national waste management plan, and other action plans. The existing waste statistics are considered to be useful for both the follow-up and the development of action plans in this field, even if follow-up indicators and other uses based on the statistics need to be further developed.

5.3. Completeness

Table 4. Description of missing data in data set one on waste generation.

Description of missing data (waste category, economic activity, ..)	Explanation	How to overcome the deficit

No missing data in dataset 1.

Table 5. Description of missing data in data set two and three on treated waste quantities and capacities.

Description of missing data (waste category, treatment category, region, ...)	Explanation	How to overcome the deficit

No missing data in dataset 2 and 3.

5.3.1. Data completeness - rate

The data on waste generation is considered to be complete across waste types and economic activities, i.e. the rate is 100 %. In the cells where the reported values are zero, there are strong indications that the combinations of waste type and economic activities are not occurring. For example, the waste type may not be reported by any of the several hundred enterprises included in the survey, or that the combinations of activity and waste type is extremely unlikely.

The data on waste treatment is also considered to be complete for all facilities with permission to treat waste. The data covers all incineration, with and without energy recovery, all landfilling, all other disposal, and most of the recovery. Backfilling and recovery of inert wastes (mineral waste and soils) in smaller facilities are not covered, but the overall rate is considered to be very close to 100 %. In the cells where the reported values are zero, the combinations of waste type and treatment method are not occurring.

6. Accuracy and reliability

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6.1. Accuracy - overall

The overall accuracy varies between industries and types of waste. Typically, the accuracy is good for waste treatment and for generated waste from waste treatment facilities, households, and in industrial branches with large amounts of waste, i.e. NACE 05-09, 10-12, 17-18 and 24-25. For other industries, the uncertainties are larger, especially in NACE G-U excl. 46.77.

Random errors are described under sampling errors below. Measurement errors and nonresponse are also considered to be random to some extent. Regarding bias, it is assumed to be negligible at the aggregated level for non-hazardous waste. This is because the mining industry accounts for most of the non-hazardous waste and the mining industry is subject to a total coverage survey.

6.2. Sampling error

Sampling errors may occur when a sample of the local units/facilities/enterprises that are included in the target population is surveyed. The error is due to the degree of variation in the data and can be controlled by choosing the appropriate sampling design. In sample surveys, the sampling errors are assessed by the coefficients of variation.

In cases where data on the generation of waste and treatment of waste have been produced from surveys (questionnaire or environmental reports as the data source), sampling errors (coefficients of variation) are estimated together with the estimates of population totals for each waste category. Surveys are used for estimation of waste generation in mining and quarrying and manufacturing industries. Web surveys were used for NACE C10-33. Environmental reports were used in NACE 05-33, 38 and 46.77. For NACE 05-09 and 38.1-2, a total survey of environmental reports is the only data source, and hence there are no sampling errors in these industries.

In practice, the unit nonresponse is treated as being random. In the estimation process, the number of selected units in each stratum is replaced by the number of responding units (m_h in the formula below). This means that the unit nonresponse is reflected in an increased sampling error.

The variance is calculated according to the formula:

$$\hat{V}(\hat{t}_z) = \sum_{h=1}^{H} \frac{N_h^2}{m_h}\left(1-\frac{m_h}{N_h}\right)\frac{1}{m_h-1}\left[\sum_{k=1}^{m_h} z_{hk}^2 - \frac{\left(\sum_{k=1}^{m_h} z_{hk}\right)^2}{m_h}\right]$$

where

$\hat{t}$ = *point estimate*

H = *number of strata*

N_h = *population in stratum h*

m_h = *total responses in stratum h*

The mean error of the estimate is then calculated using

$$SE(\hat{t}) = \sqrt{\hat{V}(\hat{t})}$$

and the relative mean error (*rmf*) or coefficient of variation is calculated as

$$rmf = \frac{SE(\hat{t})}{\hat{t}}$$

In the tables reported, the variance coefficients are expressed as percent of the point estimate.

In sectors other than those mentioned above, sample surveys are not used and hence sampling error is not applicable for these sectors.

For disposal and recovery of waste all facilities with a permission to treat waste is surveyed by environmental reports, i.e. it is a total survey with no sampling error.

6.2.1. Sampling error - indicators

Uncertainties in key aggregatesTable presents the key aggregates reported. For waste generation, coefficients of variation are calculated as the overall standard deviation from the sample surveys in relation to the estimated total amount of waste. Only aggregated data from administrative sources is used for waste generation from households, and hence there is no sampling error. The mining industry (NACE 05 – 09) accounts for 80 % of the non-hazardous and 64 % of the hazardous waste generated from enterprises. Since no sample survey is conducted for this industry, the contribution to the sampling error is zero for non-hazardous waste. The largest contributors to hazardous waste from enterprises other than NACE B are NACE F, G-UX46.77 and D. None of these industries are surveyed by means of a sample survey, and hence the coefficient of variation is rounded to zero also for generation of hazardous waste in enterprises.

For waste treatment, the coefficients of variation are zero because it is not a sample survey.

Table 6. Totals and coefficients of variation for the key aggregates in 2020.

Country: Sweden Reference year: 2020		**Total hazardous waste (key aggregates),** ***Tonnes***	**Total non-hazardous waste (key aggregates)** ***Tonnes***	**Coefficient of variation hazardous waste** ***%***	**Coefficient of variation non-hazardous waste** ***%***
Generation of waste					
1	**Households**	437 830	4 207 954	0	0
2	**Enterprises**	8 092 152	145 861 146	0	0
Recovery and disposal of waste					
1	**Incineration with energy recovery R1**		28 5101	0	0
2	**Incineration as a means of disposal D10**		67 523	0	0
3	**Recovery R2-R11**		1 842 060	0	0
4	**Landfilling D1, D3, D4, D5, D12 Land treatment and release to water D2, D6, D7**		4 782 526	0	0

It has been assumed that the different sub-sectors are independent of one another when they are summed to the key aggregate. The standard formula for propagation errors can thus be applied:

$$U_{total} = \frac{\sqrt{(U_1 * x_1)^2 + (U_2 * x_2)^2 + ... + (U_n * x_n)^2}}{x_1 + x_2 + ... + x_n}$$

Where:

U_{total} is the percentage uncertainty for the total waste quantity

x_i is the incoming waste quantity

U_i is the percentage uncertainty for waste quantity x_i

For all the sub-categories that are not subject to sample surveys, $U_i = 0$. Waste treatment is surveyed by a total survey to all registered waste treatment facilities. Since it is a total survey the variation coefficient is 0.

6.3. Non-sampling error

In the Swedish reporting of waste statistics, sample surveys account for only part of the estimates and hence various types of non-sampling errors are the main contributors to the total survey error (TSE).

Non-response, coverage errors and erroneous and/or incomplete answers can cause non-sampling errors. Table 7 and table 8 below show the distributions of object status in the questionnaire survey and environmental report survey, respectively.

Table 7. Distribution of object status in questionnaire survey (observation object=local unit)

Response status	C10_12	C13_15	C16	C17_18	C19	C20_22	C23	C24_25	C26_30	C31_33	Total
Valid response	80	28	55	54	1	79	44	119	219	76	755
unit nonresponse	50	10	19	10	2	23	13	34	49	31	241
Over coverage	0	0	1	0	0	0	1	0	5	0	7
Response rate	62%	74%	73%	84%	33%	77%	76%	78%	80%	71%	75%
Over coverage rate	0%	0%	1%	0%	0%	0%	2%	0%	2%	0%	1%
nonresponse rate	38%	26%	25%	16%	67%	23%	22%	22%	18%	29%	24%

Table 8. Distribution of object status in environmental reports (observation object=facility)

	ABAL	B05_09	C10_12	C13_15	C16	C17_18	C19	C20_22	C23	C24_25	C26_30	C31_33	Total
Valid response	713	19	98	14	41	42	11	100	23	109	110	26	1306
Env. report not accessible, imputation with	2	0	0	0	0	0	0	2	1	0	0	0	5

data from WStatR2020													
Env. report not accessible, imputation not possible	199	0	6	0	1	3	0	7	2	6	8	0	232
Env. report not complete, imputation not possible	27	0	27	3	17	13	1	19	3	53	22	5	190
Over coverage	698	1	0	0	2	3	0	0	0	3	10	0	717
Total	1639	20	131	17	61	61	12	128	29	171	150	31	2450
Response rate	44%	95%	75%	82%	67%	69%	92%	78%	79%	64%	73%	84%	53%

6.3.1. Coverage error

Coverage errors regarding the population occur when the survey method results in:

- Waste generating enterprises or facilities are included in the target population, but not included (missing) in the frame population. This is known as "under-coverage".
- The same enterprise or facility is included in several sub-surveys, or objects that were not active during the reference period are included in the frame population. This is known as "over-coverage".

Coverage errors lead to waste quantities either being missed, counted twice, or overestimated due to over-coverage. Under- and over-coverage problems related to the population that have been detected in connection to the collection of data include:

- Local units with incorrect NACE codes in the business register.
- Out-of-date information in the business register or the environmental reports register (SMP) on local units or facilities that are no longer active (over-coverage) or new enterprises or facilities starting recently (under-coverage).
- Data on amounts of packaging waste is obtained from the official packaging waste statistics and allocated to households and NACE G-U excl. 46.77. If packaging waste is included in glass-, paper-, wooden or plastic waste in environmental reports or questionnaires, there is a risk for double counting.

To compile data adapted to the waste statistics regulation, different methods have been used for different activities. In the surveys for waste generation reaching 100 % coverage has been aimed for by the following strategies/techniques:

- In sample surveys, waste generation in small local units below cut-off (less than 10 employees) has been covered by multiplying each reported amount of waste in enterprises with 10-49 employees by a factor defined as

$$\frac{number\ of\ employees\ in\ the\ population,\ 10-49\ employees}{number\ of\ employees\ in\ units\ above\ cutoff}$$

- When using waste factors to estimate generated waste, activity data that covers the whole industry has been used when applicable (e.g. working hours, number of employees). This is applicable for industries not surveyed by means of sample survey.
- In NACE 38.3 and 46.77, proportional adjustment to reach 100% coverage has been made. The adjustment factor has been assessed by number of employees.

In NACE 05-09, waste from NACE 08 is not covered. This has several reasons. Historically, very few environmental reports for this industry were available. In the business register, the sites are either part of a local unit included in some other economic activity, typically in NACE 23, or correspond to local units with less than 10 employees. This known deficit has not been prioritised, mainly because the contribution from NACE 08 to the waste generation from the group NACE 05-09 is negligible compared to NACE 07 and 09 (NACE 05-06 are practically not occurring in Sweden).

Depending on the size and activity, waste treatment facilities can be divided into three categories:

- **"**A facilities" require a permission from the Swedish environmental court. Larger waste incineration plants, landfill sites, composting plants, anaerobic digestion plants and industrial plants are A activities. All A activities are obliged to annually upload an environmental report with waste data to the Swedish Portal for Environmental Reporting (SMP).
- "B facilities" require permission from the county administrative boards. Other (smaller than A) waste incineration plants, landfill sites, composting plants, anaerobic digestion plants and industrial plants are B activities. All B activities are obliged to annually upload an environmental report with waste data to SMP.

- "C facilities" require a registration to the local authority, usually the municipality. Examples of C facilities are some preparatory treatment and storage facilities, and smaller facilities that use soils and mineral waste from construction and demolition for backfilling or construction purposes. C facilities are generally not obliged to upload environmental reports to SMP.

In the survey of waste treatment all facilities with permission to manage waste are included in the frame and the survey. That includes 1 639 waste treatment facilities (in NACE E38 and E46.77) and 320 industry facilities that also treat waste are included in the frame. Smaller facilities do not report to SMP. Thus, Sweden lacks a comprehensive national data source/inventory that covers smaller facilities (estimated to more than 3 000 facilities) which were not included in the frame. Compared to facilities with permission, the registered activities are considered to be of less importance regarding amount of waste treated (on national total level), and their activities are mainly recovery, transfer and storage. These activities are not surveyed because of the lack of easily available data in combination with the assumption that they are of less importance when it comes to waste treatment. Recent pilot studies however, indicate that on a national total level, the licensed activities can, in fact, contribute to a non-negligible amount of treated waste for some waste categories (for example recovered soils and mineral waste from construction and demolition) and may have an effect on the recovery rate of these wastes. This will be further investigated for future WStatR-reportings and in ongoing governmental assignment on improving the Swedish waste statistics. A new reporting system "Waste Register" (Avfallsregistret) has been launched in 2021, which covers both facilities with permission and registered facilities for tracking the generation and transport of hazardous wastes.

6.3.1.1. Over-coverage - rate

Over-coverage rate due to units being closed before 2020 or not active in 2020, is calculated. See tables 7 & 8 above.

6.3.1.2. Common units - proportion

Different frames have been used in different surveys, i.e.:

- NACE 05 – 09 and NACE 10 - 33 are based on local units in the Statistics Sweden business register. This is matched with the register of environmentally hazardous activities in the Swedish Portal for Environmental Reporting (SMP), operated by the county administrative boards and the Swedish EPA. Two frames are constructed, one with local units matching a facility in SMP and one with the remaining local units. The former is used in the environmental reports survey and the latter used in the web survey. The object definitions are not identical, which can lead to coverage errors.
- NACE 38 and NACE 46.77 are based on register of environmentally hazardous activities in the Swedish Portal for Environmental Reporting (SMP), operated by the county administrative boards and the Swedish EPA. The frame for waste treatment consists of facilities with permits for the treatment of waste included in this database.
- The frame (for generated waste) of incineration plants in NACE 35 is based on the annual energy statistics survey (Electricity supply, district heating and supply of natural and gasworks gas 2020).

This may lead to over-coverage (object counted in several surveys) as well as under-coverage (objects in the target population missing in all frames used). The different frames have been checked against each other with the aim of detecting objects that have appeared in several of the frames. Any cases identified where data have appeared twice have been corrected. It is hence assumed that no data has been counted twice.

Local units have been used as observation unit in the surveys of manufacturing industries. In the surveys of NACE 05-09, 38 and 46.77 facilities were applied. A "facility", in this case, is a unit that has permission for environmental hazardous activities and is registered in SMP. Usually a facility is equivalent to local unit, but there are exceptions since the facility is based on the

environmental hazardous activities and the local unit is based on the economic activities. There are examples where one local unit consists of two or more facilities (two separate permissions), as well as where one facility consists of two or more local units. This causes coverage problems in those sectors where the frame is based on the business register, i.e. local units, while the data is actually collected on facility level. We have tried to overcome this problem by checking that each local unit is only counted in one of the sub populations (web-survey or environmental reports population).

It happens that a facility is matched to several local units, coded as different activities (e.g. NACE 08 and 23), and the facility may represent each of the local units, or both/all of them. The waste must be allocated to one activity only, and the choice is made manually using information in the business register and the environmental report. This does not have any influence on the total amounts of waste, but may affect the distribution of waste between different activities.

Coverage rates in the questionnaire survey and environmental report survey, respectively, are shown in tables 7 and 8 above.

In NACE G-U excl. G46.77, the under-coverage-rate is unknown, but suspected to be non-negligible. For example, the statistics on waste from harbours does not cover all harbours, which leads to large under-coverage mainly for the waste items 10.2 and 11. We also know that there is major under-coverage in the data used for waste from airports, medical care and distribution of newspapers. The under-coverage rate is not possible to quantify, mainly due to lack of documentation, and hence no compensation is possible. The data source used for hazardous waste 2020 is considered to have better coverage rate than the data source used for previous years, but still the under coverage could be substantial. Many companies in these industries are not represented in the hazardous waste register, however, it is not known how many of these companies that actually generated hazardous waste.
There may be an under-coverage of recovery of soils and mineral waste from construction and demolition – smaller facilities do not need permission (only notification to the local authority), and they are not included in the survey of waste treatment. This will also have an influence of the generation of the corresponding secondary wastes.

Another possible under-coverage is when wastes, usually well-defined “clean” wastes, are used as fuel or raw material in industries. There are several examples where the industries do not report this as waste treatment in the environmental report. During several years there has been an attempt to identify these facilities, and today all major facilities should have been identified and are included in the survey.

The definition of waste has been interpreted according to European regulation and practices. After 2008 there has been a tendency towards classifying some rest-products as by-products instead of waste. This means that rest-products that have been included in the waste statistics before 2008 are no longer included. A difficulty is when a facility generating a rest-product and a facility receiving the rest-product classify the same rest-product in different ways. Since waste generation and waste treatment are separate surveys, there are usually no possibilities to discover those discrepancies. It is a recognized task for the supervising and monitoring authorities to give guidance so the classifying of rest-products as waste or by-product becomes harmonized in all parts of the waste management chain.

6.3.2. Measurement error

Measurement errors can occur when incorrect data is received from respondents (in questionnaires or in environmental reports) and not corrected during editing. Furthermore, estimated values have been permitted in the surveys. This can affect the precision of the reported quantities. In those cases where macro data is used, we have usually no insight into the measurement problems in the underlying data collection. Measurement errors may also affect macro data collected from business associations, but generally, information about suspected measurement errors in these data sources is not available.

The forms and the design of the survey have been discussed with the Board of Swedish Industry and Commerce for Better Regulation (NNR). The questionnaires have also been discussed with Statistics Sweden's questionnaire design department. This effort, which was carried out during WstatR2016, was made to eliminate risks of misunderstanding etc.

Data from environmental reports and web surveys are subject to review by micro editing rules. Certain combinations of waste type and activity that are unlikely to occur are flagged, as are extreme observations. Each object is given a score based on suspected errors (flagged by the editing rules) and expected impact on the statistical estimates (using design weight). All objects whose suspected errors are expected to have a significant impact are checked manually. In several cases, relatively large errors in the submitted responses/environmental reports have been detected. In addition, the output editing sometimes leads to correction of errors not detected in the micro editing. There can still be incorrect responses/data that have passed undetected, and the magnitude is difficult to quantify, but the micro- and output editing processes should detect all significant errors.

Classification errors

The information in the environmental reports is not always clearly reported. The information can sometimes be interpreted in different ways, for example classification of waste (e.g. when the waste is called only "sludge") or classification of treatment (e.g. the treatment may be called “recycling” both when it is a preparatory treatment, for example sorting, and when it is “final recycling”, for example use of metal scrap in a steel work).
The corresponding errors may also arise in questionnaire surveys. The respondents have to make the interpretation of which information that should be reported in the questionnaire and how, and there is an obvious risk for misunderstanding and misinterpretation.

1. In the questionnaires and in the use of environmental reports we have primarily used LoW (List of waste) codes to label the waste. However, in many cases, both in questionnaires and environmental reports, as well as in both waste generation and waste treatment, the respondents do not always apply the LoW classification, but use their own nomenclature, for example naming wastes as “other waste”, “rest waste”, “oil waste”,” sludge”, “combustible waste”, “landfill waste”, and similar. In these cases, there has been a manual reclassification to LoW. However, several waste types are difficult to unambiguously classify to LoW or EWC-Stat:"Oil wastes" (waste that contains oil) can be classified under several different LoW codes that, in turn, can result in several different EWC-Stat categories such as 01.3H, 03.2H, 02H, 10.2H, and 08H.
2. "Sludge" can be classified in a lot of different ways giving different EWC-Stat categories such as Industrial effluent sludge (03.2), Sludges and liquid wastes from waste treatment (03.3) or Common sludge (11), but can also be other categories such as EWC-Stat 12, 09.2, 09.1, 02H, 01.3H.
3. “Ash” and “slag” can mean both EWC-Stat 12.4 and 12.8. In addition, ash and slag from waste incineration can be classified as both EWC-Stat 12.4 and 12.8 depending on if the waste incineration is regarded as co-combustion or incineration.

4. "Other wastes" and "rest wastes" is normally classified as EWC-Stat-code10.2, unless the environmental report provides further information. However, similar texts could have been other wastes.

Errors in precision of quantities

Most waste quantities are based on weighing at the waste treatment facilities. In principle, all major waste management facilities are equipped with weighing-machines. Data from waste generators are usually based on data achieved from the waste management facilities (for example invoices, individual annual report to customers or similar).
Conversion factors have been used if waste has been reported in other units than tonnes. Conversion factors have been obtained from data from respondents and other experts, including Swedish Waste Management (Avfall Sverige), official energy statistics, etc. Some of the conversion factors are not particularly controversial, such as tonne per m^3 of oil or tonne per m^3 of sludge. Problems have occurred when the waste has been reported as mixed, or when it was unknown whether the waste has been compressed or not. The same conversion factors have been used in all sub-surveys for similar wastes. Some waste types are sometimes given in number of items, for example refrigerators, freezers, fluorescent tubes, other sources of light, and similar. These have been converted to weight by different conversion factors.

6.3.3. Non response error

The unweighted response rate for the web surveys on waste generation was 75 % on the total level. This is much better than in previous reference periods, thanks to the fact that the survey is mandatory from reference year 2020. The proportion of valid environmental reports is similar, except among smaller facilities in NACE 16-18, 24-25 and 38+46.77.

The unit nonresponse was compensated by means of proportional adjustment, that is, linear expansion within each stratum. Thus, it was assumed that each stratum is homogeneous and that the respondents are representative for the non-respondents. The nonresponse adjustment and the sample adjustment are made at the same time. Such adjustments have been made for the surveys in the manufacturing industry. Nonresponse- and sampling error has not been estimated separately, but the nonresponse error is reflected as a larger sampling error.

In the waste generation survey for NACE 38 and 46.77 there was non-response due to environmental reports with classified information or with missing information about waste generation. No compensation for these rare cases was made, and hence there is a negative nonresponse bias in waste generation in NACE 38 and 46.77.

In addition, in the survey of waste treatment there was non-response due to environmental reports with classified information or with missing information about waste treatment. This also leads to a negative nonresponse bias.

The description above concerns unit non-response. Item non-response can also occur. No adjustment for item nonresponse has been made because it is not obvious which types of waste that should occur for a specific facility.

When adjusting for non-response at least two different errors can occur:

1. Linear expansion within strata assumes that the responding and non-responding parts of the population have similar properties regarding the parameters that are surveyed, in this case waste generation. If this assumption is wrong and waste generation is systematically lower or higher in non-responding units than in the responding units used for estimation, linear expansion leads to over- or underestimation. It can also lead to errors in the distribution between waste types. Some of the objects in the sample could be extreme in some way. An extreme value together with a high design weight and/or low response rate implies a risk for errors. The result can be a large over-estimation of a particular type of waste. This risk

for error is not easy to detect if the error is not so large that experienced waste and industry experts can detect it when checking various compilations. However, outliers have been reallocated to separate strata (with weight = 1) in order to avoid over estimation when linear expansion is used. The weights of the objects remaining in the original strata have been adjusted accordingly.

6.3.3.1. Unit non-response - rate

At the overall level, the unit non-response rate in the web-survey was 24 %. For environmental reports, 199 of the 811 reports in the mining & quarrying and manufacturing industries were missing or did not contain useful information. See table 6 for response to web survey.

Table 6. Response rate for web survey

NACE	Npop	Nsamp	Nresp	response rate	non-response rate
10-12	656	130	80	62%	38%
13-15	95	38	28	74%	26%
16	425	75	55	73%	25%
17-18	272	64	54	84%	16%
19	3	3	1	33%	67%
20-22	425	102	79	77%	23%
23	256	58	44	76%	22%
24-25	1412	153	119	78%	22%
26-30	1334	273	219	80%	18%
31-33	649	107	76	71%	29%
TOTAL	5527	1003	755	75%	24%

Npop=number of units in the population
Nsamp=number of units sampled
Nresp=number of responding units
Due to over coverage the response- and nonresponse rate do not always summarize to 100 percent.

In the waste generation survey for NACE 38 and 46.77, the number of surveyed facilities was 994, of which 509 generated waste and 145 facilities were reported as unit non-response. In addition to the non-responding objects, some of the treatment plants in NACE 38 and 46.77 generate no waste. Thus, they are not considered unit non-response. It was judged that the non-responses to a large part were from non-active facilities, and no adjustment was made. However, it is likely that some of the non-responding facilities have waste generation that should be included in the statistics.
Also, in the survey of waste treatment 1639 facilities were surveyed of which 314 are reported as unit non-response. The non-responses are expected to large part come from non-active facilities, and no adjustment was made. However, it is not impossible that some of the non-response facilities have waste treatment that should have been included in the statistics.

6.3.3.2. Item non-response - rate

The rate of item non-response is impossible to determine in this case, since it is often not obvious which types of waste that “must” be generated in a specific industry, and it is even more difficult to reveal if some rare wastes are missed. Generally, item non-response has been assumed to be not occurring, and hence the rate is zero. Units with obvious multiple item non-response, e.g. only reporting a couple of hazardous waste items and no non-hazardous ones, are not used in the estimation. Such objects are treated as unit nonresponse. There is a risk of a small negative bias due to item non-response, but the effect on the estimates is assumed to be negligible.

6.3.4. Processing error

Processing errors occur when the raw data are processed in various ways during the data production. The following processing errors can occur:

- **Editing errors.** In the surveys, all the submitted questionnaires and environmental reports are checked and data corrected if necessary. Minor errors have been corrected and some imputations have been carried out when data were missing.
- **Input errors.** The environmental reports are checked and reviewed in paper format or pdf format, and then the data has been entered into a database manually. When entering the data, a figure can be entered in the wrong place, or in the data entry itself (e.g. one digit too few or too many). The database has a built-in system to prevent some of the most common input errors (for example only approved classification codes for waste classification as well as treatment method given e.g. the economic activity).
- **Coding errors.** If a waste or treatment method is described in free text, the waste or treatment code must be assessed manually which could lead to coding errors. These errors can occur when the person reviewing the questionnaire or environmental report misunderstands the responses and makes an incorrect amendment.

The aim has been to reduce or avoid the above mentioned types of processing errors by an iterative process of micro- and macro-editing during and after the data collection. Controls have been made both before and after the input to the database.

The scripts used for estimation and table production are reviewed independently by two persons to detect errors.

6.3.4.1. Imputation - rate

No imputation was done in the web survey. In the environmental report survey of NACE B and C, 3 objects were imputed with data from the 2019 environmental report, and 7 were imputed with data from other sources. Hence the imputation rate was 10/ 881 = 1,1 %. The rate in terms of waste amounts has not been calculated.

In the survey of waste generation in NACE 38 and 46.77 the number of surveyed facilities was 595, of which all waste data was imputed for 2.

5.3.4.2. Common units – proportion

Ideally, there should be no common units (i.e. duplicates) since the web survey frame has been constructed as the complement to the register of environmental hazardous activities (SMP). However, due to the different unit definitions, in total 19 units, were sampled in both the web survey and in the environmental reports. This is less than 2 %, sampled in the web survey. This was dealt with by imputing the questionnaires with data from the environmental reports.

6.3.5. Model assumption error

In e.g. NACE 01-03, 41-43 and G-U excl. 46.77, the data available covers only part of the population, and various assumptions have been made to estimate the amounts for the whole population. Typically, waste generation is assumed to be proportional to turnover, number of employees etc. but these assumptions have not been verified and may infer model error.

Waste from small enterprises

None of the surveys covers the entire population in the industries surveyed. Waste generated in local units with less than 10 employees is estimated by means of cut-off expansion.

Proportional adjustments

In NACE 38.3 and NACE 46.77 only major facilities were investigated (usually facilities that have permission to handle more than 10 000 tonnes of waste per year). A proportional adjustment based on the number of employees (metal facilities in one group and non-metal in another) has been

made. This calculation is based on the assumption that the waste generation is the same per employee in small enterprises as in big enterprises.

Waste factors

The main problem with waste factors is that only one or a few factors that can affect the amount of generated waste is reflected by the factor. For example, if the factor is expressed as tonnes of waste per employee, the change in amounts of generated waste between two years only mirrors the change in number of employees and does for example not capture any measures taken to reduce the amount of waste generated per employee or improved sorting at source in different waste types. Waste factors have been used in several cases. In some cases the factors are based on current measurements, e.g. household waste from enterprises. These factors can be regarded as rather accurate. In other cases data from case studies, e.g. bio-degradable wastes from shops and restaurants have been used to estimate waste factors, which may increase uncertainty.

6.4. Seasonal adjustment

Not relevant since the statistics only includes annual data.

6.5. Data revision - policy

Normally, no data revisions are made unless specific and significant reasons exist, e.g. new standards or requirements from Eurostat.

6.6. Data revision - practice

When errors have been detected in the Eurostat review process, corrected data has been reported to Eurostat.

6.6.1. Data revision - average size

Generally, revisions are small.

7. Timeliness and punctuality

Top

A general time schedule for the reporting according to the EU waste statistics regulation is shown in Table 9.

Table 9. Time schedule for reporting waste statistics

Activity	Start	Completed
Planning, preparations and supplementary method developments	October 2020	March 2021
Data collection and processing	April 2021	April 2022
Compilation of statistics	January 2022	April 2022
Compilation of checking documentation	April 2019	May 2020
Drafting of Quality Report	April 2022	May 2022
Final checking of statistics and documentation	March 2022	May 2022
Data processing (checks of accuracy, completeness etc.)	November 2022	April 2022
Drafting of national statistical report	December 2021	May 2022
Supplementary work, follow-up, archiving	April 2022	June 2022

Delivery of statistics and quality report to Eurostat		30 June 2022 or earlier
National publication of statistical reports and available statistics in public database		June 2022

7.1. Timeliness

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7.1.1. Time lag - first result

The time lag between the end of the reference period and the publishing date is around 18 months.

7.1.2. Time lag - final result

Final results are submitted to Eurostat two weeks after the publishing date.

7.2. Punctuality

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7.2.1. Punctuality - delivery and publication

All data and publications were delivered in time to Eurostat.

8. Coherence and comparability

Top

The regulatory framework and guidelines from Eurostat have been followed as far as possible. All surveys have been carried out to achieve 100 % coverage of waste quantities. This should guarantee that the statistics are comparable with corresponding statistics from other member states. However, the following areas should be highlighted as somewhat problematic concerning comparability:

- The concept municipal waste contains, apart from waste generated by households, both in practice and legally, also includes similar waste from industries, shops, offices and other business. The majority of waste flows, such as bag and dustbin waste, packaging waste, electronic scrap, etc. contain both waste generated by households and waste from different operations. For every waste flow included in wastes from household, an assessment has been made by industry experts of how much originates from households and how much originated from businesses and other sources.
- The distinctions between waste and by-products have had considerable effects on the statistics and hence on comparability with other countries. Different countries may have different practices how to handle the by-products in the waste surveys.
- Local unit, establishment, facility and station have mostly been used as survey objects. A local unit, establishment, facility or station can have several different economic activities, one main activity and several secondary activities. In this case the entire local unit, establishment, facility or station has been classified by its main activity. For example, coking plants can be found at steelworks. Independent coking plants (not existing in Sweden) should be classified as NACE 19 and steelworks as NACE 24. In our survey, coking plants at steelworks have been classified as belonging to NACE 24, and the waste generated there has been allocated to NACE 24.

8.1. Comparability - geographical

The same methods are used in across Sweden.

For mobile treatment equipment the generation of waste and the recovery and disposal of waste, have been reported where it has been used. Capacity data have, however, been reported in the municipality where it is registered or permitted. Only a few mobile operations have been found in

the surveys, so the locations of these facilities are not considered to have any significant impact on the total reported quantities of waste or treatment capacities. See table 10 for classification used.
Table 10. Description of classification used.

	Name of classification(s) used	Description of the classification(s) (in particular compatibility with WStatR requirements)
Economic activities	SNI 2007	National classification based on NACE REV 2. Four first digits identical.
Waste types	List of waste	Converted into EWC-STAT Ver. 4 with conversion key
Recovery and treatment operations	Disposal operations and Recovery operations (so-called R code and D code) according to Annex I and Annex II in the Waste Directive	Converted to recovery and disposal operations according to WStatR production guidelines. The national statistics is presented in a less aggregated form (recovery is presented in several classes)

8.1.1. Asymmetry for mirror flow statistics - coefficient

This measure has not been calculated.

8.2. Comparability - over time

The current survey WStatR2022 is mostly similar to the prior surveys WStatR2020, WStatR2018, WStatR2016, WStatR2014 and WStatR2012. All surveys follow the guidelines from Eurostat, which means they should be comparable over time. However, some methodological improvements have the effect that the estimates for different years are not always comparable. These cases are described under *Major changes compared with previous year*, together with a description of observed major changes since last survey in 2020.

For a few industries with relatively low rates of waste generation data is not collected for every reference year, but less frequent (typically every 4 years). This affects the comparability over time for NACE 01-03, 13-15, 16, 19, 20-22, 23, 26-30, 31-33. For these industries, interpretations and comparisons of trends are not meaningful. For all industry NACE:s (C), a survey was used regarding generated waste 2020. This was to make sure that we included the potential impact of Covid-19 on generated waste. NACE 16 was investigated with survey method for the first time since 2008. A new method was also used for estimating hazardous waste from NACE G-U excl 46.77. Administrative register data on hazardous waste was used for the first time in WStatR 2022. Waste amounts from NACE D35 in WStatR2022 is extrapolated from gross electricity supply in combination with waste amounts from WStatR2020.

There have also been some changes in methodology and interpretations as described in earlier quality reports. The amounts of rest products classified as by-products are increasing. Many rest-products that in more recent WStatR are reported as by-products were reported as waste in WStatR2006 and WStatR2008. For example, there are two waste types in the steel sector, which in the current and more recent surveys are classified as by-products: electric arc furnace slag and blast furnace slag. In the paper industry, bark and wood residues that are used as fuel have been reclassified as by-products. As mentioned earlier in this report, many of the reported estimates are associated with considerable uncertainties. This means that even if the results are comparable, it can be difficult to interpret the differences between reference years. The differences can, in some cases, reflect statistical uncertainties or different interpretations of for example by-products, and in other cases be due to actual changes in waste amounts.

Major changes compared with previous year

For WStatR 2022 some new methods were introduced:

- Vegetal waste (09.2) in NACE A is now estimated using a new method
- Mineral wastes (12.A*) A clarification regarding hazardous-classification in the environmental reports of some 12.A waste in the NACE B05-09 has increased the amount of hazardous waste reported significantly.
- NACE 16: survey method was used for the first time since 2008
- Hazardous waste in the NACE G-U excl. G46.77 sector is now estimated using a new method using register data.

WASTE GENERATION

The total amount of waste generated in Sweden increased from ca 140 000 000 tonnes in 2018 and to ca 150 000 000 tonnes 2020. The majority of this waste (116 000 000 tonnes) is mineral waste (12.A) from the mining and extraction industry (NACE B05-09). This is also where the majority of the increase has occured (comp. 103 000 000 tonnes in the same category generated in 2018). There has been a 6% increase in non-hazardous waste and a 274% increase in hazardous waste between 2018 and 2020. The increase in hazardous waste is due to a classification clarification regarding hazardous status of some 12.A waste generated in the mining and extraction industry. The increase of 4 740 000 tonnesof 12.A* in the mining and extraction industry explains almost the entire increse in hazardous waste of 5 000 000 tonnes between 2018 and 2020.

Other major changes are driven by an increase of waste in NACE F41-43, an increase of hazardous waste in NACE G-U excl. G46.77 (driven by a method change), variation in NACE E38 and a general decrease in generated waste in the manufacturing industries (NACE C, notably C26-20).

For more detailed descriptions see each NACE below.

For waste types that are classified as confidential the publication of the statistic would run thw risk of disclosing confidential information regarding one or more reporting facilities/companies. For these waste types or waste type and treatment combination the changes have still been verified by SMED, but are not disclosed here.

NACE A (01-03)

The total amount of non-hazardous wastes in NACE A has increased from 940 600 tonnes in 2018 to 1 034 900 tonnes in 2020. This is mainly driven by a new method to measure vegetable wastes (09.2) in the agricultural sector (NACE 01), which SMED thinks gives a more correct result. An observable increase in manure (09.3) is also clear, correctly reported, and contributes to the overall increase of non-hazardous wastes.

Vegetal waste (09.2): One major change in the reporting from NACE A is the inclusion of vegetal waste from codigesters, where substrate from NACE A is now included. This results in an increase of ca 40 000 tonnes of vegetal waste. This addition gives a more accurate result.

Animal and mixed wastes (09.1): During 2020 there was an emergency inhibition of fishing for cod in the Baltic Sea resulting in a large decrease in 09.1 reported from the fishing industry. The amount dropped from 54 tonnes in 2018 to 2 tonnes in 2020.

Glass wastes (07.1), **mixed and undifferentiated wastes (10.2)** and **common sludges (11)** have all increased because of an increase in the number of persons employed in the fishing industry.

The change in other wastes (such as **Batteries and accumulator wastes (08.41)**) is a very small reduction in absolute numbers, but because of small amounts in the sector give large relative changes. The amounts of 08A and 08A* have also reduced, as a result of a reduction in the number of worked hours in the forestry industry.

NACE B (05-09)
The sector has had an increase in production according to the national authority Geological Survey of Swedish. They state that the production of ore was the highest ever, so therefore it is expected that the typical waste 12A (EWC 12.2, 12.3 and 12.5) is higher than in 2018.

12A (EWC 12.2, 12.3 and 12.5) Mineral wastes has increased with almost 8 million tonnes. The mining sector has large fluctuations between the years, and it is reflected mostly in this waste category, and as stated above the ore production was the highest ever.

Also Hazardous waste 12A* (EWC 12.2, 12.3 and 12.5) has increased from almost nothing (20 tonnes) to almost 5 million tonnes. In the environmental reports, which SMED uses as a data source, the classification of a certain waste type has been unclear if hazardous or non-hazardous. Hence, this year we made an extra control with the companies about the classification of this waste, which led to a change to from non-hazardous to hazardous waste for several companies. This also gives a very large increase in total amounts of hazardous waste, but is the result of reclassification because of clarification from the facilities regarding this given type of waste.

EWC 10.2 (mixed and undifferentiated materials) has a large decrease from 2018 (18 800 tonnes) to 10 700 tonnes in 2020. During the years there has been large fluctuations in this waste category. The sorting of waste can affect this waste category.

The metal wastes 06.1 and 06.3 have decreased with about 6 000 tonnes and 2 000 tonnes respectively. There have been quite large fluctuations during the years, so this appears to be a sound decrease. Also, in 2018 there was a very high value for 06.1 (highest since 2010).

12.8A (Mineral wastes from waste treatment): There is a change in 12.8A but the waste type is classified as confidential.

Both 12.1 and 12.1* (Mineral wastes from construction and demolition) have increased with about 1 700 tonnes resp 1 400 tonnes. This has been double checked and the change is correct.

07.5 (Wood wastes) has had a quite large increase, but SMED believes the change is sound, wooden waste can differ due to different projects etc. Also 07.5* had an increase of about 90 tonnes which is judged to be correct.

12.6* Hazardous soils has had a quite large decrease, about 600 tonnes. Large differences in soils are likely due to variations in different projects. 12.6 has instead an increase of about 20 tonnes which SMED also believes is sound for the same reason.

07.4, plastic waste, has had a decrease of about 400 tonnes. It is natural with large fluctuations here due to different degree of sorting of plastic wastes.

01.3* Hazardous oils, a decrease of 350 tonnes. There have been quite large fluctuations during the years and SMED believe this decrease is sound.

09.2 decreases from 81 tonnes to 0 tonnes. Vegetal waste is quite unusual in this sector. It has only appeared in 2018, all other years it has been 0. Therefore SMED believes the 0 is correct.

07.2. Paper waste. A decrease from 120 tonnes to about 60 tonnes. There have been large fluctuations in this sector during the years, the change is correctly reported.

The other changes are small numerically (less than 10 tonnes) and SMED believes they are sound.

NACE C10-12

The food, drink and tobacco processing industry (C10-12) reported a total amount of non-hazardous waste of 579 000 tonnes in 2020 compared to 699 400 tonnes in 2018. This is a reduction of 17%. The reduction is mainly due to a change in the handling of wet waste from a few producers, where the water content has now been removed from the reported waste (see 09.2 Vegetal waste). The amount of hazardous waste was 2 750 tonnes 2020 compared to 2 650 tonnes in 2018, that is a reduction of 3.6 % and must be considered a similar amount between years.

Vegetal waste (09.2): Between 2018 and 2020 there has been a reduction of 118 000 tonnes. This is mainly driven by a removal of water from very watery wastes such as fruit water from rinsing pipes. 100 000 tonnes of water have been removed compared to comparable reporting in 2018. In 2020, 90 000 tonnes of vegetal waste were reported.

Animal faeces, urine and manure (09.3): Between 2018 and 2020 there was an increase of 23 600 tonnes of animal faeces, urine and manure. There has been an increase in reporting from several facilities. In 2020, 66 300 tonnes of waste were reported.

Mixed and undifferentiated materials (10.2): Mixed and undifferentiated materials have increased by approx. 10 000 tonnes between 2018 and 2020. The amount reported was 44 000 in 2018 and 54 000 tonnes in 2020. Many small increases lie behind this change.

Paper and cardboard waste (07.2): Waste has decreased by 6 000 tonnes from 21 000 tonnes to 15 000 tonnes. The change is driven by many small changes.

Changes in Metal wastes, ferrous, non-ferrous, and mixed ferrous and non-ferrous (06.1, 06.2 and 06.3): There seems to be changes in coding between the metal codes between the years. The total change is not significant.

Textile wastes (07.6): Textile waste (bags) reported from more facilities in the sector. The increase is deemed sound.

Common sludges (11): Increased from 14 600 to 19 000 tonnes between 2018 and 2020. This may be due to an effort to code sludges to EWC 11. A reported increase from actors is also clear.

Sorting residues (10.3): Clarification in the environmental reports is likely behind the reduction in sorting residues.

Household and similar wastes (10.1): A reduction in 10.1 (from 4 560 tonnes to 3 340 tonnes) is likely due to a shift to 10.2. The data has been verified at the facility-level.

Chemical Wastes (02.A*): Has increased from 1 800 tonnes to 2 200 tonnes between 2018 and 2020. The data has been verified at the facility-level.

Discarded equipment (08A and 08A*): A shift between hazardous and non-hazardous waste results in difference between years, but not in the total amount.

Soils (12.6 and 12.6*): Variation in a variable waste type is to be expected. Fewer facilities had projects resulting in 12.6* type of waste in 2020 compared to 2018.

Wood waste, hazardous (07.5*): The data has been verified at the facility-level. The increase is deemed sound.

Industrial effluent sludges, hazardous (03.2*): The data has been verified at the facility-level.

Healthcare and biological wastes (05*): There is a change in amount of this waste type, but the value of the waste type is classified as confidential for 2020.

All other smaller changes are checked and are deemed to be correctly reported and/or may have overlapping intervals of estimated amounts.

NACE C13-15

The reduction in Textile wastes (07.6) is directly proportional to the increase in Mixed and undifferentiated wastes (10.2) indicating that for the surveys and environmental reports a considerable proportion of the textile wastes were reported as combustible wastes.

Variation in Construction and demolition wastes (12.1) between years are natural as construction projects vary in time.

Plastic wastes (07.4) have reduced by a significant amount. Because no facility-level comparison is possible for this NACE it is impossible to say what this reduction is due to. Since four years have passed since the last survey changes are, however, to be expected.

Because of a gap in the investigation of the NACE a comparison at microlevel/facility level is not possible, which makes it difficult to explain the remaining differences. Differences in waste amounts are to be expected, however.

NACE C16

Data has been collected in a different way than before. We now use data from the environ-mental reports together with data from a survey. Therefore comparisons between earlier years must be done with caution. There are several waste types where there are very large differences between data for 2020 and earlier years. We believe that the method used for data for 2020 has better quality and therefore we assume that the results for 2020 are correct although there are large differences, in total for hazardous and non-hazardous as well as for several waste types. For comments on changes in specific waste types, see below.

This year even more wood rest products have been classified as by-products and not waste. This gives a large difference in the total non-hazardous waste and also for EWC 07.5 wood waste. We believe the classification made regarding generated waste 2020 is accurate.

In the case of Metal wastes EWC 06.1 and 06.2 the increase from 0 tonnes in 2018 is due to the fact that all metal was allocated to metal waste code 06.3.

In the case of Animal and mixed food wastes EWC 09.1 there is an increase in the amount reported between 2018 and 2020. A general trend in Sweden is that also companies have separately collected food waste. This trend may be the explanation for this increase.

There is a large decrease in hazardous Mixed and undifferentiated materials EWC 10.2*, which is expected. Waste treatment facilities continuously work towards reducing mixed wastes.

Soil, both non-hazardous and hazardous, was 0 in 2018. For 2020 there are some thousand tonnes reported. This is due to the new survey for 2020, which gives SMED possibilities to get data for these waste types.

NACE C17-18

The total amount of non-hazardous waste is very similar to 2018. The total in 2018 was about 1.5 million tonnes, and 2020 1.6 million tonnes. This is expected since the economic turnover has been very similar between the years, a small decrease (although we do not know that there is a straight correlation between turnover and waste, but it gives an indication). When it comes to total hazardous waste there is a very large decrease which mainly is due to a very large decrease of hazardous soils, a waste category with large variations historically, which SMED judges to be correctly reported. However, there are some changes in some specific waste categories which should be mentioned.

A large increase occurs for 07.2 paper waste. All companies report this waste type and there are large variations, some have an increase other a decrease. The change in total seems to be OK.

One of the largest differences between 2018 and 2020 is for EWC 12.4 (combustion wastes), with a 56 000 tonnes increase. The change has been verified in the facility-level data.

There is a large decrease in EWC 03.2 (33 000 tonnes) and a large increase in EWC 11 (28 000 tonnes). It is hard to distinguish between 03.2 (Industrial effluent sludges) and 11 (common sludges). If you add these together, the sum is very similar between 2018 and 2020.

For EWC 03.3 (Sludges and liquid wastes from waste treatment) there is a large decrease. 2018 was a year with a very high value, so a decrease was expected. The dry substance content gives large differences, and are sometimes difficult to verify. However, we believe the decrease is correct.

Metals, EWC 06.1, 06.2 and 06.3: Together they are as in 2018. It is often difficult to choose the right metal code, which could be the explanation for the decrease of 06.1 and 06.2 and the increase of 06.3.

For EWC 07.1 (glass waste) there is a rather large increase. The change has been verified in the facility-level data.

For EWC 09.1 (animal and mixed waste) there is a large decrease. The change has been verified in the facility-level data.

For EWC 09.2 (vegetal wastes) there is a large increase. The change has been verified in the facility-level data.

For EWC 12.1 (Mineral waste from construction and demolition) there is a large increase. It is due to different building activities which can vary from one year to another,

For soil, EWC 12.6 there is a quite large increase, but it is natural that this waste type fluctuates over the years. The amount is depending on current construction activities.

EWC 12.7, dredging spoils has a large decrease. This is not a common waste type for this sector, so it was more unusual to have this waste in 2018. 0 ton is therefore an expected value.

When it comes to hazardous waste there are several waste types which show an increase or decrease of more than 20 %. For quite a few of them (EWC 01.1 (spent solvents), (03.2 (industrial effluent sludges), 07.5 (wood wastes), 08 excl 08.41, 08.41 (Batteries), 12.6 (Soil), it is natural with large variations and hence we assess that the values are correct. During the years from 2010 and onwards there has been large variations for these waste types. For example, for EWC 08 large variations can be expected since companies can change a large part of the equipment (for example heavy electric equipment) a certain year and not another year. And for some waste types the values are very small which then gives large variations, this is the case with EWC 05 (healthcare and biological waste) and 12.4 (Combustion waste).

For EWC 12.1 (Mineral wastes from construction and demolition) and 12.8 (Mineral wastes from waste treatment and stabilized waste) there is a very large increase. The change has been verified in the facility-level data.

NACE C19

Total non-hazardous and hazardous:

The non-hazardous waste has increased from 7 900 tonnes in 2018 to 58 800 tonnes in 2020. This increase is driven by an increase in 12.6 and 12.1 and due to construction work. Excluding these waste types gives an increase of 1 050 tonnes.

Soils (12.6): There is a large increase (49 300 tonnes) driven by construction projects.

Acid, alkaline or salt wastes (01.2*): The decrease in 01.2* (2 300 tonnes) between 2018 and 2020. The change has been verified in the facility-level data.

Mineral waste from construction and demolition (12.1): There is a large increase in waste 12.1 (1 800 tonnes) driven by construction projects.

Industrial effluent sludges (03.2*): The change has been verified in the facility-level data.

Batteries and accumulators wastes (08.41*): The increase is as reported from facilities in the NACE (200 tonnes).

Vegetal waste (09.2): There is a change in amount of this waste type, but the waste type is classified as confidential for WStatR 2022 so SMED cannot comment on the statistics.

Other changes in NACE 19 result from small changes in absolute amounts that may still give relatively large percentage changes.

NACE C20-22

Total Hazardous waste: Large decrease which is due to a decrease in 02A Chemical wastes, see below. SMED thinks the decrease is sound.

02A* Hazardous chemical wastes There is a change in amount of this waste type, but the waste type is classified as confidential for WStatR 2022 so SMED cannot comment on the statistics.

Other large changes in hazardous waste:

12.6* Hazardous soils There is a change in amount of this waste type, but the waste type is classified as confidential for WStatR 2022 so SMED cannot comment on the statistics.

03.2* Hazardous industrial sludges Large increase. This is a consequence of the large decrease in 02A* having now been classified as 03.2*. All other companies have small variations between 2018 and 2020. The change has been verified in the facility-level data.

Non hazardous waste:

03.2. Industrial sludges Large decrease. There are large variations between the companies, where some show an increase and others a decrease. The change has been verified in the facility-level data.
06.1. Metal Large decrease. It is often difficult to determine which of the metal codes is the most correct. However, the total amount of metals (06.1, 06.2 and 06.3) was 12 700 tonnes in 2018, and for 2020 the total is 10 000. SMED believes the change is correct for 06.1.

09.2. Vegetal wastes. Large decrease. The change is due mainly to a large decrease in one company. SMED believes the change is sound.

NACE C23
This group of industries were previously surveyed regarding data year 2018. Data for year 2020 covers a period during the COVID-19 pandemic. Because of this, some sectors have suffered more than others in terms of decrease of the economic turnover. It is expected that waste quantities follow the economic development.

The economic turnover in this group of industries has increased by 1 percent from year 2018 to year 2020. Generated hazardous waste has decreased by 24 percent and generated non-hazardous waste has decreased by 23 percent. Some waste categories have increased, and some have decreased. The waste categories with the *largest changes* in quantities of generated waste from year 2018 to year 2020 are presented and explained by EWC-Stat category below.

Decreasing quantities of generated waste:

The most important waste categories in terms of quantities that have decreased are:

12.1 Mineral waste from construction and demolition:

Waste quantity year 2020: **6 000** tonnes, decreasing by **81** %.

Explanation: A group of facilities are showing a decrease of waste quantities, which is deemed to be correct.

12A Other mineral waste:

Waste quantity year 2020: **23 400** tonnes, decreasing by **50** %.

Explanation: The change has been verified in the facility-level data.

07.5 Wood wastes:

Waste quantity year 2020: **16 300** tonnes, decreasing by **22** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occuring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

06.1 Metal waste, ferrous:

Waste quantity year 2020: **6 900** tonnes, decreasing by **30** %.

Explanation: The waste classification among of the EWC-Stat categories 06.1 (Metal waste, ferrous), 06.2 (Metal waste, non-ferrous) and 06.3 (Metallic wastes, mixed ferrous and non-ferrous) are a bit uncertain. The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

12.4* Combustion wastes*:

Waste quantity year 2020: **700** tonnes, decreasing by **63** %.

Explanation: A group of facilities are showing a decrease of waste quantities, which is deemed to be correct.

11 Common sludges:

Waste quantity year 2020: **40** tonnes, decreasing by **91** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

12A* Other mineral wastes*:

There is a change in amount of this waste type, but the waste type is classified as confidential for WStatR 2022 so SMED cannot comment on the statistics.

01.2* Acid, alkaline or salt wastes*:

Waste quantity year 2020: **100** tonnes, decreasing by **42** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

08A Discarded equipment

Waste quantity year 2020: **3** tonnes, decreasing by **96** %.

Explanation: Due to the low quantity of the change between year 2018 and year 2020, the change is considered to be insignificant.

The change may be correct, or a result of minor errors in the incoming data from the reporting companies, or a result of the statistical sampling.

07.3 Rubber waste

Waste quantity year 2020: **0** tonnes, decreasing by **100** %.

Explanation: Due to the low quantity of the change between year 2018 and year 2020, the change is considered to be insignificant.

The change may be correct, or a result of minor errors in the incoming data from the reporting companies, or a result of the statistical sampling.

Other waste categories that have decreased in quantity are regarded as insignificant.

Increasing quantities of generated waste:

The most important waste categories in terms of quantities that have increased are:

12.4 Combustion wastes:

Waste quantity year 2020: **21 000** tonnes, increasing by **47** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

12.6 Soils:

Waste quantity year 2020: **7 300** tonnes, increasing by **159** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

10.2 Mixed and undifferentiated materials:

Waste quantity year 2020: **19 600** tonnes, increasing by **30** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

01.2 Acid, alkaline or salt wastes:

Waste quantity year 2020: **8800** tonnes, increasing by **169** %.

Explanation: The change has been verified in the facility-level data.

12.7 Dredging spoils:

Waste quantity year 2020: **500** tonnes, increasing from **0** tonnes.

Explanation: The change has been verified in the facility-level data.

07.4 Plastic wastes:

Waste quantity year 2020: **1 200** tonnes, increasing by **69** %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

02A* Chemical wastes*:

Waste quantity year 2020: **800** tonnes, increasing by **79** %.

Explanation: The change origins mostly from two plants that have increased the waste quantities from year 2018 to year 2020.

03.2* Industrial effluent sludges*:

Waste quantity year 2020: **300** tonnes, increasing by **454** %.

Explanation: The change origins mostly from a single plant that has increased the waste quantity from year 2018 to year 2020.

Other waste categories that have increased in quantity are regarded as insignificant.

NACE C24-25
The sum of hazardous waste has decreased with 32 000 tonnes, or 15,6 % between 2018 and 2020. The biggest waste category that contributes to this difference is Combustion waste (12.4*), which has decreased with 25 000 tonnes (33 %).

The sum of non-hazardous waste has decreased with 26 000 tonnes, or 3% between 2018 and 2020. The biggest waste category that contributes to this difference is Combustion waste (12.4) that have decreased with 59 000 tonnes (14 %).

EWC 12.4* Combustion wastes continues to decrease and is now 50 200 tonnes. In 2018 the amount was 75 400 tonnes, a decrease with 33 %. The decrease is mainly due to a general decrease at all companies that have a lot of waste of this type.

EWC 03.2* Industrial effluent sludges has decreased by 3 800 tonnes since the previous measurement and is now 7 600 tonnes. In 2018 the amount was 11 400 tonnes, a decrease with 34 %. The change has been verified in the facility-level data.

EWC 02A* Chemical wastes has increased by 3 600 tonnes to 15 900 tonnes since the previous measurement. An increase of 29 %. In 2018, the amount was 12 300 tonnes. The change is verified and ok. If you look at the more long-term trend, the quantities are back to the level from 2014. The quantities therefore do not stand out this year despite this increase. However, the quantities are well below the levels from 2010 and 2012.

EWC 12.6* Soils more than doubled from the previous measurement and are now 4 600 tonnes. It is an increase of 135 %. In 2018 the amount was 2 000 tonnes. The change is verified and is ok.

EWC 03.3* Sludges and liquid wastes from waste treatment has increased significantly since the previous measurement, from 60 tonnes 2018 to 1 470 tonnes 2020. The change is verified and is ok.

EWC 12.4 Combustion wastes continues to decrease and is now 370 700 tonnes. In 2018 the amount was 430 100 tonnes. It is a decrease with 14 %. The change has been verified in the facility-level data.

EWC 12A Other mineral wastes has increased from 35 700 to 60 000 tonnes between 2018 and 2020. It is an increase of 68 %. There are more companies reporting waste of this type this time. One company reports much more waste than before and contribute greatly to the increase.

EWC 10.2 Mixed and undifferentiated materials has continued to decrease. This type of waste has decreased by 21 200 tonnes compared to 2018, and is now 28 300 tonnes. This is a decrease of 43 %. There are fewer companies that have this type of waste 2020 than 2018 which contributes to the reduction.

EWC 06.2 Metallic wastes, non-ferrous increases with 9 000 tonnes to 39 500 tonnes 2020. That is an increase of 30%. There are slightly more facilities in 2020 compared with 2018 that have registered this type of waste. There are also companies that have increased their amount of waste

of this type, contributing to the increase. Sometimes it is hard to decide if the waste shall be coded with EWC 6.1, EWC 6.2 or EWC 6.3, therefore it can be of interest to compare the total sum of these three codes. Looking at the total sum of these three codes, the quantity increases from 309 800 tonnes to 319 700 tonnes. It is an increase of 3 %.

EWC 12.1 Mineral waste from construction and demolition has decreased by 5 600 tonnes since 2018 to 7 900 tonnes. That is a decrease of 42 %. The change is verified. This is a type of waste that companies can have a lot of one year and a little of another year.

EWC 12.7 Dredging spoils (dry weight) has increased from 0 tonnes 2018 to 2 400 tonnes 2020. The change has been verified.

EWC 03.3 Sludges and liquid wastes from waste treatment has increased to 1 300 tonnes 2020. The amount 2018 was 100 tonnes. The change has been verified and is ok.

EWC 03.2 Industrial effluent sludges continue to decrease and remain at the low level recorded in 2018. This year, 1 000 tonnes were registered. That is a decrease with 48 %. In 2018 there was 1 800 tonnes. The decrease is due to the fact that fewer companies have registered this type of waste 2020, and each company generally has slightly smaller amounts than before.

All other changes of the amount of waste between 2018 and 2020 have been verified and are ok.

NACE C26-30

This group of industries were previously surveyed regarding data year 2018. Data for year 2020 covers a period when the COVID-19 pandemic was ongoing. Some sectors have because of this suffered more than others in terms of decrease of the economic turnover. It is expected that waste quantities follow the economic development.

The economic turnover in this group of industries has decreased by 8 percent from year 2018 to year 2020. Generated hazardous waste has decreased by 7 percent and generated non-hazardous waste has decreased by 28 percent. The decrease of the waste quantities is verified by several data control steps. The changes are going in different directions for different waste categories.

The waste categories with the largest changes in quantities of generated waste from year 2018 to year 2020 are presented and explained by EWC-Stat category below.

Decreasing quantities of generated waste:
The most important waste categories in terms of quantities that have decreased are:

06.1 Metal waste, ferrous:
Waste quantity year 2020: 115 900 tonnes, decreasing by 62 %.
Explanation: There is a decrease of metal waste as a whole. The waste classification among the EWC-Stat categories 06.1 (Metal waste, ferrous), 06.2 (Metal waste, non-ferrous) and 06.3 (Metallic wastes, mixed ferrous and non-ferrous) may be more uncertain.

12A Other mineral wastes:
Waste quantity year 2020: 94 200 tonnes, decreasing by 25 %.
Explanation: The change has been verified in the facility-level data.

10.2 Mixed and undifferentiated materials:
Waste quantity year 2020: 50 900 tonnes, decreasing by 22 %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

01.3* Used oils*:
Waste quantity year 2020: 34 500 tonnes, decreasing by 17 %.
Explanation: The change from year 2018 to 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

06.2 Metal waste, non-ferrous:
Waste quantity year 2020: 7 800.4 tonnes, decreasing by 43 %.
Explanation: There is a decrease of the quantities of metal waste as a whole. The waste classification among the EWC-Stat categories 06.1 (Metal waste, ferrous), 06.2 (Metal waste, non-ferrous) and 06.3 (Metallic wastes, mixed ferrous and non-ferrous) may be more uncertain.

07.4 Plastic wastes:
Waste quantity year 2020: 5 000 tonnes, decreasing by 50 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occuring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

10.2* Mixed and undifferentiated materials*:
Waste quantity year 2020: 160 tonnes, decreasing by 97 %.
Explanation: The change has been verified in the facility-level data.

12.6 Soils:
Waste quantity year 2020: 1 800 tonnes, decreasing by 70 %.
Explanation: The change has been verified in the facility-level data.

12.1* Mineral waste from construction and demolition*:
Waste quantity year 2020: 600 tonnes, decreasing by 72 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

02A Chemical wastes:
Waste quantity year 2020: 2 400 tonnes, decreasing by 22 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

03.2* Industrial effluent sludges*:
Waste quantity year 2020: 1 100 tonnes, decreasing by 36 %.
Explanation: The change has been verified in the facility-level data.

08A* Discarded equipment*:
Waste quantity year 2020: 1 700 tonnes, decreasing by 25 %.

Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

07.5* Wood wastes*:
Waste quantity year 2020: 660 tonnes, decreasing by 41 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

01.1* Spent Solvents*:
Waste quantity year 2020: 240.1 tonnes, decreasing by 59 %.
Explanation: The change has been verified in the facility-level data.

01.2 Acid, alkaline or salt wastes:
Waste quantity year 2020: 70 tonnes, decreasing by 75 %.
Explanation: The change has been verified in the facility-level data.

09.1 Animal and mixed food waste of food preparation and products
Waste quantity year 2020: 541, 6 tonnes, decreasing by 23 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

Other waste categories that have decreased in quantity are regarded as insignificant.

Increasing quantities of generated waste:
The most important waste categories in terms of quantities that have increased are:

12.6* Soils*:
Waste quantity year 2020: 10 072.3 tonnes, increasing by 3 487 %.
Explanation: The change has been verified in the facility-level data.

12.1 Mineral waste from construction and demolition:
Waste quantity year 2020: 11 046.3 tonnes, increasing by 232 %.
Explanation: The change has been verified in the facility-level data.

12.4* Combustion wastes *:
There is a change in amount of this waste type, but the waste type is classified as confidential for WStatR 2022 so SMED cannot comment on the statistics.

08A Discarded equipment:
Waste quantity year 2020: 1 778.3 tonnes, increasing by 90 %.
Explanation: The change from year 2018 to year 2020 may be a result of random errors occurring when sampling respondents, since the intervals of uncertainty for the year 2018 and year 2020 are overlapping.

07.1 Glass waste:
Waste quantity year 2020: 1 128.8 tonnes, increasing by 258 %.
Explanation: The change has been verified in the facility-level data.

12A* Other mineral waste*:
Waste quantity year 2020: 749.0 tonnes, increasing by 180 %.
Explanation: The change has been verified in the facility-level data.

03.2 Industrial effluent sludges:
Waste quantity year 2020: 349.1 tonnes, increasing by 181 %.
Explanation: The change origins mostly from two plants that have increased the waste quantities from year 2018 to year 2020.

Other waste categories that have increased in quantity are regarded as insignificant.

NACE C31-33
Two companies have been removed from SNI 31-33 since the last survey. Those companies have a large amount of waste all together (55 500 tonnes) which affects the total sum of waste. The largest impact can be observed in EWC 06.1, EWC 12A and EWC 10.2, but those companies have waste in a total of 30 EWCs.

The sum of hazardous waste has decreased with 5 600 tonnes, or 39 % between 2018 and 2020. The biggest waste category that contributes to this difference is the Chemical wastes (EWC 02A*), that have decreased with 6 900 tonnes (61.5%).

The sum of non-hazardous waste has decreased with 76 500 tonnes, or 54 % between 2018 and 2020. The waste category that contributes the most to this difference is Other mineral wastes (EWC 12A) that have decreased with 27 000 tonnes (96.1 %).

EWC 12A Other mineral wastes has decreased with 27 000 tonnes, or 96 % between 2018 and 2020. One company with a lot of waste in this category has been removed from this sector and stands for most of the decrease.

Sometimes it is hard to decide if the waste shall be coded with EWC 6.1 Metal wastes, ferrous, EWC 6.2 Metal wastes, non-ferrous or EWC 6.3 Metal wastes, mixed ferrous and non-ferrous, therefore it can be of interest to compare the total sum of these three codes. Looking at the sum of these three codes the quantity decreased from 62 500 tonnes to 17 000 tonnes, a decrease of 73 %. The change has been verified in the facility-level data.

EWC 07.5 Wood wastes has decreased with 7 000 tonnes, or 37 % between 2018 and 2020. The change has been verified in the facility-level data.

EWC 02A* Chemical wastes has decreased with 7 000 tonnes, or 62 % between 2018 and 2020. A few of the companies with large amounts of waste of this type in 2018 reported very low amounts or nothing 2020 for this EWC. This together stands for the decrease.

EWC 10.1 Household and similar wastes has increased with 1 300 tonnes, or 67 % between 2018 and 2020. There are more companies that have this kind of waste 2020 than 2018.

EWC 07.4 Plastic waste has decreased with 650 tonnes, or 37 % between 2018 and 2020. The picture is that many companies together cause the decrease, not a single company.

EWC 12A* Other mineral waste has increased with 650 tonnes between 2018 and 2020. It is an increase by a factor 20. The change has been verified in the facility-level data.

EWC 12.1 Mineral waste from construction and demolition has increased with 550 tonnes, or 114 % between 2018 and 2020. This is a kind of waste that can vary between the years. There has been a large increase at one company 2020.

EWC 01.2* Acid, alkaline or saline wastes has increased with 550 tonnes, or 99 % between 2018 and 2020. It is nearly the same number of companies that have reported this type of waste in 2018 and 2020. The change has been verified in the facility-level data.

EWC 03.3 Sludges and liquid wastes from waste treatment has increased from 0 tonnes 2018 to 500 tonnes 2020. The change has been verified in the facility-level data.

EWC 02A Chemical waste has increased with 475 tonnes, or 59 % between 2018 and 2020. More companies have reported this type of waste 2020 than 2018.

EWC 12.4 Combustion wastes has decreased with 470 tonnes, or 75 % between 2018 and 2020. The change has been verified in the facility-level data.

EWC 08A Discarded equipment (Excl. EWC 08.1 and EWC 08.41) has increased with 409 tonnes, or 283 % between 2018 and 2020. There are more companies that have reported this kind of waste 2020 than 2018.

EWC 12.6 Soils has increased with 333 tonnes, or 422 % between 2018 and 2020. The change has been verified in the facility-level data.

EWC 08.41* Batteries and accumulators waste has increased with 280 tonnes, or 293% between 2018 and 2020. There are more companies that have reported this type of waste 2020 than 2018 combined with one company with a bigger amount of waste of this kind 2020 than 2018.?

EWC 01.1* Spent solvents has increased with 280 tonnes, or 1 716% between 2018 and 2020. The change has been verified in the facility-level data.

EWC 07.5* Wood wastes has increased with 230 tonnes, or 86% between 2018 and 2020. There are more companies that report this type of waste 2020 than 2018.

EWC 09.1 Animal and mixed food waste has decreased with 105 tonnes, or 63% between 2018 and 2020. There are fewer companies 2020 than 2018 with this type of waste. Also, a few companies with much of this type of waste 2018 do not report this type of waste 2020.

EWC 12.1* Construction and demolition wastes has increased with 100 tonnes, or 33% between 2018 and 2020. This is a type of waste that can vary much from year to year at the companies. Changes in the total amount of waste between years are expected.

Other changes within the EWC codes vary but contribute less to the bigger picture and will not be described in detail.

NACE D35

Looking at the big waste streams, compared to 2018, there was a decrease of 4 000 tonnes in EWC-stat 6.1, metal waste, corresponding to 22 %. In EWC-Stat 6.3 metal waste, there was a decrease of 1 200 tonnes. In EWC-stat 7.2 (paper and cardboard waste) there was a decrease of 2 000 tonnes which corresponds to 34 %. There was a decrease of 12 000 tonnes in EWC-Stat 10.2

(mixed and undifferentiated wastes), corresponding to 32 % while in EWC 11(common sludges) there was a decrease of 900 tonnes which correspond to 38 %. In EWC 12.6 (soils) there was a decrease of 5 400 tonnes which correspond to 39 %. The total amount of generated waste decreased by 3 % as compared to 2018.

NACE E36, 37, 39
No major changes, due to that data are largely reused.

NACE E38 Waste collection, treatment and disposal activities; materials recovery; and G46.77 Wholesale of waste and scrap
The wastes reported as generated in E38 and G46.77 are to the predominant part secondary wastes generated from pre-treatment and treatment of wastes. The largest uncertainties depend on uncertainties in the interpretation of what is a secondary waste (that has changed properties in the treatment/pre-treatment) and what is waste that has only been stored and transferred (has not changed properties in the treatment/pre-treatment plant).

The explanations to the major changes are in many cases the same for G46.77 as for E38 because the same method and the same data sources are used. A difference between E38 and G46.77, however, is that the calculated scale-up influences G46.77 more since the entire sector is concerned. In E38 only 38.3 is up-scaled (not 38.1-38.2).
The facilities investigated in E38 and G46.77 have been taken from the register of environmentally hazardous activities in the Swedish Portal for Environmental Reporting (SMP), operated by the county administrative boards and the Swedish EPA.

Overall, the change in the generation of total non-hazardous waste for NACE E38 has decreased from 6 729 200 tonnes to 5 948 000 tonnes. This is a decrease with 781 200 tonnes (12 %). This decrease seems to be caused mainly by large decreases in the generation of sorting wastes (10.3) metal wastes (6.1, 6.2, and 6.3) mineral waste from waste treatment and stabilized waste (12.8A) and other mineral wastes (12A).

The generation of sorting wastes (10.3) has decreased from 2 649 000 tonnes to 2 365 000 tonnes. This is a decrease by 284 000 tonnes (11 %). This decrease seems to be mainly due to a decrease in the pretreatment of waste.

The generation of metal wastes (6.1, 6.2, 6.3) has decreased from 1 765 500 tonnes to 1 511 000 tonnes. This is a decrease by 254 000 tonnes (24 %). This decrease seems to be mainly due to decreases in secondary generation of metal wastes. The change has been verified in the facility-level reported data.

The generation of mineral waste from waste treatment and stabilized waste (12.8A) has decreased from 767 400 tonnes to 535 000 tonnes. This is a decrease by 232 000 tonnes (30 %). The change has been verified in the facility-level reported data.

The generation of other mineral waste (12A) has decreased from 565 000 tonnes to 471 000 tonnes. This is a decrease by 94 000 tonnes (17 %) The change has been verified in the facility-level reported data.

The total generation of hazardous waste for NACE E38 has increased from 485 000 tonnes to 619 000 tonnes. This is an increase by 134 000 tonnes (28 %). The increase seems to be mainly due to increases in oil waste* (01.3*), chemical waste* (02A*) and wood waste* (07.5*).

The generation of mineral waste from oil waste* (01.3*) has increased from 66 000 tonnes to 131 000 tonnes. This is an increase by 65 000 tonnes (99 %). The change has been verified in the facility-level reported data.

The generation of chemical waste* (02A*) has increased from 155 000 tonnes to 205 000 tonnes. This is an increase by 50 000 tonnes (32 %). The change has been verified in the facility-level reported data.

The generation of wood waste (07.5*) has increased from 67 000 tonnes to 113 000 tonnes. This is an increase by 46 000 tonnes (70 %). The change has been verified in the facility-level reported data.

The total generation of hazardous waste for G46.77 has decreased from 35 400 tonnes to 35 600 tonnes. This is a decrease by 800 tonnes (2 %), which can be considered negligible when taken into account the uncertainty in the data.

The total generation of non-hazardous waste for G 46.77 has decreased from 569 400 tonnes to 234 000 tonnes. This is a decrease by 335 000 tonnes (59 %). This decrease seems to be mostly due to large decreases in the generation of metal wastes (6.1, 6.2, 6.3) and sorting wastes (10.3). The decrease has been verified in the facility-level reported data.

The generation of metal wastes (6.1, 6.2, 6.3) has decreased from 360 100 tonnes to 145 400 tonnes, this is a decrease of 214 700 tonnes (60 %). This decrease seems to be mainly due to decreases in secondary generation of metal wastes. The change has been verified in the facility-level reported data.

The generation of sorting wastes (10.3) has decreased from 116 600 tonnes to 44 500 tonnes, this is a decrease of 71 500 tonnes (62 %). The change has been verified in the facility-level reported data.

NACE F41-43

The total amount 2020 was close to 13.5 million tonnes, compared to 12.5 million tonnes in 2018 and 10.7 million tonnes in 2016. The increase in the total waste, both between 2018 and 2020 and between 2016 och 2020, are larger than expected from the economic development.

The largest changes of waste inn F41-43 between 2018 and 2020 are:

1. **07.5 Wood waste**. The amount has increased with 277 000 tonnes or 42 %. A large part of the increase depends on import of wood waste, and the actual amount generated is therefore less.
2. **12.6 Soils**. The amount has increased with 421 000 tonnes or 5 %. The change has been verified in the facility-level data.
3. **Metal wastes 06.1, 06.2 and 06.3** together has a slight increase. Several facilities report slightly increased amounts of metal wastes. The change has been verified in the facility-level data.
4. **07.1 Glass waste** and **07.4 Plastic waste** have increased 24 % respectively 59 %. It is a high percentage increase but low amounts (1 500 tonnes of glass waste and 400 tonnes of plastic waste). From 1 July 2020 there is a rule that all construction and demolition sites have to sort glass waste and plastic waste at source. The decreased amount is probably a result of this rule (This rule states that WEEE, hazardous wastes (not mixed), wood waste combustible waste, metals (different metals separated), mineral wastes, excavated soils, asphalt, mineral wool glass and plastic shall be managed and collected separately at the construction site),

5. **07.7 H Wastes containing PCB.** The amount has decreased. It is a small quantity and the amount usually vary from year to year depending on the projects. PCB have been prohibited from 1980.
6. **12.1 Mineral waste from construction and demolition**. The amount has increased nearly 300 000 tonnes or 11 %. The EWC-Stat category includes also "clean" and unmixed wastes for material recovery: concrete, plasterboard, tiles, bricks and similar. However, bot the clean and mixed fractions seem to have increased, so even if more materials are sorted out (in tonnes), the percentage of material sorted out seems to be about the same 2018 and 2020. The change has been verified in the facility-level data.
7. **12.6H Soils containing hazardous substances** (contaminated soil) has decreased with 190 000 tonnes or 32%. The change has been verified in the facility-level data.
8. **12AH Other mineral waste containing hazardous substances**. This is asbestos waste and has increased 12 000 tonnes or 50 %. The change has been verified in the facility-level data.

Changes in 12.7 and 12.7H Dredging spoils.
The amounts of dredging spoils are based on information from the Swedish Agency for Marine and Water Management.

	2016	**2018**	**2020**
Amount of dredging spoils (EWC-Stat 12.7), tonnes	1 352 600	654 900	1 503 100

The Swedish Agency for Marine and Water Management collects data about all dredging projects in Swedish Coastal waters. The Agency collects data from county councils as a part of the international conventions HELCOM and OSPAR. The figures use to vary a lot from one year to another, depending on the actual dredging projects going on.

NACE G-U XG46.77
All fractions of hazardous waste, except 08.1*, have reported major changes. The same goes for the total amount of hazardous waste. This is due to a change in methodology. The new method relies on mandatory reporting by all companies generating hazardous waste. Estimates reported for 2018 and earlier were based on a small sample. In addition, the nonresponse rate was high and no relevant auxiliary information was available, and hence the estimates were uncertain.

This year, no waste has been reported on waste codes 01.2, 02A, 03.2, 08.1, 08.41 or 10.3, although small amounts have been reported previous years. This is due to variations in generation and reporting from few sources. These are also types of waste that are more often reported as hazardous waste.

Similar to the above, 08A The data has been verified at the facility-level.

06.1, 12.4, 12.6 and 12.8A have changed much in ratio but not in amount, due to variations in generation and reporting from few sources.

07.1 Glass wastes has increased due to increase in collected amounts of glass packaging.

07.4 Plastic wastes has decreased much due to smaller amounts of calculated plastic packaging from the sector. The calculation is based on two sets of register data. Those data are developed using different methods and may not correlate, increasing variation between years for this sector.

07.5 wood wastes has decreased much due to new definitions of waste treatment for wood packaging.

10.2 Mixed and undifferentiated materials has increased due to variations in generation and reporting from few sources, in this case ports.

11 Common sludges has decreased considerably, variations in generation and reporting from few sources, in this case ports.

12.1 Mineral waste from construction and demolition has decreased considerably. This is due to large amounts being collected by municipalities that are now considered to actually belong to the construction sector and has not been allocated to this sector this year.

HOUSEHOLDS

Major changes in the amount of generated waste from households regarding WStatR2022 compared to WStatR 2020 are listed below:

- The amount of waste collected at the recycling centres has generally increased for almost all bulky fractions, in general at around 10 % or more (e.g. for glass, non-hazardous wood, metal, etc.). The largest increase was seen in generation of Hazardous Wood waste category (07.5) by 21 300 tonnes (or 43 %) compared to WstatR 2020. According to the Swedish waste management association, cleaning and rebuilding of private houses during the pandemic period were among the main reasons for the increased collection of bulky waste at the recycling centres.

- Quantities of lead-acid batteries (08.41 and 08.41 *) have increased by 1 100 tonnes (non-hazardous) and 2 000 tonnes (hazardous) since WstatR 2020 (48 % for hazardous and 43 % for non-hazardous). The increase is probably due to the same reasons as for all bulky waste mentioned above. In addition, the distribution of waste generated by households and operational waste is very uncertain. It could simply be that more waste within professional activities was allocated to the household sector.

- The amount of vegetal waste generated (09.2), which in practice is garden waste collected at recycling centres, has increased to 94 300 tonnes or by 27 000 tonnes compared to WstatR 2020. This may have depended on the weather conditions facilitating more vegetation and partly because of the pandemic related restrictions with households spending more time at home and spending more own time for gardening instead of hiring professionals.

WASTE TREATMENT

The major differences in waste treatment between 2018 and 2020 have four main explanations:

- real changes in amounts of treated waste,
- differences due to methodological changes or changes in interpretation,
- differences due to improved coverage rate and
- differences related to measurement errors.

Below is an overview of the largest changes observed for the treatment categories Recycling, Other recovery and Disposal and the underlying causes for the observed changes. Recycling here means recovery where the same material is recycled (paper waste to paper, rubber waste to rubber and so on). Other recovery means other recovery operation than recycling and backfilling, and includes energy recovery.

This analysis is based on the statistics of waste treatment excluding treatment of mining wastes (rocks and tailings). This is because those wastes are arisen in huge quantities and will dominate the statistics of waste treatment, especially landfilling, other disposal and material recovery including backfilling.

In this analysis the presentation of the waste treatment categories is more detailed than in the WStatR reporting to EU, so biological recovery (composting and anaerobic digestion) and backfilling are presented separately from material recovery. We have also included preparatory treatment which is not included in the WStatR reporting. This has been done to make it easier to do relevant analyses of the development of the waste treatment. It should also be added that the primary data collection is more detailed which leads to, for example, that material recovery is split up into anaerobic digestion, composting, spreading on land, conventional material recycling, recovery as construction material and backfilling.

The discussion below is divided into two parts. First, changes in each treatment category are analysed and discussed, and then changes in each waste category (EWC-Stat). It is to a large part the same underlying data, but the data is analysed from two perspectives.

Changes in waste treatment

Use as fuel (incineration with energy recovery)
The total amount of hazardous waste used as fuel has decreased with 119 000 tonnes between 2018 and 2020. The data has been verified at the facility-level.

The total amount of non-hazardous waste used as fuel has increased slightly between 2018 and 2020. There are new incineration facilities that have been taken into operation between 2018 and 2020. Waste incineration facilities also import combustible waste from other countries, for example U.K. and Norway.

Incineration of 10.1 Household waste has decreased slightly. The same tendency is reported by Waste Management Sweden who presents statistics on management of municipal waste.

There is an increase of 10.2 Mixed and undifferentiated materials, and a decrease of 10.3 Sorting residues. Often the respondents do not differ between those two categories, and report them as business waste, independent if the waste has been sorted and mechanically treated at a waste facility or is only presorted at source. The sum of 10.2 and 10.3 has increased, which is in accordance with an increasing waste incineration capacity in Sweden. A large part of the 10.2 and 10.3 waste is imported waste from other European countries.

Incineration on land (incineration without energy recovery)

There is a distinct decrease in the amount of incinerated 02A* Chemical wastes. One chemical industry reported 37 900 tonnes of incinerated in 2018 but changed the waste classification to non-hazardous 03.3. It is called “process water” and contains different organic chemicals. In 2018 the total wet weight was accounted, but in 2020 only the dry content. The data has been verified at the facility-level.

Backfilling (excluding mining waste)
The total amount of backfilled waste has increased with more than 1.7 million tonnes. The largest increases are 06.2 Soil and 12.1 Mineral waste from construction and demolition.

Several bigger facilities have reported considerably more 12.6 to backfilling in 2020 than in 2018. There is also a decrease in the amount of materially recovered 12.6 Soils, so some of the changes depend on changes in the classification of the waste treatment. Backfilling become implemented in the Swedish waste legislation in 2018, and this implementation should have influenced how the treatment is classified.

Also 12.1 Mineral waste from construction and demolitions has increased between 2018 and 2020. There are several bigger facilities that report backfilling of 12.1 Mineral waste from construction and demolition in 2020, but not in 2018. Also, the total amount of treated 12.1 has

increased with about 100 000 tonnes between 2018 and 2020, and there are several bigger facilities that report larger amounts of 12.1 in 2020 than in 2018.

There is also an increase in backfilling of 12.8 Mineral waste from waste treatment and stabilized wastes. It is mainly bottom ash and slag from waste incineration. The data has been verified at the facility-level.

Recycling
Recycling is here divided into several sub-categories: biological recovery and other recycling including use as construction material. In the following discussion mining wastes are excluded (mining waste may affect the other recycling, including use as construction material)

Anaerobic digestion and composting (biological recovery)

The total amount of waste treated by anaerobic digestion and composting is increasing. There is a national environmental goal that states: "in 2023 more than 75 percent of food wastes from households, commercial kitchens, shops and restaurants shall be treated biologically so nutrients and biogas can be recovered". There are also special policy instruments to support this development, for example financial support to new biogas facilities.

The total amount of waste to anaerobic digestion and composting has increased between 2018 and 2020. For several wastes there are also tendencies to transfer wastes from composting to anaerobic digestion.

Especially 09.1 Animal and mixed food waste is increasing ("food waste" according to the environmental goal is included in 09.1) and especially the amounts to anaerobic digestion are increasing.

Material recovery (including recovery as construction material – excluding wastes from mining)

In this treatment category we have included mainly the recovery operations R2 – R11, but excluded backfilling (that is a sub-category to R3 and R5). Treatment of mining waste is excluded from this section.

Conventional material recycling

This category of material recovery includes recycling of waste when the material is recycled to the same material and use, for example metal recycling, paper recycling, plastic recycling and glass recycling.

Conventional recycling has decreased between 2018 and 2020. Above all, it is the recycling of 06.1 Metal wastes, ferrous that has decreased considerably. One reason for this decrease is, probably, how the facilities report, or rather do not report, end-of-waste criteria. The metal wastes are usually transported to a sorting plant, which may also include mechanical treatment and storage. It is expected that a large part of the metal waste should fulfil the end-of-waste criteria when leaving the sorting plant. However, only a few facilities have referred to the end-of-waste criteria in their environmental reports. The sorted waste, or material fulfilling the end-of-waste criteria is then transported to steelworks and other metal works, and they do not report it as waste, not even as "end-of-waste scrap". If the metal waste reaches the end-of-waste stage at the sorting facilities, the recycling should be allocated to the sorting facilities, but in their environmental reports it is not possible to identify when or if the material has gained the end-of-waste stage.

Conventional recycling of 07.2 Paper and cardboard wastes has decreased. This decrease is in accordance with the development of the pulp and paper industry. The Swedish Forest Industries Federation reports that the production of recycled pulp decreased from 662 000 tonnes in 2018 to

532 000 tonnes in 2020. Also, the total production of paper and cardboard decreased from 10.4 million tonnes in 2018 to 9.7 million tonnes in 2020.

Material recovery of 09.2 vegetal wastes has decreased. Also, the overall treatment of 09.2 has decreased. About 20.000 tonnes were used in 2018 for final landfill cover, and the landfill wasclosed in the end of 2018. Those 20.000 tonnes or corresponding amount in 2020 seem to have disappeared from the waste statistics and cannot be traced to other facilities or other treatments. There are also less quantities treated in the connection to food industry which probably depends on that more residues from the food industry have been classified as by-products in 2020.

Material recovery as construction material

Material recovery (including recovery as construction material) has decreased. To a part this can be explained by increased backfilling. Backfilling was implemented in Swedish waste legislation in 2018 but was used from 2016 in reporting of construction and demolition wastes. The implementation of backfilling in the legislation should have influenced the respondents (for other wastes than C&D waste) to report backfilling rather than material recovery. However, the difference between material recovery and backfilling is difficult. We have recommendations that state that material recovery as construction material is when the use of waste requires special technical specifications (for example material composition, particle size, hydraulic conductivity and others), and backfilling when it doesn't matter what material is used. Another challenge, in this context, is that backfilling is a sub-category to R3 (material recovery of organic substances) and R5 (material recovery of inorganic substances). Recovery of construction material is classified as R3 or R5 depending on the waste, and thus backfilling will be a sub-category to use as construction material.

The transfer of treatment from material recovery to backfilling is noticeable for 12.6 Soils and 12.6H Soils containing hazardous substances. For both 12.6 and 12.6H there is also an increase in landfilling while the material recovery is decreasing.

There are several larger facilities (municipal landfills) that have reported decreased quantities of material recovery as construction material and instead increased quantities of landfilled waste and/or backfilled waste. There are also facilities that have developed the opposite and reported increased amounts to material recovery as construction material and decreased backfilling or landfilling, but they are fewer.

Material recovery as construction material of 12.4: There is a change in waste type and treatment combination, but the waste type and treatment combination is classified as confidential. SMED cannot comment on the statistics here, though the change has been verified.

Material recovery of 12.6 Soils has decreased but there is a corresponding increase in Backfilling, so this change is mainly explained by the transition from material recover to backfilling, already discussed above in the section about backfilling.

Material recovery of 12.6H Contaminated soils has decreased. This decrease seems to be balanced by an almost equal increase in landfilling. This may depend on harder regulations on the management of contaminated soils.

Landfilling (excluding mining wastes)

Landfilling of non-hazardous waste has increased with about 6% between 2018 and 2020. It is mainly 12.1 Mineral waste from construction and demolition, 12A Other mineral wastes, and 12.6 Soils that have increased. Data for 12.1 and 12.6 are collected in a special C&D waste inquiry, and the data should be reliable. The data has been verified at the facility-level.

There is also a decrease of landfilling of 12.4 Combustion residues. The largest differences depend on three steel mills that now report the slag (LoW 10 02 01 and 10 02 02) as by-products which are sold as construction material and others outside the steel mills.

The amount of landfilled hazardous waste has increased about 11% between 2018 and 2020. It is mainly 12.6H Soils (excluded mineral waste from mining) that has increased. Data for 12.6H is collected in the special reporting of construction and demolition waste. There are three ordinary landfills that have reported larger amounts in 2020 than in 2018.

Pretreatment
Pretreatment is not reported to Eurostat in WStatR, but in Sweden data about pretreatment is presented. Pre-treatment occurs mainly in NACE 38 and NACE 46.77, and there is a balance between the amount of pre-treatment and the generation of secondary wastes.

The largest decreases are 12.1 Mineral waste from construction and demolition. The change has been verified in the facility-level data.

Also, the amount of pretreated 06.3 Mixed metals has decreased between 2018 and 2020. The change has been verified in the facility-level data.

Treatment of mining waste
The largest changes in the treatment depends on changed classification of tailings. In 2018 and earlier the tailings were classified as non-hazardous, but in 2020 the facilities have been asked if the tailings are hazardous waste or non-hazardous waste.

The amounts of mining wastes often change from one year to another, because it is coupled to the production which is coupled to the economy. The amounts of generated mining waste (rocks and tailings), and the total treatment of mining waste have been checked against production data.

Since the amounts of mining wastes are huge, there is a tendency to use both rocks and tailings for construction and backfilling, also backfilling in old mines and pits. Tailings are pre-treated before backfilling in a special process.

Changes by waste type

EWC-Stat		**Comments**
01.1H	Spent solvents	The total amount of treated 01.1H has decreased. It is especially incineration with energy recovery and incineration without energy recovery that have decreased, while recovery has increased. The change has been verified in the facility-level data.
01.2	Acid, alkaline or saline wastes	Change in waste type and treatment combination, but the waste type and treatment combination (overall treatment) is classified as confidential.
01.2H	Acid, alkaline or saline wastes	There is some decrease in treated amount of 01.2H. Material recovery and landfilling have decreased and incineration with heat recovery has increased. The change has been verified in the facility-level data.
01.3H	Used oils	For used oils there is an increase in total final treatment, especially regarding incineration with energy recovery. The change has been verified in the facility-level data.

02A (01.4, 02, 03.1)	Chemical wastes	There is an increased amount of treated 02A Chemical waste. The increase comes from landfills at pulp- and paper industries that uses LoW Green liquor sludge from pulp- and paper industry for backfilling of landfills during closure. In 2018 a lot of these wastes were stored for later use (in 2020).
02AH (01.4H, 02H, 03.1H)	Chemical wastes	The total amount of treated hazardous chemical wastes has decreased between 2018 and 2020. Especially incineration without energy recovery has decreased, while landfilling has increased. The change has been verified in the facility-level data..
03.2	Industrial effluent sludges	Change in waste type and treatment combination, but the waste type and treatment combination is classified as confidential.
03.2H	Industrial effluent sludges	Change in waste type and treatment combination, but the waste type and treatment combination is classified as confidential.
03.3	Sludges and liquid wastes from waste treatment	There is a total decrease of about 35000 tonnes in treatment of 03.3. The change has been verified in the facility-level data.
03.3H	Sludges and liquid wastes from waste treatment	There is an increase of more than 11 ,000 tonnes of the total final treatment of 03.3H. It is incineration with energy recovery that has increased. The change has been verified in the facility-level data.
05	Health care and biological wastes	There are only natural differences between 2018 and 2020.
05H	Health care and biological wastes	There is an increase in treatment of 05H. It is incineration with energy recovery that has increased with 3 600 tonnes while incineration without energy recovery has decreased. The change has been verified in the facility-level data.
06.1	Metallic wastes, ferrous	The treatment of 06.1 has decreased considerably, with 530 000 tonnes. It is material recovery that has decreased, especially conventional material recycling. One reason for this decrease is, probably, how the facilities report, or rather do not report, the end-of-waste criteria. The metal wastes are usually transported to a sorting plant, which may also include mechanical treatment and storage. It is to expect that a large part of the metal waste should fulfil the end-of-waste criteria when leaving the sorting plant. However, only a few facilities have referred to the end-of-waste criteria in their environmental reports. The sorted waste, or material fulfilling the end-of-waste criteria, is then transported to steelworks and other metal works, and is not reported as waste, not even as “end-of-waste scrap”. If the metal waste obtains the end-of-waste stage at the sorting facilities, the recycling should be allocated to the sorting facilities, but in their environmental reports it is not possible to identify when or if the material has gained the end-of-waste stage. On the other hand, there are six major steelworks that reported that they received 06.1 both in 2018 and 2020. Those six steel mills recycled 1.85 million tonnes of 06.1 in 2018, but only 1.37 million tonnes in 2020. The economy in the steel sector has declined between 2018 and 2020 with about 5 %, but the decrease in recycled scrap is much higher. Also, there are 1 600 tonnes of 06.1 reported as landfilled. Filter dust, and sweepings from metal power production have been

		classified as LoW 12 01 02 ferrous metal dust and particles. This classification may be discussed.
06.2	Metallic wastes, non-ferrous	There is a slight increase in the total amount of treated 06.2, and it is material recycling that has increased. The change has been verified in the facility-level data.
06.3	Metallic wastes, mixed	The total amount of treated 09.3 has decreased. The change has been verified in the facility-level data.
07.1	Glass wastes	There are only minor changes in the treatment of 07.1 Glass wastes. Most of the increase of landfilling, and decrease in material recycling, is reported from glass recovery facilities who manage packaging glass waste (the landfilled reject is glass reject from the mechanical sorting process, and due to higher requirements from the glass market they have to bleed out more glass reject).
07.2	Paper and cardboard wastes	There is a decrease in the total amount of treatment of paper and cardboard wastes. This decrease is in accordance with the development of the pulp and paper industry. The Swedish Forest Industries Federation reports that the production of recycled pulp decreased from 662 000 tonnes in 2018 to 532 000 tonnes in 2020. Also, the total production of paper and cardboard decreased from 10.4 million tonnes in 2018 to 9.7 million tonnes in 2020.
07.3	Rubber wastes	Change in waste type and treatment combination, but the waste type and treatment combination are classified as confidential.
07.4	Plastic wastes	The treatment of 07.4 plastic waste has decreased between 2018 and 2020. It is especially incineration with energy recovery that have decreased. The change has been verified in the facility-level data.
07.5	Wood wastes	The treatment of wood waste has decreased between 2018 and 2020. It is the amount of incinerated with energy recovery (R1) that has decreased. There are several incinerator facilities that have reported decreased amounts of wood waste in 2020. There are also some wood industries that reported incineration of wood waste in 2018, but in 2020 that wood waste was classified as by-product. It is also found that the amount of wood waste from Construction and demolition treated by energy recovery has increased. Also, the amount of wood waste imported for energy recovery has increased between 2018 and 2020. The kind of wood waste that has decreased seems to be mostly wood waste from wood industry and wood waste from forestry, which have been classified as by-products in 2020 but not in 2018.
07.5H	Wood wastes, hazardous	There is a decrease in the amount of treated hazardous wood waste which mainly is incinerated with energy recovery. At some incineration facilities there is an ambiguity when classifying hazardous wood waste. In the environmental report the waste is usually described as just “hazardous wood waste” or “impregnated wood waste”. However, in the special reporting of

		C&D waste (that is attached to the environmental report) impregnated wood waste is classified as LoW 17 02 04 which becomes 12.1H mineral waste from construction and demolition. Some of the decrease seems to depend on changed classification of the hazardous wood waste. We suspect that the data for 2018 is erroneous. The environmental report for 2020 seems to be reliable. The change has been verified in the facility-level data.
07.6	Textile wastes	For 2018 there were no treatment identified for 07.6 textile waste but in 2020 there were about 2,500 tonnes of material recovery. Data about textile waste treatment is usually not collected, since the management of textile wastes mainly takes place on smaller facilities that don't have to issue environmental reports. The data has been verified at the facility-level.
07.7H	Waste containing PCB	There is an increase of the quantity of treated 07.7H waste containing PCB. The change has been verified in the facility-level data. It has also been observed from earlier that PCB-wastes have fluctuations in quantity from year to year. There is also a large quantity of pre-treatment of PCB wastes: about 8,000 tonnes. It is mainly electrical equipment such as transformers and capacitors that are drained and the PCB is transferred to an incineration facility and the metals are transferred to metal recovery.
08.1	Discarded vehicles	Sweden does not report treatment of non-hazardous discarded vehicles. Non-hazardous vehicles are generated as secondary waste when hazardous discarded vehicles are dismantled, and these are further transferred to shredder facilities. The shredding is regarded as a pre-treatment process and is not reported in WStatR.
08.1H	Discarded vehicles	Hazardous discarded vehicles are pre-treated by dismantling, which is a preparatory treatment, and not reported in WStatR (see also previous 08.1 Discarded vehicles (non-hazardous).
08.41	Batteries and accumulators wastes	The change has been verified in the facility-level data. Usually, Sweden regards all batteries to be hazardous and the treatment is reported under 08.41H, see next item.
08.41H	Batteries and accumulators wastes	The treatment of batteries and accumulators has a slight decrease. The change has been verified in the facility-level data.
08A (08 excl. 08.1 and 08.41)	Discarded equipment	Discarded equipment is generally classified as hazardous (08AH) unless the respondent clearly states it is non-hazardous.
08AH (08H excl. 08.1H and 08.41H)	Discarded equipment	The final treatment of 08AH has changed only marginally. However, we have found an increase in pre-treatment (that is not reported in WStatR). The pre-treatment is usually dismantling or shredding (usually of dismantled components). The change has been verified in the facility-level data.
09.1	Animal and mixed food waste	The treatment of 09.1 Animal and mixed food has increased by about 127 000 tonnes. The dominating treatment is anaerobic digestion and it has increased. The change has been verified in the facility-level data. Several facilities reported larger amounts in 2020 and 2018.

		There is also an uncertainty in the classification of the waste. Many facilities do not report the treated waste in LoW codes. Instead they use the common name, for example “organic industrial waste”, which makes it hard to determine if the waste is 09.1 or 09.2. A part of the increase may be connected to the decrease in treatment of 09.2 vegetal waste.
09.2	Vegetal wastes	The treatment of 09.2 vegetal waste has decreased. A part of the decrease may depend on the uncertainty in classification of 09.1 and 09.2 (see comment in previous item). There are a number of bigger facilities that report less quantities in 2020 than 2018, but the opposite can also be noted.. Another observation is that vegetal waste treated in connection with food industries has decreased since several residues has been classified as by-products in 2020
09.3	Animal faeces, urine and manure	The treated quantity of 09.3 Animal faeces, urine and manure has increased. It is mainly anaerobic digestion of manure that has increased. This is in accordance with other statistics from the Swedish Energy Board that reports an increased number of farm digestors. There is also a number of facilities that report (especially anaerobic digestion) higher amounts in 2020 than in 2018.
10.1	Household and similar wastes	The amount of treated 10.1 household waste and similar has decreased. There is a decrease in incineration with energy recovery and an increase in landfilling, and the changes are comparable with reports from Waste Management Sweden (even if the waste classification is a little different).
10.2	Mixed and undifferentiated materials	Change in waste type and treatment combination, but the waste type and treatment combination is classified as confidential.
10.2H	Mixed and undifferentiated materials	Change in waste type and treatment combination, but the waste type and treatment combination is classified as confidential.
10.3	Sorting residues	The amount of treated 10.3 Sorting residues has decreased. It is above all the quantity to incineration with energy recovery that has decreased. The change has been verified in the facility-level data. It is also observed that backfilling has increased while material recovery has decreased. One reason could be that backfilling now has been implemented in the Swedish legislation.
10.3H	Sorting residues	The total treatment of hazardous sorting residues has decreased. The change has been verified in the facility-level data.
11	Common sludges	The amount of treated 11 Common sludges has increased slightly. Incineration with energy recovery has increased while biological treatment has decreased (comment: the digestion of sludges that are integrated into the treatment process in municipal sewage treatment plants are not included since we regard it as an internal process). A large part of the changes in the treatment concerns sludges from pulp and paper industries, and there are several paper mills that report increased amount of incinerated sludge and decreased amounts of composted sludge.

12.1	Mineral waste from const-ruction and demolition	The amount of treated 12.1 Mineral waste from construction and demolition has increased. Data for treatment of 12.1 is collected by two parallel reporting: 1. In Sweden there is a special reporting of C&D waste – all waste facilities must submit a report of the received C&D waste (quantity in tonnes, classification according to LoW) and how it has been treated (R and D codes). 2. In the annual environmental report, the waste management facilities should describe the waste and the waste treatment. However, there is today no standardized form for the reporting. Regarding C&D waste these two methods usually give different results. Both methods give an increase of the treated amount of 12.1. It is above all the landfilling of 12.1 that has increased, but also backfilling and incineration with energy recovery have increased. The change has been verified in the facility-level data. Backfilling of 12.1 is usually done when covering old landfills that shall be closed and is often coupled to different closing projects. Therefore, the amount of backfilling at a certain facility may vary a lot from year to year. We have identified 6 – 7 facilities (landfills that are closing) that have reported 10,000 – 50,000 tonnes each of backfilling of 12.1 in 2020 but none in 2020. Also the opposite can be discovered, there are about 5 facilities that reported backfilling in 2018 but none, or very reduced, in 2020. The change regarding change in landfill has been verified in the facility-level data.
12.1H	Mineral waste from cons-truction and demolition	The amount of treated hazardous 12.1H has increased from 2018 to 2020. Both incineration with energy recovery and landfilling have increased. It is mainly impregnated wood waste (wood containing hazardous substances) that is incinerated. The change has been verified in the facility-level data.
12.4	Combustion wastes	The total amount of treated 12.4 Combustion wastes has decreased considerably since 2018. Apart from this also a change in waste type and treatment combination, but the waste type and treatment combination are classified as confidential.
12.4H	Combustion wastes	There are only minor changes.
12.6	Soils	The amounts of treated soils have increased. We have also observed that the total amount of generated soils has increased. There is also a diversion from recycling to backfilling depending on that backfilling has been implemented in the legislation.
12.6H	Soils	There is only a small change in the total amount of 12.6H Hazardous soils. There is a diversion from “recycling” to landfilling (in this case recycling has been stabilizing the soil and the soil is ? used as construction material).
12.7	Dredging spoils	The amount of treated dredging spoils has increased from 2018. We have found that there are big variations between different years. The amounts and treatments are collected from the Swedish Agency for Marine and Water Management and are identical to the reporting to OSPAR and HELCOM.

12.7H	Dredging spoils	The amount of 12.7 has decreased. It was mainly a major dredging project in a harbor that reported treatment of hazardous dredging spoils in 2018.
12.8A (12.8, 13)	Mineral wastes from waste treatment and stabilized wastes	The total treatment of 12.8 has increased. It seems to be a change in classification of slag and bottom ash from waste incineration. There is an uncertainty if the bottom ash shall be LoW 10 01 15 (which is EWC-Stat 12.4) or LoW 19 01 12 (which is LoW 12.8A), so the facility may report differently depending on the current interpretation. Especially backfilling of 12.8 has increased. We have also noticed that there are three or four facilities that reported recycling of 12.4 in 2018, but backfilling of 12.8 in 2020.
12.8AH (12.8H, 13H)	Mineral wastes from waste treatment and stabilized wastes	There is a slight decrease in the total treatment of 12.8AH (12.8H+13H) which seems to be within natural variations. Eight facilities have reported treatment, and 7 of them have slightly decreased amounts. There is one item reported as backfilling (about 22 000 tonnes). Backfilling of hazardous waste is not allowed but, in this case, it was LoW 19 05 06*, which was specified as "waste, classified as hazardous waste, that has been stabilized/solidified" that was used for landscaping of an old landfill.
12A (12.2, 12.3, 12.5)	Other mineral wastes, **excluding mining waste**	The amount of treated 12A (12.2, 12.3, 12.5) excluding mining waste has increased. Especially the amount to landfilling has increased. The data has been verified at the facility-level.
12AH (12.2H, 12.3H, 12.5H)	Other mineral wastes, **excluding mining waste**	The amount of treated 12AH (12.2H, 12.3H, 12.5H) excluding mining waste has slightly decreased. The decrease seems to be within the natural variations.
12.3B 12.3BH	Mining waste	The major changes for mining waste depend on changed classification of tailings that earlier were classified as non-hazardous (LoW 01 03 06 or 01 03 08), butin 2020 in several cases instead have been classified as hazardous waste (LoW 01 03 05* or 01 03 07*). The classification has been based on a special inquiry to the mining facilities. There are also common variations of the amount of mining waste that varies from year to year. The major treatment of rocks (LoW 01 01 01) is landfilling, backfilling and recycling (when used as construction material). There is a tendency towards less landfilling and more backfilling or use as construction material, but it depends a lot on the local possibilities because normally the mining waste is transported only shorter distances, and managed within the mining area. The treatment of tailings is mainly D 4 Surface impoundment (Other disposal). There are some tailings that are stabilized to some kind of paste and used for filling of old mine pits. This treatment has been classified as backfilling, but it can be discussed if landfilling would be more appropriate.
sum-nonH	**Sum non-hazardous, excluding mining waste**	The total final treatment of all non-hazardous wastes, excluding mining waste, has changed very little between 2018 and 2020. However, there are some diversions between different treatment categories. Within the category Recycling and backfilling, it can be observed that the amount of use as construction material is

		decreasing while backfilling has increased. It is basically the same treatment but since backfilling was implemented in the legislation in 2018, backfilling has been used more. The increase in backfilling depends mainly on 12.6 Soils. Also, an increase of biological treatment can be observed, which is in line with the environmental goals set up by the government and the parliament. There is also an increase in energy recovery which may depend on increased import of combustible waste EWC-Stat 10.2 and 10.3.
sum-H	**Sum hazardous, excluding mining waste**	The total amount of final treated hazardous wastes, excluding mining wastes, has decreased. At the same time, the pre-treatment (not reported in WStatR) has increased with approximately the same amount. Incineration with heat recovery as well as incineration on land has decreased. Also recycling, including use as construction material, has decreased while landfilling has increased. The decrease in incineration on land (D10) depends on hazardous wood waste, see 07.5H above. The decrease in recycling depends mainly on 12.6H contaminated soil, see above. The increase in landfilling depends mainly on 12.6H contaminated soil, see above.

8.2.1. Length of comparable time series

The time series for reference years 2010-2020 are overall comparable, with good comparability among years 2014-2020. Methodological improvements over time may affect the comparability slightly. For some waste types, interpretation of what is a waste or a by-product has been problematic, which may have affected the results somewhat.

8.3. Coherence - cross domain

See section 8.5.

8.4. Coherence - sub annual and annual statistics

Not relevant. No sub annual or annual waste statistics is produced in Sweden.

8.5. Coherence - National Accounts

The same classifications and frames are used in most business surveys and economic statistics at Statistics Sweden.

8.6. Coherence - internal

Efforts are made to avoid double counting and data gaps, but it could still occur to a limited extent. There are some discrepancies between total amounts of treated and generated waste. These differences for WStatR2022 have been handled and for the majority of the discrepancies explanations, e.g. amounts of import and export of different waste types, have been found.

9. Accessibility and clarity Top

Statistics on waste generation, recovery and disposal of waste and the current quality report will be published on the website of the Swedish Environmental protection agency (EPA), when reporting to Eurostat is complete. A report will be published in June 2022, in which the statistical material on waste generation and treatment in Sweden will be presented and discussed. For more details compared to what is presented in the overarching report, statistics leaflets covering waste statistics in specific NACE:s (e.g. NACE F41-43) and waste types (e.g. municipal waste) will also

be published on the Swedish EPA:s website. The statistics on waste generation and treatment in Sweden will be available in Statistic Sweden´s public database.
The intention for this quality report is to be a resource for more advanced statistical users in order to increase clarity regarding methods and checking procedures.
The statistics have been produced according to the Official Statistics Act (SFS 2001:99) and the Public Access to Information and Secrecy Act (SFS 2009:400). Data collection from environmental reports is done according to The Swedish Environmental Code (SFS 2000:61) and EPA ordinance (NFS 2016:8).

9.1. Dissemination format - News release

Swedish EPA is responsible for dissemination formats, e.g. press releases relating to the publication of the report "Waste in Sweden 2020" as well as the statistics leaflets.

9.2. Dissemination format - Publications

Report: *Waste in Sweden 2020* will be published by Swedish EPA in June 2022.
Leaflets: Information on waste statistics in a number of selected NACE and for different waste types are been published on the Swedish EPA:s website in June 2022. These information leaflets present statistics on common waste types as well as trends in the given NACE:s. These are:
- Construction
- Electricity, gas, steam and air conditioning supply
- Households
- Service industry
- Construction and demolition wastes
- Municipal waste
- Import and export of waste

9.3. Dissemination format - online database

Data tables are published in Statistics Sweden's public database together with summary tables and figures.

Extract of the waste statistics data is published in data tables on the Swedish EPA´s webpage.

9.3.1. Data tables - consultations

Not applicable.

9.4. Dissemination format - microdata access

Not applicable. Micro data is confidential and no public use files are produced.

9.5. Dissemination format - other

Not applicable.

9.6. Documentation on methodology

The Quality Report is published.

9.7. Quality management - documentation

SMED has its own quality management documentation, which was used during the project.

9.7.1. Metadata completeness - rate

Not applicable.

9.7.2. Metadata - consultations

Not applicable.

10. Cost and Burden Top

Estimates made in WStatR2014 and earlier, indicate an average response burden of 1 hour per respondent in questionnaire surveys. In WStatR2022, environmental reports have been the major data source, and they are not connected to any extra burden for the respondents, as these are mandatory for other purposes than waste statistics. In the case of web surveys, there is an extra burden for the 755 respondents, estimated to 755 hours in total.

Since reference year 2020, it is mandatory for facilities to respond to surveys. The response rate as such was therefore significantly higher för WStatR 2022 than it has been previously. Waste producers of hazardous waste should also register amounts of generated hazardous waste in the Swedish hazardous waste register. This register has been a new data source for generated hazardous waste from the service industries (G-U excl. G46.77) in WStatR2022. Since reference year 2016, it is mandatory for facilities that receive construction and demolition waste to report amounts and treatment of received construction and demolition waste, which has increased the burden. The reason was mainly to improve the evaluation of the Waste Framework Directive 2008/98/EC aim to have 70 % of construction and demolition waste recycled by 2020. A contributing reason was also the need of improvement of the quality of the official statistics. SMED has also collected data from organisations and authorities that collect waste data for their own purposes, independently of the WStatR work. This work is not included in Table 11.

Table 11. Burden of respondents

Survey / Source	Type and total number of respondents	Actual no. of respondents	Time required for response[1]	Measures taken to minimise the burden
NACE 10-12 (web survey)	130	80	80	Cut-off values applied in the sampling process in order not to burden small business. The survey is not mandatory, which is reflected in very low response rate and probably significantly decreases the burden.
NACE 13-15 (web survey)	38	28	28	
NACE 16 (web survey)	75	55	55	
NACE 17-18 (web survey)	64	54	54	
NACE 19 (web survey)	3	0	0	
NACE 20-22 (web survey)	102	79	79	
NACE 23 (web survey)	58	44	44	
NACE 24-25 (web survey)	153	115	115	
NACE 26-30 (web survey)	273	219	219	
NACE 31_33 (web survey)	107	76	76	
NACE 41-43 – mandatory reporting of received construction and demolition waste	527	527	527	
TOTAL	**1003**	**755**	**755**	

[1] 1 h per respondent

11. Confidentiality

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Data is treated according to the Public Access to Information and Secrecy Act (2009:400).

11.2. Confidentiality - data treatment

The p% rule is used for primary cell suppression. The software TauArgus is used for statistical disclosure control.

11.1. Confidentiality - policy

Data is treated according to the Public Access to Information and Secrecy Act (2009:400).

11.2. Confidentiality - data treatment

The p% rule is used for risk assessment, and the software TauArgus is used to apply primary and secondary cell suppression. Companies that cause unsafe cells have been asked for consent, which has reduced the number of suppressed cells.

12. Comment

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No further comments.

Annexes on data methods:

Annex Description of methods for determining waste generation - overview
Annex Waste generation in the economy – sample survey
Annex Waste generation in the economy on the basis of information on waste treatment
Annex Determination methods for waste generated by households

Related metadata

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Annexes

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Annex 1.

Table 12, Description of methods for determining waste generation

Item	NACE	01.1H	1.2	01.2H	..	..	..	..	..	..	..	..	..	12.8, 13
1	01-03	Mix of methods												
2	05-09	Environmental reports												
3	10-12	Environmental reports, Web survey												
4	13-15	Environmental reports, Web survey												
5	16	Environmental reports, Web survey												
6	17-18	Environmental reports, Web survey												
7	19	Environmental reports												
8	20-22	Environmental reports, Web survey												
9	23	Environmental reports, Web survey												
10	24-25	Environmental reports, Web survey												
11	26-30	Environmental reports, Web survey												
12	31-33	Environmental reports, Web survey												
13	35	Mix of methods.												
	36	Reuse of data												
14	37	Sewage sludge from official statistics, other waste factors												
	39	Reuse of data												
15	38	Mix of methods, Principally Environmental reports												
16	41-43	Mix of methods, principally information in environmental reports from facilities that receive C												
17	G-U, excl. 46.77	Mix of methods												
18	46.77	Mix of methods												
19	HH	Mix of methods												

12.8H, 13H																					

Annex 2:

Waste generation in the economy – sample survey

The business register was used as base for the sampling, except for NACE 38 and NACE 46.77 where the register of environmentally hazardous activities was used. Local unit has been used as statistical unit. A local unit can have several different activities, one main activity and several secondary activities. The entire local unit has been classified by its main activity. Local unit is used because in most cases, the entire local unit has a common waste management and local unit is often equivalent to facility registered as environmental hazardous. Those facilities have to make a yearly environmental report which usually contains waste data.

Several data sources were used in the survey:

- The main data source has been environmental reports from facilities that are registered as environmentally hazardous activities according to the Environmental Code. These reports were available as PDF-files at the website Swedish Portal for Environmental Reporting (SMP). In NACE B05-09 and NACE C19, the environmental reports are the only data source since all relevant facilities are registered as environmentally hazardous activities.
- For some industries, units not registered as environmentally hazardous, data was also collected by web-questionnaires, see below. The local units covered by environmental reports were excluded from the sample frame to the web survey that was based on the business register.

Number of statistical units per stratum and item according to the available register, number of statistical units selected for sample survey and questionnaires sent out and number of non-responses are not shown due to risk of disclosure.

In the following tables, units are divided into six different size classes according to the numbers of employees:

Size classes	Numbers of employees
:1	10-19
:2	20-49
:3	50-99
:4	100-249
:5	250-499
:6	500 and upwards

Environmental reports and web survey data was the main data source for the following NACE:s:

B05-09
C10_12
C13_15
C16
C17_18
C19
C20_22
C23
C24_25
C26_30
C31_33

Number of available environmental reports and sent out surveys as well as number of respondents can be found in table 7 and 8.

Annex 3. Waste generation in the economy on the basis of information on waste treatment

Data for waste generation in Construction (NACE 41-43) has been based on information from waste treatment facilities. All waste treatment facilities and facilities with permission to manage waste that receive construction and demolition waste have to report type of waste (LoW code) for the C&D waste (defined according to chapter 17 in the List of Wastes), waste treatment (R and D code), amount and in case of mechanical treatment and sorting also generated secondary wastes. These data are used to estimate the total amount of construction and demolition wastes (chapter 17 in LoW) handled in the country.

Annex 4. Waste generation in the economy on the basis of models or other methods
In some cases, waste data has been reused from earlier years. These sectors and sub sectors have very small amounts of waste according to earlier surveys. Other NACE are based on other methods, see table 13 below.

Table 13. Waste generation in the economy on the basis of models or other methods.

Waste from Agriculture, Forestry and Fishing (NACE 1-3)		
1	Scope of the model (waste types and economic sectors covered)	All wastes in NACE 1-3.
2	Basic data for the estimations (production figures etc.)	The results obtained from this sector were based on a combination of several different methods, mainly: • Waste factors • Trade organizations and other companies • Official statistics • Development project • Data from co-digestion facilities • Reuse of data

3	Description of the model and the factors applied	**- Waste factors:** Based on earlier development projects ("Metodutveckling för Jordbruks-, skogsbruks- och fiskesektorn" by Kjell Rasmusson, SCB and Jan-Olov Sundqvist, IVL. 2007 and "Översyn av NACE A inför ASP 2016" by Jonas Allerup and Annika Gerner, SCB. 2015, as well as "Förbättra ASP2022-data" by Sandra Stålhandske and Tova Andersson) **- Trade organizations and other companies:** Organizations such as, Konvex AB (cremation of animals), Swedish Waste Management and Swedish Ensilage Plastic Recycling. **- Official statistics:** From Statistic Sweden, Swedish EPA, The Swedish Agency for Marine and Water Management and the Swedish Board of Agriculture. **- Development project:** See "Household waste from business" later in this annex. - **Data from co-digestion facilities:** All co-digestion facilities in Sweden were asked to provide data on waste received from NACE A activities. - **Reuse of data:** For some waste streams there was no other possibility than to reuse data from the prior WStatR (WStatR2020).

Electricity, gas, steam and air conditioning supply (NACE 35)		
1	Scope of the model (waste types and economic sectors covered)	Combustion Plants Waste from combustion Plants NACE D35 was surveyed in WStatR2018. In WStatR2022 waste from combustion plants is extrapolated from gross electricity supply in combination with waste amount from WStatR2018. The survey regarding 2012 is used for non-response imputation. For all waste types except ashes, non-response imputation is made on plant level assuming that waste

		generation is proportional to energy generation. Concerning the large waste categories, 12.4 and 12.8 (both ashes), a slightly different model for non-response imputation is applied. Based on the 2012 survey, factors of ash generation per MWH of combusted fuel (per fuel type) were derived and used on facility level (for the non-responding part of the population). Other sub sectors Some sub sectors have been reused. Other sub sectors have been adjusted (e.g. according to quantity produced, number of facilities in service).

Water supply, sewage, remediation act (NACE 36, 37 and 39)		
1	Scope of the model (waste types and economic sectors covered)	NACE 36: Updated with activity data for reference year 2015 (data updated every five years). NACE 37: Common sludges. The reporting according to Council Directive of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (86/278/EEC) is due every second year. The last reporting period available in the waste statistics production process, refers to 2016 data. These were the newest available data at the time of data collection. It should be noted that the sector is considered as very stable and that sludge quantities vary only marginally between years. NACE 37 Other wastes: Waste factors from WStatR2012 was used but updated with regards to quantity of produced sludge. Data reused from WStatR2014 for NACE 39.

Construction (NACE 41-43)

1	Scope of the model (waste types and economic sectors covered)	All wastes in NACE 41-43 Construction.
2	Basic data for the estimations (production figures etc.)	Data reported to the environmental reports register (SMP) from facilities receiving construction and demolition wastes.
3	Description of the model and the factors applied	All construction and demolition wastes are considered to be included in the main data source. Data on dredging spoils is collected from the Swedish Agency for Marine and Water Management. Other wastes (non-C & D-waste) are calculated using factors based on information from a few large building companies.

Service sector (parts of G-Q)		
1	Scope of the model (waste types and economic sectors covered)	In the service sector data from several different public enterprises, authorities and agencies have been used, for example: - Material companies according to the extended producer's responsibility - Swedish Transport Agency (reused from 2016) - Swedavia (Swedish Aviation Authority) (reused from 2016) - Swedish Armed Forces (reused from 2016) - Region Västra Götaland (reused from 2016) These enterprises/authorities make their own surveys to cover their own needs. Usually they cover all kind of wastes from their sphere of interest. Waste from public cleansing (streets, parks etc.) was reused. Data about discarded vehicles is included. 09.1 Animal and mixed food waste from the retail sector (47), Restaurants and similar (55, 56) and institutional kitchens

		(education, health, elderly care and prison care) is included. Household waste has been calculated as a rest: total amounts of collected municipal waste – 78% assumed to be generated from households –amounts reported in other NACE sectors. For hazardous waste the Swedish newly installed waste register was used.
2	Basic data for the estimations (production figures etc.)	The food waste factors have been obtained from previous studies in Sweden. Factors for household waste were developed using the same data.
3	Description of the model and the factors applied	See 2.
4	Routines applied or foreseen to guarantee sufficient quality (periodical revision of factors, focused surveys for verification etc.)	

Household waste from business (included in other sectors, where no other data source was available)		
1	Scope of the model (waste types and economic sectors covered)	This model concerns "10.1 Household wastes" generated in business. This factor can be used in all industries, when there is no other data source for this waste (the surveys do usually cover the household waste). For 2020, it was used for NACE A01-03, D35 E36-37-39 and F41-43
2	Basic data for the estimations (production figures etc.)	The factor is 86 kg per employee. The number of employees is obtained from Statistics Sweden.
3	Description of the model and the factors applied	In 2013 an analysis from enterprises (or rather local units) was made that have reported the household waste in the inquiries. The result showed that it was 86 kg/employee (CV = 31 %).
4	Routines applied or foreseen to guarantee sufficient quality (periodical revision of factors, focused surveys for verification etc.)	This factor is expected to develop. Improved source separation and waste prevention programs may change the amounts.

Annex 5. Determination methods for waste generated by households

The data about waste generation from households (see Table 12 below) is retrieved from different trade organizations and producer's responsibility organisations that make own surveys of the wastes they handle.

Table 1. Determination methods for waste generated by households.

1	**Indirect determination via waste collection**	
1.1	Description of reporting unit applied (waste collectors, municipalities)	The data about waste generation from households is retrieved from different government agencies, trade organisations and producer's responsibility. These organisations make their own inquiries: • Swedish Waste Management collects data from all municipalities about household waste (including household waste from business), generation and treatment. • Swedish Waste Management also collects data of collected household waste from household (inquiry to the municipalities) • In Sweden, there are several producer responsibility organisations (here referred as material companies) which are responsible for different types of packaging materials. The material companies have provided data about generated and recycled packaging waste. • El-Kretsen (producer's responsibility organisation for WEEE) reports collected and treated amounts of WEEE. Remark: we have assumed that 08 Discarded equipment from household mainly consists of WEEE. • The national corporation of Swedish pharmacies for medical wastes.
1.2	Description of the reporting system (regular survey on waste collectors, utilisation of administrative sources)	Data is retrieved from the sources above, registers and from experts.

1.3	Waste types covered	EWC stat codes: 01.3; 02A; 06.3; 07.1; 07.2; 07.3; 07.4; 07.5; 07.6; 08A; 08.1; 08.41; 08; 09.1; 09.2; 10.1; 11; 12.1
1.4	Survey characteristics (1.4a – 1.4d)	
	a) Total no. of collectors /municipalities (population size)	290 municipalities
	b) No. of collectors/municipalities selected for survey	290 municipalities
	c) No. of responses used for the calculation of the totals	Unknown. The calculation is performed by Swedish Waste Management and the number of responses varies between types of wastes.
	d) Factor for weighting	Unknown. The calculation is performed by Swedish Waste Management and the number of responses, and hence the weighting factors, varies between types of wastes.
1.5	Method applied for the differentiation between the sources household and commercial activities	In most types of "household waste" also commercial waste is included. We have made a judgement from case to case of the amount from households. Discussions have been held with experts from each data source.
1.6	Percentages of waste from commercial activities by waste types	Different for each type of EWC-Stat code. For EWC-Stat 10.1, 22 % of the collected waste is assumed to be generated by commercial activities and hence 78% is reported in the household sector. For item 06.3 the fraction is 91 %, for 07.1 it is 92 %, for 07.4 it is 98 % and for 07.6, 90 % is reported in the household sector and for 12.1 the fraction is 50 %.
1.7	Population served by collection scheme for mixed household and similar waste, in %	100

2	**Indirect determination via waste treatment**	
2.1	Specification of waste treatment facilities selected	Not applicable
2.2	Waste types covered	Not applicable
2.3	Method applied for the differentiation between the sources household and commercial activities	Not applicable

2.4	Percentages of waste from commercial activities by waste types	Not applicable	