

Facility Data Manager (FDM) 2025 Content Guidance

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Facility Data Manager (FDM) Content Guidance Table of Contents:

Click on any of the sections below to jump to that section:

- FDM Introduction
- Facility Site Information
- Reporting
- Production
- Energy
- Water
- Wastewater
- Air Emissions
- Waste
- Chemical Management

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Introduction: What is Facility Data Manager?

Brands, manufacturers, and facilities use Facility Data Manager (FDM), from Worldly, to track monthly environmental metrics and progress towards targets.This enables brands, manufacturers and facilities to collaborate more closely throughout the year on shared goals.

Once facilities have tracked a full year of environmental metrics in FDM, they can save time on annual reporting by automatically importing their FDM data into the Higg FEM. FDM data can cover up to 100% of the Higg FEM L1 quantitative questions. Managing environmental data all on one platform helps move away from using spreadsheets for monthly data tracking and reduces errors in reporting.

Brands, manufacturers and facilities use FDM to:

- Track monthly environmental metrics and progress towards targets
- Collaborate on shared goals throughout the year
- Save time on annual reporting with the Higg FEM by automatically importing data from FDM
- Manage environmental data all on one platform, to reduce errors and move away from spreadsheets

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Getting Started

FDM is designed to support facilities with tracking their environmental data and identifying opportunities to improve. Facilities should be honest and transparent when inputting data in FDM.

- The guidance provided in the sections below includes detailed information for each FDM question that is designed to help facilities understand and complete FDM accurately.
    - Please note that many questions in the guide will reference "**suggested uploads**" – these uploads are not required, but are there to give users an idea of the type of documentation that would support a response to the question.
- Visit the Worldly Training and Support Site for additional details on accessing, getting started, and using FDM here: https://support.worldly.io/hc/en-us/categories/24070913942171-Facility-Data-Manager-FDM
- FDM eLEarning Modules are available on Worldly's online learning platform here: https://worldly.io/learning/

Help

If you have any issues with the Worldly platform or are confused by a question in FDM, you may contact the FDM support team by submitting your questions at support.worldly.io.

FDM Data Reporting Cadence

FDM requires that monthly data is submitted. Facilities can opt to enter data in less frequent intervals (e.g. quarterly), however this will require separate data submissions. (e.g. if a facility wishes to report data quarterly, they will be required to submit 3 monthly data submissions in FDM for that quarter).

Validating Your FDM

FDM Validation is on the roadmap for inclusion into the Cascale Verification Program in the future, but as of now it is not yet supported by Cascale. Users may opt to organize and implement a validation program with a third party assurance provider or verifier. The validation scheduling and coordination process occurs off the Worldly platform. Each organization may design validation programs cooperatively with business partners and customize validation program characteristics such as the frequency of remote/onsite audits, required auditor level of qualification, and pricing.

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Site Information

General Introduction

The Site Information section of FDM requires you to complete questions and provide detailed information relating to your facility's location, size, and operations. The Site Information section also requires facilities to enter information on relevant environmental aspects such as energy and water sources, wastewater type and treatment, waste types, refrigerant use, etc. **Note:** Guidance on the Site Information questions that are specific to a facility's environmental aspects is included in the relevant sections of this guidance (e.g. guidance on Site Information questions related to energy sources is included in the the Energy Section of the guidance).

Your responses to Site Information questions will be used to customize your FDM to your facility type and applicable reporting metrics.

You will also be asked for information on your facility's permits on this page. The intent of this is to determine your compliance status with relevant environmental permits. Please provide information on any rules or regulations your facility is required to follow such as permits, authorizations, licenses, registrations, certificates, or other compliance documentation your facility is required to follow.

Notes:

- The Site section of FDM should be completed first before moving on to any other sections of the module.
- If your facility has completed a Higg FEM (FEM2023 or later) you will be able to import your facility's Site information from the Higg FEM.
- Once your facility completes the Site section, this information will be rolled forward in FDM for future submissions to eliminate redundant data entry.

Facility Scope

FDM is a facility level tool that is designed to track the environmental data of a single business entity or manufacturing unit. It is understood that there may be complexities in defining this globally therefore, the following definitions and exceptions apply when determining the facility scope for the completion of a single FDM.

- FDM shall cover the entire facility which is defined as all onsite business activities of a legal business entity as defined by the scope of the applicable business license/operating permit in the facility's country of operation. This includes all owned and operated onsite processes, equipment, and areas (e.g., facilities cannot exclude specific operations or facility areas from FDM).

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- One (1) FDM is required for each legal business entity as defined by the applicable business license/operating permit except in the following circumstance:
    - Where multiple manufacturing units (facilities) are located at the same premises with different business licenses, however the facilities are fully owned and operated by a single legal business entity, one (1) FDM can be completed.
        - **Note:** If the separate facilities are not legally owned/operated by a single parent business entity with a valid operating license, which includes ownership of all facilities, separate FDMs must be completed for each facility.
    - Where a material or component supplier of the facility with a separate business license is located at the same premises and supplies 100% of its materials/services to the facility, its operations can be included in the facility's FDM.
        - **Note:** If the material or component supplier provides materials or services to other facilities, it must not be included in the facility's FDM scope and would require a separate FDM.

- Facilities located at two separate physical locations (i.e., different legal addresses) must complete one (1) FDM per location regardless of ownership (e.g., if two facilities are located at different physical locations, but their operations are covered under one (1) parent business license, separate FDMs are still required.)

Site Information

Facility Profile Questions Pathway (by Facility Type)
The Site Information section contains questions on facility type, product and material categories, facility processes and industry sector. Your facility's responses to these questions will lead you through a series of predefined selections where you can select the applicable responses.

Note: It is possible for multiple profile pathways to apply if more than one facility type is selected. This means that the facility would need to input information about the product and material category, and facility processes for each selected facility type.

- For example, a vertical integrated facility will select two facility types ("Finished Product Assembler" and "Material Production (Raw and intermediate materials are transformed into their final state before assembly)") and will need to provide information on the products, materials and processes for each facility type.

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Country or Region *(Ref ID - sitecountry)*

Facilities will select the country or region that the facility is located in.

Facility Type *(Ref ID - sipfacilitytype)*

Facilities will first select their facility type(s) from the list of options below. Based on the selected facility type(s) and then additional questions on applicable product categories, materials used, facility processes, and industry sector will apply.

Note: If applicable, more than one facility type should be selected, for example:

- If you are a vertically integrated facility with cut and sew operations as well as wet processing (e.g., dyeing) you would select both “Final Product Assembler” **and** “Finished Product Processing (Product Printing, Product Painting, Product Dyeing, Product Laundering and Product Finishing, Embroidery & Embellishments)”. OR
- If you are a hardgoods facility that assembles final product and manufactures hard components on site, you would select both “Final Product Assembler” **and** “Component / Sub-Assembly Manufacturing (including Packaging)”

Facility Type Option	Examples
Finished Product Assembler	Finished goods production/ final product assembly.
Finished Product Processing (Product Printing, Product Painting, Product Dyeing, Product Laundering and Product Finishing, Embroidery & Embellishments)	Printing and dyeing of products, including wet processing, and laundering Home Furnishing : Buffing & Polishing, Moulding etc.
Component / Sub-Assembly Manufacturing (including Packaging)	Label, zipper, snap, button, elastic bungee, cardboard Home Furnishing : Metal Handle
Material Production (Raw and intermediate materials are transformed into their final state before assembly)	Fabric dye-house, fabric manufacturer, yarn dyeing, PCB manufacturer, Hardgoods: Metal pieces, wooden laminates, metal plating
Raw Material Processing (Raw Materials are processed into intermediate material products)	Yarn spinning Hardgoods: foundry, metal processing, plastic injection,Wood Planks
Raw Material Collection & Bulk Refining (Materials are collected/extracted/farmed and refined to bulk commodity state)	Cotton farming and ginning, processing of bottles, fabric scrap, etc. into new recycled materials, forestry, mining, crude oil refinery

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	Home Furnishing : Wooden Logs , Metal Sheet rolls.

Product Category *(Ref ID - sipproductcategories)*

This question will be only applicable to facilities that selected the following as their facility type(s):

- Finished Product Assembler, **and/or**
- Finished Product Processing (Product Printing, Product Painting, Product Dyeing, Product Laundering and Product Finishing, Embroidery & Embellishments)

Facilities will select all of the applicable product categories from the list below.

Note: For each selected product category, a detailed product list will be available for the facility to select which specific products they manufacture for each selected product category.

- Apparel
- Footwear
- Home Textiles (includes bed linens, tablecloths, towels, cloth napkins, and similar products)
- Accessories (includes handbags, jewellery, belts, and similar products)
- Home Furnishings
- Electronics
- Toys
- Outdoor Sporting Goods - Soft goods (includes tents, backpacks, luggage, harnesses, slings etc. with a textile component)
- Outdoor Sporting Goods - Hard Goods (includes bikes, coolers, climbing gear, watercraft, and other equipment made of metal, plastic, or wood)
- Other
    - **Note:** If Other is selected, facilities should only input the “other” product categories/products in the applicable sub-questions that are not already listed in the predefined categories above **OR** if specific product types are not available in the pre-defined product categories, then add the predefined product category as well as the new/unavailable product type in the sub question.

Material Category *(Ref ID - sipmaterialtype)*

Facilities will select all the applicable type(s) of material categories from the list below based on their facility type.

Note: For specific facility types, a detailed list of materials will be available for the facility to select which materials they use for each selected material category.

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- Barriers
- Foams
- Insulation Materials
- Leather
- Metals
- Plastics
- Rubbers
- Synthetic Leathers
- Textiles
- Wood-Biomass Based
- MMCF
- Electronic related material
- Packaging related material
- Fiber (natural and man-made)
- Chemicals
- Metals
- Other

Facility Processes

Facilities will select all the applicable processes from the available lists based on their facility type.

Note: The list of specific facility processes that can be selected will be predefined for each facility based on their selected facility type, products type (if applicable), and materials used.

Industry Sector *(Ref ID - sipindustrysector)*

Facilities will select all the applicable industry sectors from the list below.

Notes:

- Industry sector refers to the industry which the facility makes products or materials for.
- Packaging manufacturers that supply packaging materials should select “Other” as their facility type.

    - Apparel
    - Footwear
    - Home Textiles (includes bed linens, tablecloths, towels, cloth napkins, and similar products)
    - Accessories (includes handbags, jewellery, belts, and similar products)

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- Home Furnishings (Non-Textile)
- Electronics
- Toys
- Outdoor Sporting Goods - Soft goods (includes tents, backpacks, luggage, harnesses, slings etc. with a textile component)
- Outdoor Sporting Goods - Hard Goods (includes bikes, coolers, climbing gear, watercraft, and other equipment made of metal, plastic, or wood)
- Other

Permits

Please complete the following questions to provide details on your facility's environmental permits requirements and compliance status. *(Ref ID - sippermits)*

For this question, facilities will be asked to complete a table to provide the following information on all applicable environmental permits.

- Type of Permit (This list will be pre-populated with a list of environmental aspects which may require permits)
- Is a permit required?
  - If yes, what is your status for this permit?
    - If "Not available" is selected, please describe, or provide additional details.
  - Name of the regulatory agency issuing the permit
  - Is there an expiration date?
  - Please enter expiration date (Month / Year)
  - Please specify the reason why this permit is invalid.
    - Required if "Available but Invalid" or "Not available due to authorization in progress" is selected for permit status.
  - If "Available and valid" is selected, Do you have any outstanding legal notice documenting a non-compliance issue?
    - If yes, please describe.
  - Please upload a copy of your permit.
- Provide any additional notes.

Note:
The following Guidance should be used to answer the question "Is a Permit Required?":

- **Yes** : Means, the facility has that environmental impact and a permit is required within that country or jurisdiction
- **No** : Means, the facility has that environmental impact,but a permit is not required within that country or jurisdiction

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- **Not Applicable** : Means, the facility does not have that environmental impact as such there is no requirement to obtain a permit
- **Unknown** : Means, the facility has that environmental impact but does not know whether a permit is required within that country or jurisdiction

Suggested Uploads:

- Copies of all up-to-date environmental permits/registrations which are applicable to the facility.
- If applicable, supporting evidence of applications for renewal for any expired permits.

Note: Required licenses/permits for third party service providers (e.g. hazardous waste contractors) is not in scope for this question.

What is the intent of the question?

The intent of this question is for facilities to demonstrate that they have obtained all applicable legally required environmental permits.

Technical Guidance:

Maintenance of all legally required environmental permits is a foundational compliance requirement. Please provide information on any rules or regulations your facility is required to follow such as permits, authorizations, licenses, registrations, certificates, or other compliance documentation your facility is required to follow for the following aspects:

- Water use
- Wastewater discharge (Direct/Onsite)
- Wastewater discharge (Indirect/Offsite)
- Wastewater treatment (Direct/Onsite)
- Wastewater treatment (Indirect/Offsite)
- Chemical use and management
- Air emissions for supply unit (point source)
- Air emissions for process (Fugitive source)
- Solid waste discharge
- Integrated Environmental permits (e.g., general environmental discharge permit)
- Other environmental permits
    - Examples of other environmental permits may include:
        - Onsite waste generation, management or storage.
        - Required registration/permits for specific chemicals used. For example: Potassium Permanganate is controlled for purchasing and registration with the police office is required in some jurisdictions. This is not a permit, but registration required by law - therefore it must be included here.

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Energy

Refer to the Energy section of this guide for details and guidance on the Energy Applicability Questions contained in the Site Information Section of FDM.

Water

Refer to the Water section of this guide for details and guidance on the Water Applicability Questions contained in the Site Information Section of FDM.

Wastewater

Refer to the Wastewater section of this guide for details and guidance on the Wastewater Applicability Questions contained in the Site Information Section of FDM.

Air Emissions

Refer to the Air Emissions section of this guide for details and guidance on the Air Emissions Applicability Questions contained in the Site Information Section of FDM.

Waste

Refer to the Waste section of this guide for details and guidance on the Waste Applicability Questions contained in the Site Information Section of FDM.

Chemicals

Does your facility only use Minimal Chemicals (liquid and gaseous fuels, over the counter chemicals, maintenance chemicals for factory up-keep) onsite? *(Ref ID - chemminimal)*

- **Answer Yes if,** Your facility **ONLY** uses minimal chemicals such as those listed below onsite.
- **Answer No if,** Your facility has other chemical use onsite for production or facility operations.

Note: Minimal Chemical use refers the use of only liquid and gaseous fuels (e.g., Diesel, LPG, for vehicles or cooking) and /or over the counter chemicals for cleaning

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and factory maintenance/up-keep (e.g., detergent, kitchen supplies, paint, thinner), and does not belong to any other chemical use classification listed in the question below.

What kind of chemicals does your facility use? (Select all that apply) *(Ref ID - chemtype)*

Facilities will select the applicable types of chemicals that are used onsite from the listed chemical use classifications below.

Notes:

- This question will only be asked if you select No to the question “Does your facility only use Minimal Chemicals (liquid and gaseous fuels, over the counter chemicals, maintenance chemicals for factory up-keep) onsite?”.

In FDM, chemicals used are categorized as follows:

- **Production Chemicals**
  - This refers to chemicals used in processes to make a product (e.g., chemicals used for dyeing or other wet processing, printing, laundry or washing, cementing or gluing, slashing during weaving, fibre extrusion, yarn spinning, leather tanning, electroplating, welding or other production process).
- **Operations Chemicals**
  - This refers to chemicals that are not used directly in the production process but are used in equipment or processes utilized to operate basic energy conversion or wastewater management within the facility (e.g., Chemicals used in onsite wastewater treatment, Cooling Tower, Boilers (exclude small scale electricity boilers that are used for ironing/Mini Boilers))
- **Maintenance/Tooling/Equipment Chemicals**
  - This refers to chemicals that are not used directly in the production process but are used for regular upkeep and maintenance of facility equipment. (e.g., chemicals used in general facility/equipment maintenance, lubrication of facility equipment or tools (Machine Oil), sourced in Industrial scale or in large quantities)
- **Spot Cleaner Chemicals**
  - This refers to chemicals used to remove contaminated spots or nonpermanent stains from materials or final products (e.g., Garment Spot Cleaning, Fabric Stain Removal)

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Reporting

General Introduction

The Reporting Section of the FDM requires facilities to report details on the information that is included with each FDM submission such as the reporting period, operating days and sections that will be reported on (e.g. energy, water, waste, etc.)

Reporting Month *(Ref ID - reportingmonth)*

Facilities will select the month for which you will be reporting data for (e.g. if your facility will be reporting energy and water data for January, the month January should be selected from the dropdown menu).

Reporting Year *(Ref ID - reportingyear)*

Facilities will select the year for which you will be reporting data for (e.g. if your facility will be reporting data for 2025, the year 2025 should be selected from the dropdown menu).

How many days did your facility operate in this reporting period? *(Ref ID - sipoperatingdays)*

Facilities will enter a total number (not a range) of days that the facility operated in the reporting period.

Operating days are considered days when production and/or production related activities (e.g. product/raw material loading/shipment) were conducted at the facility. Any operating day where the number of hours in operation OR the number of workers is less than 50%, then count the day as 0.5 day. Where the number of hours in operation OR the number of workers is greater than 50%, then count the day as 1 day.

Select all sections you want to report on during this reporting period *(Ref ID - report_sections)*

For this question, facilities will select the aspects from the list below for which data will be reported in FDM submission (e.g., if you wish to report production volume, energy and water use, you will select these three (3) options.)

- Production Volume
- Energy Use

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- Wastewater
- Water Use
- Waste Disposal
- Air Emissions

It is recommended that you include **all** areas that you are tracking at your facility for each FDM submission.

Please coordinate with your brand partners to make sure that you are reporting all the information that they require from your facility.

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Production

General Introduction

The Production Section of FDM requires facilities to report details on production information for the reporting period by facility type. This includes production volume and number of employees.

What was your facility's volume this reporting period? *(Ref ID - sipfacilityannualprodvol)*

Facilities will be required to complete a table to provide the following information on their production volume (amount of units produced) in FDM reporting period for each applicable facility type:

Note: If multiple facility types are selected in the Site section of FDM, you will be required to input production volume for each applicable facility type.

- Reporting Period Quantity
- Unit of Measure (This will be pre-populated based on the selected facility types)
    - **Note**: Production volume must be input in the predefined unit of measure listed in FDM (e.g., kg or pieces/pairs). If the facility uses a different unit to track production volume, this must be converted into the unit of measure listed in FDM.
- Reporting Period Quantity (Additional Option)
- Unit of Measure (Additional Option)

Note: The additional options for reporting production volume and unit of measure are provided to allow for reporting of in different units from the predefined units of measure for each facility type.

Suggested Uploads:
Production tracking records that show the amount of units produced in the reporting period.

Reporting Production Volume for this question in FDM
Facilities should report the total amount of units produced by your facility during the reporting period, **not** the number of units that were shipped/sold during the month. The total amount of products reported should **not** include the rejects in the reporting period.

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Note: For facilities that have multiple facility types (e.g., Finished product assembler and finished product processing) the volume of final products shipped/sold should be reported under the Finished Product Assembler facility type, and the volume of products processed through the processing facility should be reported under the Finished Product Processing facility type. For example:

- A cut and sew operation with printing processes produces 100,000 pcs and processes 2,000 kg of garments through its printing processes, should report monthly volume as follows:
    - Finished Product Assembler: 100,000 pcs
    - Finished Product Processing: 2,000 kg

Note: This reporting logic applies to other facility type combinations as well where applicable.

Reporting Standard Allowed Minutes in FDM

For some facility types, additional production volume reporting options allow facilities to report in Standard Allowed Minute (SAM) which is a metric that provides an indicator of the time allowed to produce a product by workers including general allowances (e.g., efficiency, machine, personal, fatigue allowances, etc.). The guidance below provides an overview and examples how SAM can be determined.

Different products utilize different amounts of time and resources during production which will in turn influence resource consumption (i.e., energy, water used, etc.). SAM can be used as a production metric to relate resources consumption and the environmental impact to different types of products or be added together and used as a metric to normalize resource consumption and environmental impacts for production over a period of time (e.g., a calendar year). It should be noted that the SAM will vary by the type of product (e.g. shorts versus a jacket).

Year on year, tracking of SAM against energy, water and other parameters can allow facilities to review the efficiency of resource consumption and help inform performance improvement.

When reporting production volume in SAM, the user must report the TOTAL SUM of SAM for the reporting period and **not** the INDIVIDUAL SAM for each product type that is manufactured in your facility.

Once individual SAM values are known for a specific product, the product SAM can be multiplied by the number of products produced. This is done across all product types / categories and the total is calculated to arrive at the TOTAL SAM. This total is reported as the “Reporting Period Quantity”.

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Example for Apparel facility:

Product type	Processes	SAM per piece	Number of products produced in reporting period	Total SAM per product type
Polo shirt	Cutting Sewing Packaging	15	100,000	15 x 100,000= 1,500,000
V-neck shirt	Cutting Sewing Packaging	12	500,000	12 x 500,000 = 6,000,000
			Total SAM	**7,500,000**

Example for Hardgoods facility:

Product type	Processes	SAM per piece	Number of products produced in reporting period	Total SAM per product type
Rucksack	Cutting Gluing Sewing Assembly Packaging	45	20,000	45 x 20,000= 900,000
Tent	Cutting Gluing Sewing Assembly Packaging	60	30,000	60 x 30,000= 1,800,000
Camping table	Cutting Assembly Packaging	150	10,000	150 x 10,000 = 1,500,000
			Total SAM	**4,200,000**

There are different approaches to calculating SAM, however if a consistent methodology is used across all products, this will produce comparable data that can be compared year over year. Below are some resources that look at the different methods of determining SAM (which is often used interchangeably with Standard Minute Value or SMV):

- https://www.ilo.org/global/publications/ilo-bookstore/order-online/books/WCMS_PUBL_9221071081_EN/lang--en/index.htm
- https://www.onlinetextileacademy.com/sam-standard-allowed-minute/
- https://www.onlineclothingstudy.com/2011/02/how-to-calculate-sam-of-garment.html#:~:text=Standard%20allowed%20minutes%20(SAM)%20%3D,%2B0.048)%20%3D%200.31%20minutes.
- https://ordnur.com/apparel/standard-minute-value-smv-garments-calculation-importance/

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What was your facility's shipped/sold volume this reporting period? *(Ref ID - sipfacilityshippedvol)*

Facilities will be required to complete a table to provide the following information on their production volume (amount of units shipped/sold) in FDM reporting period for each applicable facility type:

Note: If multiple facility types are selected in the Site section of FDM, you will be required to input production volume for each applicable facility type.

- Reporting Period Quantity
- Unit of Measure (This will be pre-populated based on the selected facility types)
    - **Note**: Production (amount of units shipped/sold) volume must be input in the predefined unit of measure listed in FDM (e.g., kg or pieces/pairs). If the facility uses a different unit to track production volume, this must be converted into the unit of measure listed in FDM.
- Reporting Period Quantity (Additional Option)
- Unit of Measure (Additional Option)

Note: The additional options for reporting production volume (amount of units shipped/sold) and unit of measure are provided to allow for reporting of in different units from the predefined units of measure for each facility type.

Suggested Uploads:
Production tracking records that show the amount of units shipped/sold in the reporting period.

Reporting Production Volume for this question in FDM
Facilities should report the total amount of units shipped/sold by your facility during the reporting period, **not** the number of units that were produced during the reporting period. The total amount of products reported should **not** include the rejects in the reporting period

Note: Please refer to the examples in the question above for guidance on how to calculate production volume that can be used to determine the amount of products shipped/sold in the reporting period.

Why does the FDM also use shipped/ sold quantity?

The main rationale is to create a consistent production metric that aligns with production volume reported in the Higg FEM. This provides comparable data for industry benchmarking. Additionally, using shipped/ sold amount as a metric discourages excessive or unnecessary production including leftovers, semi-products, samples and rejects which are also an environmental concern.

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Total Number of Employees: *(Ref ID - sipfulltimeemployees and siptempemployees)*

Enter the average number (*not* a range) of full-time and temporary employees that worked at the facility in this reporting period. The calculation guidance below applies for both full-time and temporary employees.

Suggested Uploads:

- Payroll/accounting records that show the number of each worker category (full-time and temporary) in the reporting period.

How To Track Facility Data:

Facilities should establish a process to track the number of workers in each pay period (e.g. weekly, bi-weekly, monthly). The average number of employees (full-time or temporary) can then be determined using the following guidance:

1. Add the total number of employees your facility paid in all pay periods during the reporting period.
2. Count the number of pay periods your facility had during the reporting period.
3. Divide the number of employees by the number of pay periods.
4. Round the answer to the next highest whole number to get the average number of employees

For example:

- Pay period 1: 520 employees
- Pay period 2: 525 employees
- Pay period 3: 545 employees
- **Average number of employees: 530** [(520+525+545)/3]

Note: The same calculation methodology should be applied for full-time and temporary employees.

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Energy

General Introduction

Energy production and energy use are the largest man-made sources of air pollution and greenhouse-gas (GHG) emissions. The operational, environmental, and financial impacts of energy are key issues for facility operations. Driving energy efficiency and use of renewable energy throughout facility operations is an important area of focus for all factories.

Additional details and criteria for reporting energy data in FDM is provided in the guidance below along with useful technical guidance and resources to support your facility in the management and reduction of energy and GHG.

IMPORTANT: The sources in the Energy section are determined by the Energy applicability questions that you answered in the Site section. If there are sources that your facility uses that do not appear in this section, please go to the Site section Energy questions and update the necessary selections.

Energy Use in Your Factory

Energy is used throughout manufacturing facilities for various operational and production activities. FDM requires that facilities track and report energy use data for the energy sources listed below, which are grouped into three categories (Purchased, Renewable, and Non-Renewable Energy).

Additional requirements on reporting energy data in FDM including any specific exclusions are provided in the relevant FDM question guidance below.

Purchased Energy	Renewable Energy	Non-Renewable Energy
• Purchased Electricity • Purchased Steam • Purchased Chilled Water • Purchased Heating (District Heating)	• Biodiesel • Biogas • Geothermal • Hydro • Mini or Micro-Hydro (onsite) • Purchased Renewables • Solar Photovoltaic (electricity)(onsite)	• CNG - Compressed Natural Gas • Coal - commercial mix (1) • Coal Water Slurry (2) • Diesel • Fabric Waste • Fuel Oil - Blended (3) • LNG - Liquid Natural Gas • LPG - Liquid Petroleum Gas • Natural Gas

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	● Solar Thermal (onsite) ● Wind (onsite)	● Petrol/ Gasoline ● Propane
Biomass		
● Biomass – Sustainably sourced with certification. (4) ● Biomass - Without sustainably sourced biomass certification. (5)		

Notes:

(1) Coal - commercial mix includes all types of traditional coal (e.g., anthracite, bituminous, etc.)

(2) Coal Water Slurry is a combustible mixture of fine coal particles suspended in water used as fuel source.

(3) Fuel Oil - Blended includes all types of fuel oils (e.g., furnace oil, bunker fuel, etc.)

(4) Biomass – Sustainably sourced with certification is any biomass that has supporting certification documentation from a sustainably sourced biomass program (e.g., Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), ISCC Biomass Certification, Sustainable Biomass Program (SBP) Certification, Better Biomass Certification, Country Specific Certification, etc.)

(5) Biomass - Without sustainably sourced biomass certification is any biomass that is not certified through a sustainably sourced biomass program.

Domestic and Production Energy Use

In FDM, energy use is categorized as domestic or production energy use which are defined as follows:

Domestic Energy Use - Energy that is consumed in non-production related areas and/or buildings such as employee washrooms, domestic only wastewater treatment plant, or office areas separated from production, canteen and kitchen, security posts, external lighting (e.g. roadway or landscape lighting), medical center, etc.

Production Energy Use - Energy that is directly or indirectly consumed in production related activities or production areas such as production equipment operations, onsite energy generations for production (e.g. steam or electricity), industrial wastewater treatment plant, production area lighting, heating, ventilation and cooling, etc.

Note: If industrial and domestic wastewater are treated together, energy use of the combined wastewater treatment plant should be included in production energy use.

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Reporting Energy Use in FDM for Purchased Electricity, Purchased Renewables, Onsite Renewables and EACs

The following provides guidance on how to report, purchased electricity, purchased renewables, onsite renewables and relevant EACs in FDM:

Scenario 1
How Purchased Electricity should be reported if Purchased Renewables are also purchased through a PPA by the facility

The facility should report their Purchased renewables and answer the relevant sub questions under purchased renewables category.

If the facility purchases grid electricity in addition to purchased renewables, the additional grid electricity purchased should be reported under Purchased electricity.

Example: Facility A uses 100 MWh of Electricity within the facility, out of which 60MWh is from Purchased renewables connected to a PPA, and the remaining 40MWh is directly taken from the Electricity service provider without any renewable attributes.

The Facility should report their electricity consumption as below,

- Purchased Electricity = 40,000 kWh
- Purchased Renewables = 60,000 kWh

Scenario 2
How Purchased Electricity should be reported if EACs are also purchased and retired from an external party without any power purchase agreement for purchase of renewable electricity.

The facility should report their Purchased electricity under purchased electricity category.

The annual quantity of EACs purchased and retired under the facility name will need to be reported under the separate question on purchase of Energy Attribute certificates.

No deduction or addition of electricity usage is required in this situation, the facilities GHG emissions will be calculated by the system, taking into consideration the GHG emissions from purchased electricity and the GHG reduction credits relevant for the purchased and retired EACs.

Example: Facility B uses 100 MWh of Electricity within the facility, and also purchased and retired 40MWh of EACs.

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The Facility should report their electricity consumption as below,

- Purchased Electricity = 100,000 kWh
- Report 40 MWh under the EAC question.

Note: The facility should **NOT** report any quantity under Purchased Renewables.

Scenario 3

How Purchased Electricity should be reported if Purchased Renewables are also purchased through a PPA by the facility, and the relevant EACs for the purchased renewables are also retired under the facility name.

The facility should report their Purchased electricity under purchased electricity category.

The facility should report their Purchased renewables and answer the relevant sub questions under purchased renewables category.

Since the EACs for the purchased renewables are also retired under the facility name, the facility should answer “Yes” to the sub question on ownership of the purchased renewables.

FDM has now accounted for both the Purchased Electricity and the Purchased Renewables.

The associated EACs of the Purchased Renewables should NOT be reported under the EAC question as the consumption and GHG reduction have already been considered when reporting both the consumption information.

Example: Facility C uses 100 MWh of Electricity within the facility, out of which 60MWh is from Purchased renewables connected to a PPA and associated EACs are also retired under the facility name, and the remaining 40MWh is directly taken from the Electricity service provider without any renewable attributes.

The Facility should report their electricity consumption as below,

- Purchased Electricity = 40,000 kWh
- Purchased Renewables = 60,000 kWh

Note: The facility should **NOT** report any EACs under the EAC question.

Scenario 4

How Purchased Electricity should be reported if Purchased Renewables are also purchased through a PPA by the facility, and additional EACs are purchased and retired

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under the facility name to offset the associated Scope 2 emissions from purchased renewables.

The facility should report their Purchased electricity under purchased electricity category.

The facility should report their Purchased renewables and answer the relevant sub questions under purchased renewables category.

The PPA should state that the ownership of the Renewable Energy or associated GHG Offsets are also transferred to the facility when purchasing the purchased renewables, if so, the facility should answer “Yes” to the sub question on ownership of the purchased renewables.

FDM has now accounted for both the Purchased Electricity and the Purchased Renewables.

The additional EACs purchased and retired under the facility name should be reported under the EAC question.

Example: Facility D uses 100 MWh of Electricity within the facility, out of which 60MWh is from Purchased renewables connected to a PPA and additional EACs are retired under the facility name for the remaining 40MWh that the facility purchases from the electricity service provider.

The Facility should report the their electricity consumption as below,

- Purchased Electricity = 40,000 kWh
- Purchased Renewables = 60,000 kWh
- In this case, the facility should report the 40MWh of EACs under the EAC question.

Note: No deduction or addition of electricity usage is required in this situation, the facilities GHG emissions will be calculated by the system, taking into consideration the GHG emissions from purchased electricity , the purchased renewables and the GHG reduction credits relevant for the purchased and retired EACs.

Scenario 5

How Purchased Electricity should be reported if a facility generates onsite renewable electricity and sells it to the grid without using it onsite, but registers the onsite renewable electricity under an EAC scheme and retires it under the facility name.

The facility should report their Purchased electricity under purchased electricity category.

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The facility should NOT report the onsite generated renewable electricity under any of the onsite renewable electricity categories.

The EACs registered and retired under the facility name should be reported under the EAC question.

Example: Facility E uses 100 MWh of Purchased Electricity within the facility, and generates 20MWh of onsite solar PV electricity and exports the renewable electricity to the grid, while registering the onsite renewable electricity under an EAC scheme and retires them under the facility name,

The Facility should report their electricity consumption as below,

- Purchased Electricity = 100,000 kWh
- In this case, the facility should report the 20MWh of EACs under the EAC question.

Note: The facility should **NOT** report any consumption under Onsite Solar PV or deduct any electricity consumption from the purchased electricity.

Scenario 6

How Purchased Electricity should be reported if a facility generates onsite renewable electricity and uses it onsite, and also registers the onsite renewable electricity under an EAC scheme and retires it under the facility name.

The facility should report their Purchased electricity under purchased electricity category.

The facility should report the onsite generated renewable electricity under the relevant the onsite renewable electricity categories.

The EACs registered and retired under the facility name should NOT be reported under the EAC question.

Example: Facility F uses 100 MWh of Purchased Electricity within the facility, and generates 20MWh of onsite solar PV electricity and uses it onsite, also while registering the onsite renewable electricity under an EAC scheme and retires them under the facility name,

The Facility should report their electricity consumption as below,

- Purchased Electricity = 100,000 kWh
- Onsite Solar PV = 20,000kWh
- Also indicate within the sub question for onsite solar PV that the facility has not sold the EACs to an external party.

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Note: In this case, The facility should **NOT** report the 20MWh of EACs under the EAC question.

Scenario 7

How Purchased Electricity should be reported if a facility generates onsite renewable electricity and uses it onsite, and also registers the onsite renewable electricity under an EAC scheme and sells it to another organization which retires the credits under their name.

The facility should report their Purchased electricity under purchased electricity category.

The facility should report the onsite generated renewable electricity under the relevant onsite renewable electricity categories., also report whether the credits were sold to an external party and the relevant percentage of EACs sold to that party in the sub questions posted to the facility.

The facility should not report the EACs under the EAC question.

Example: Facility G uses 100 MWh of Purchased Electricity within the facility, and generates 20MWh of onsite solar PV electricity and uses it onsite, also it registered the onsite renewable electricity under an EAC scheme and sells EACs relevant for 15MWh to Facility H which retires them under Facility H. and the remaining 5MWh is retired under the Facility G.

The Facility should report their electricity consumption as below,

- Purchased Electricity = 100,000 kWh
- Onsite Solar PV = 20,000kWh
- Also indicate within the sub question for onsite solar PV that the facility has sold 75% of the EACs to an external party.

Note: In this case, The facility should **NOT** report the 20MWh of EACs under the EAC question, or even the 5MWh EACs that it retired under its own name.

Energy Data Quality

Accurately tracking and reporting energy use data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand the facility's energy use footprint and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing an energy tracking and reporting program, the following principles should be applied:

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- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in FDM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g., small quantity exceptions).
- **Accuracy** - Ensure that the data input into the energy tracking program is accurate and is derived from credible sources (e.g., calibrated meters, established scientific measurement principles or engineering estimates, etc.)
- **Consistency** - Use consistent methodologies to track energy data that allows for comparisons of energy use over time. If there are any changes in the tracking methods, energy sources, or other operations that impact energy use data, this should be documented.
- **Transparency** – All data sources (e.g., energy bills, meter readings, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external) should be defined and performed on energy data as well as the processes used to collect and track data to ensure reported data is accurate. For additional guidance on managing data quality, refer to Chapter 7 of the *GHG Protocol a Corporate Accounting and Reporting Standard: Managing Inventory Quality.*

The above principles are adapted from The Greenhouse Gas Protocol - Chapter 1: GHG Accounting and Reporting Principles (https://ghgprotocol.org/)

Reporting Energy Data in FDM

Note: When reporting energy data in FDM, Facilities should refer to the "Reporting Energy Use in the FDM for Purchased Electricity, Purchased Renewables, Onsite Renewables and EACs" section above in this Guidance.

Before reporting energy data in FDM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate energy data.

Do:

- ✓ Review source data (e.g., utility invoices, meter logs, etc) against aggregated totals to ensure it is accurate.
- ✓ Compare the current data with historical data. Any significant changes (e.g., an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✓ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✓ Ensure the proper units are reported and verify any unit conversions from source data to reported data.

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- ✓ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✓ Add notes in the “Provide any additional comments” field to describe any data assumptions, estimation methodology, or other relevant comments on the data for a particular source.

Do Not:

- X Report data that is not accurate (e.g., the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g., engineering calculations).

Energy Applicability Questions (from Site Section of FDM)

The following applicability questions are completed on the Site Section of FDM and will be used to pre-populate sources in the energy data reporting section of FDM.

Select all sources of energy for your facility (exclude sources used for company owned and controlled vehicles). Select all that apply: *(Ref ID - ensourcefacility)*

Purchased Energy

- Purchased Electricity
- Purchased Steam
- Purchased Chilled Water

Renewable Energy

- Biodiesel
- Biogas
- Mini or Micro-Hydro (onsite)
- Purchased Renewables
- Solar Photovoltaic (electricity) (onsite)
- Solar Thermal (onsite)
- Wind (onsite)

Non-Renewable Energy

- CNG - Compressed Natural Gas

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- Coal - commercial mix
- Coal Water Slurry
- Diesel
- Fabric Waste (e.g. Scrap or unused fabric from the facility or an external source that is suitable for energy generation (e.g. incineration))
- Fuel Oil - Blended
- LNG - Liquid Natural Gas
- LPG - Liquid Petroleum Gas
- Natural Gas
- Petrol/Gasoline
- Propane

Biomass

- Biomass - Sustainably Sourced with certification.
- Biomass - Without sustainably sourced biomass certification.

After selecting your energy sources, you will be asked the following sub questions to provide additional details on your applicable energy sources:

- **What is the source of biomass? Select all that apply.** *(Ref ID - enbiomasssource)*
    - Under what certification system is this biomass certified under?
    - If Other or Country Specific Certification, please describe and give reference link to certification system.
    - Please upload certificates.

- **Does your facility use electricity other than electricity provided by the national power grid, and if so, do you know the GHG emission factor of this purchased electricity source?** *(Ref ID - enghgefelecpurch)*

  Answer Yes if: Your facility uses electricity other than the electricity provided by the national power grid (e.g., through a direct power purchase agreement), and if you know the specific GHG emission factor of this purchased electricity source.

  Answer No if: Your facility purchases electricity from the national grid or you purchase electricity from another provider (not the national grid) and do not know the specific GHG emission factor of the electricity source.

  Note: FDM will automatically allocate the standard country emission factor for GHG calculations for your facility, and will not use the reported custom emission factor until specifically indicated in the future.

    - If Yes, please indicate the emission factor (kg CO2e/kWh)

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        - **Note:** This should be the most recent and applicable emission factor attributable to the facility's purchased electricity used in the reporting period.
    - Please provide a direct link to the source of this emission factor
    - Please upload documentation if available.

- **Does your facility know the energy source (energy mix) used to generate your purchased steam?** *(Ref ID - ensteammix)*

  Note: If you do not know the specific energy source (energy mix) used to generate your purchased steam, you should select "No"to this question.

    - If Yes, please select the energy sources.

- **Is the GHG emission factor of your purchased chilled water provided to you by your supplier of the purchased chilled water?** *(Ref ID - enchilldwateref)*

  Answer Yes if: Your supplier of purchased chilled water provides you with the specific GHG emission factor of this source and you have documentation to support this.

  Answer No if: Your supplier of purchased chilled water **does not** provide you with the specific GHG emission factor of this source and/or you **do not** have documentation to support this.

  Note: FDM will automatically allocate the standard country/energy source emission factor for GHG calculations for your facility, and will not use the reported custom emission factor until specifically indicated in the future.

    - If Yes, please indicate the emission factor (kg CO2e/kWh)
        - **Note:** This should be the most recent and applicable emission factor attributable to the facility's purchased chilled water used in the reporting period.
    - Please provide a direct link to the source of this emission factor
    - Please upload documentation if available.

- **Is the GHG emission factor of your purchased heating provided to you by your supplier of the purchased heating?** *(Ref ID - ensourcedistrictheatingefknown)*

  Answer Yes if: Your supplier of purchased heating provides you with the specific GHG emission factor of this source and you have documentation to support this.

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Answer No if: Your supplier of purchased heating **does not** provide you with the specific GHG emission factor of this source and/or you **do not** have documentation to support this.

Note: FDM will automatically allocate the standard country/energy source emission factor for GHG calculations for your facility, and will not use the reported custom emission factor until specifically indicated in the future.

  - If Yes, Please indicate the emission factor (kg CO2e/kWh)
    - **Note:** This should be the most recent and applicable emission factor attributable to the facility's purchased heating used in the reporting period.
  - Please provide a direct link to the source of this emission factor
  - What is the temperature of the heated water received at the facility (Celsius)?
  - What is the temperature of the heated water from district heating exiting the facility (Celsius)?
  - Please upload documentation, if available.

- **Is the GHG emission factor of your purchased renewables provided to you by your supplier of the purchased renewables?** *(Ref ID - ensourcepurchrenewefknown)*

  Answer Yes if: Your supplier of purchased renewables provides you with the specific GHG emission factor of this source and you have documentation to support this.

  Answer No if: Your supplier of purchased renewables **does not** provide you with the specific GHG emission factor of this source and/or you **do not** have documentation to support this.

  Note: FDM will automatically allocate a standard renewable energy source emission factor for GHG calculations for your facility, and will not use the reported custom emission factor until specifically indicated in the future.

  - If Yes, Please indicate the emission factor (kg CO2e/kWh)
    - **Note:** This should be the most recent and applicable emission factor attributable to the facility's purchased renewables used in the reporting period.
  - Please provide a direct link to the source of this emission factor
  - Please upload documentation if available.
  - Does your facility know the renewable energy sources (energy mix) used to generate your purchased renewables?
  - If Yes, please select the energy sources
  - Complete the following table to provide details on the energy mix of your purchased renewables for the reporting year.

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    - Please upload a copy of your PPA (Power Purchase Agreement)
    - Does your facility have the ownership of the associated renewable energy credits/carbon offsets from these purchased renewables?

- **From the reported Onsite Solar or Wind Power Generation, Are the carbon or renewable energy credits sold/allocated to an external party?** *(Ref ID - enonsiterenewsellrecs)*

    - What is the percentage of the credits sold/allocated to the external party?

- **What is the capacity of the onsite Solar Photovoltaic (electricity generating) system (in kWp)?** *(Ref ID - ensolarcapacity)*

- **What percentage of your facility's total diesel usage is for the onsite Generator ?** *(Ref ID - endieselforgeneratorqty)*

  Note: This question refers to **diesel used in non-vehicular sources only**.

  Note: If Diesel and /or Biodiesel are selected as sources, you will be asked the following sub questions to provide details on the fuel blend of these fuels. For example, if the biodiesel blend used at your facility is B20 (20% Biodiesel and 80% traditional diesel fuel), the numeric value of 20 should be input for the question “What is the percentage of Biodiesel within your biodiesel source?”

- **Is the Diesel used within your facility a mixture of both Biodiesel and Diesel?** *(Ref ID - endieselmix)*
    - If Yes, What is the percentage of Biodiesel within your diesel source? (ie. B10, B15, B20 etc)

- **Is the Biodiesel used within your facility a mixture of both Biodiesel and Diesel?** *(Ref ID - enbiodieselmix)*
    - If Yes, What is the percentage of Biodiesel within your biodiesel source? (ie. B100, B90, B75 etc)

Suggested Uploads

- Energy tracking records that show all of the facility’s energy sources.
- Supporting documentation that supports responses to the applicable sub questions.

What is the intent of the question?

The intent of this question is to ensure facilities have identified and understand important characteristics of all energy sources used at the facility.

Technical Guidance:

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Understanding all of your facility's energy sources is an important first step in energy management that will support identifying and tracking what energy is being used, where it is being used, and how much is being used.

In FDM for this question, facilities are required to select all energy sources used within the site's physical boundary and operations under your business control (owned, operated, or directly leased).

Note: Several of the sub questions require specific data on energy sources such as GHG emission factors for purchased electricity and chilled water, energy mix and pressure/temperature of purchased steam, etc. This information may be available directly from the utility provider, government sources, or other credible publicly available sources.

Reporting Fuel Blends in FDM for Diesel and Biodiesel

Commercially available fuels are often blended and may be available in different concentrations. For example, B10 (10% Biodiesel and 90% traditional diesel fuel). In the FDM, facilities are asked to report details on the proportions of the fuel blends used to allow for accurate accounting of GHG emissions. This information should be obtained from fuel providers.

Does your facility identify and track separately energy use in domestic vs. production?*(Ref ID - ensourcetracksepdomprod)*

- **Answer Yes if**: You track the quantity energy used for domestic use and production use separately.

Note: Refer to the definitions of domestic and production energy use in the Introduction section of the Energy Guidance.

If you answer Yes to this question, you will be asked to complete two (2) tables to provide details on your facility's domestic and production energy use for each applicable energy source.

Note: If your facility selects multiple facility types in the Site section of FDM (e.g., Finished Product Assembler and Material Production), a separate table for production energy use will be displayed for each selected facility type.

If you answer No to this question, you will be asked to complete a single table to provide details on your facility's total energy use for each applicable energy source.

Would you like to track electricity use by the meter?*(Ref ID - ensourceelectricmetertrack)*

- **Answer Yes if**: You track the quantity electricity used at your facility by meter.

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Note: Tracking electricity use by meter is defined as the use of an onsite fixed meter(s) and/or sub-meter(s) that is owned or accessible to the facility to obtain meter readings to verify the quantity of electricity used onsite.

If you answer Yes to this question, you will be asked the following sub questions to indicate how many meters your facility uses to track electricity use:

- How many meters would you like to track for your Domestic electricity use?
- How many meters would you like to track for your Production electricity use?
- How many meters would you like to track for your electricity use?

Note: You may enter up to 30 meters for domestic and production tracking.

If you answer No to this question, It is recommended that you provide additional comments in the energy tracking table to describe how your facility tracks electricity usage.

Does your company have any owned and controlled vehicles? *(Ref ID - ensourcevehicleany)*

Answer Yes if: Your facility operates vehicles that are owned and/or controlled by the facility.

Note: This should include any company owned or controlled vehicles used for transporting including, but not limited to employees (workers and management staff), contractors, customers, raw materials, or product.

If you answer Yes to this question, you will be asked the following questions to indicate the sources of energy/fuel used in company vehicles and to provide additional details on your energy/fuel sources:

Select all sources of energy/fuel for company owned and controlled vehicles. Select all that apply: *(Ref ID - envehicleheader)*

Notes: For sources below that relate to charging or fuelling of vehicles onsite, you should select the energy source below only if this energy consumption is tracked separately and is NOT already included in the facility's overall energy reporting for the source(s) selected in the previous question so as to avoid double counting the use of this energy source in the FDM. For example, if your facility has electric vehicles and charges them onsite using purchased electricity and the electricity consumption of these vehicles is not tracked separately (i.e., subtracted from overall facility electricity consumption), you **should not** select this source for this question. Similarly, if the

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facility has natural gas or propane fueled vehicles that are refueled onsite and this is not tracked separately from overall facility usage, you **should not** select these as sources for this question.

Purchased Energy

- Purchased Electricity

Renewable Energy

- Biodiesel
- Biogas
- Ethanol
- Hydrogen - Renewable Source (i.e., Produced from renewable energy (green hydrogen))
- Purchased Renewables (electricity)
- Solar Photovoltaic (electricity)
- Wind (electricity)

Non-Renewable Energy

- CNG - Compressed Natural Gas
- Diesel
- Hydrogen -Non- Renewable Source(i.e., Produced from non-renewable energy (grey hydrogen))
- LNG - Liquid Natural Gas
- LPG - Liquid Petroleum Gas
- Petrol/Gasoline
- Propane

Note: If Diesel, Biodiesel, Ethanol and/or Petrol/Gasoline are selected as sources, you will be asked the following sub questions to provide details on the fuel blend of these fuels. For example, if the petrol/gasoline used at your facility is 90% petrol/gasoline and 10% Ethanol, the numeric value of 10 should be input for the question “What is the percentage of Ethanol within your Petrol/Gasoline source?” :

- **Is the Diesel used for the vehicles a mixture of both Biodiesel and Diesel?** *(Ref ID - endieselvechicle)*
    - If Yes, What is the percentage of Biodiesel within your diesel source? (ie. B10, B15, B20 etc)
- **Is the Biodiesel used for the vehicles a mixture of both Biodiesel and Diesel?** *(Ref ID - enbiodieselvehicle)*
    - If Yes, What is the percentage of Biodiesel within your biodiesel source? (ie. B100, B90, B75 etc)
- **Is the Petrol/Gasoline used for the vehicles a mixture of both Ethanol and Petrol/Gasoline?** *(Ref ID - enpetrolvehicle)*

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    - If Yes, What is the percentage of Ethanol within your Petrol/Gasoline source? (ie. E10, E15, E20 etc)
- **Is the Ethanol used for the vehicles a mixture of both Ethanol and Petrol/Gasoline?** *(Ref ID - enethanolvehicle)*
    - If Yes, What is the percentage of Ethanol within your Ethanol source? (ie. E100, E85, E50 etc)

Suggested Uploads

- Energy tracking records that show all of the facility's energy sources of energy/fuel for company owned and controlled vehicles.
- Supporting documentation that indicates the fuel blend ratio for Diesel, Biodiesel, Ethanol and Petrol/Gasoline in company owned and controlled vehicles, if applicable.

What is the intent of the question?

The intent of this question is to ensure facilities have identified all energy sources of energy/fuel for company owned and controlled vehicles.

Technical Guidance:

Understanding all of your facility's energy sources is an important first step in energy management that will support identifying and tracking what energy is being used, where it is being used, and how much is being used.

In FDM for this question, facilities are required to select all energy sources used for company owned and controlled vehicles. This should include company owned or controlled vehicles used for transporting including, but not limited to employees (workers and management staff), contractors, customers, raw materials, or product.

Reporting Fuel Blends in FDM for Diesel, Biodiesel, Ethanol and Petrol/Gasoline

Commercially available fuels are often blended and may be available in different concentrations. For example, B10 (10% Biodiesel and 90% traditional diesel fuel), or E85 (up to 85% Ethanol and 15% traditional petrol/gasoline). In FDM, facilities are asked to report details on the proportions of the fuel blends used to allow for accurate accounting of GHG emissions. This information should be obtained from fuel providers.

Does your facility track the use of every energy/fuel source used by company owned and controlled vehicles? *(Ref ID - ensourcevehicletrackopt)*

Answer Yes if: Your facility tracks the quantity of energy/fuel consumption for energy sources used for company owned and controlled vehicles.

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Note: If your facility tracks some, but not all energy/fuel use for energy/fuel sources used by company owned and controlled vehicles, you should select Yes, and report data for the sources that are tracked in the Energy section of FDM.

Note: To avoid double counting energy use if your facility uses fuels for vehicles onsite, you **should not** report the energy for these sources unless it has been separately tracked and/or subtracted from the facility's energy use for the respective energy source reported in the overall facility energy consumption data for non-vehicular use.

Does your facility purchase Energy Attribute Certificates (EACs) (e.g., Renewable Energy Certificates (RECs))? *(Ref ID - ensourcepurcheac)*

Note: When reporting EAC data in FDM, Facilities should refer to the "Reporting Energy Use in FDM for Purchased Electricity, Purchased Renewables, Onsite Renewables and EACs" in the Introduction section of this Guidance.

Answer Yes if: Your facility purchased **and** retired EACs for the reporting period. If another business entity (e.g., Manufacturing group or brand partner) purchased and retired the EAC on behalf of your facility, it must have been registered/retired under your facility's name and location (i.e., legal business entity name and address) as listed on their Worldly account.

Note: If your facility purchased, but did not retire the EACs for the reporting period, you should answer No to this question.

If you answer Yes to this question, you will be asked the following sub questions to provide details on your purchased EACs:

- What type of Energy Attribute Certificates does your facility purchase?
- How many MWh did your facility purchase and retire in the reporting period?
    - **Note**: Report the MWh quantity retired in the reporting period (e.g., If 100MWh was purchased, but only 75MWh was retired for the reporting year, 75MWh should be input)
- Please upload your certificate
- Please select the energy sources of your EACs
- Complete the following question to provide details on the energy mix of the EAC for the reporting period.

Suggested Uploads

- Documentation that demonstrates your facility purchased/retired EACs or that EACs were registered and retired on behalf of your facility in the reporting period

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(e.g., documentation from the relevant EAC scheme authority that shows the EAC has been used/retired).

What is the intent of the question?

- The intent of this question is for companies to report purchased and retired EACs in the FDM reporting period.

Technical Guidance:

Energy Attribute Certificates (EACs) is a general term for a variety of market-based instruments that represent how energy is generated and ownership of the attributes of that energy. The name and specific requirements for EACs are typically defined by the jurisdiction or program under which they are issued. EACs can be issued as part of government initiatives or be offered by independent third-party providers such as the EAC programs listed below:

- Renewable Energy Certificates (RECs) in North America https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs
- Guarantees of Origin (GOs) in Europe https://www.aib-net.org/
- Renewable Energy Guarantees of Origin (REGOs) in the UK https://www.ofgem.gov.uk/environmental-and-social-schemes/renewable-energy-guarantees-origin-rego
- International RECs (I-RECs) https://www.irecstandard.org/
- Tradable Instruments for Global Renewables (TIGRs) across the rest of the world https://apx.com/about-tigr/
- Green-e Energy (EACs) https://www.green-e.org/
- EKOenergy certified EACs https://www.ekoenergy.org
- Green Electricity Certificate (GEC) http://www.greenenergy.org.cn/
- Renewable Energy Guarantees of Origin System (YEK-G) https://yekgnedir.com/en/

Certificates are typically produced per Megawatt hour (MWh) and are registered in a tracking system as part of the EAC scheme. EACs will have several unique identification and data attributes associated with them such as:

- Certificate type/unique identification number
- Tracking system ID
- Renewable fuel type
- Renewable facility location
- Emissions rate of the renewable resource

Retiring EACs

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Once the end user of the EAC claims the energy attributes of the EAC, it is then retired and no longer available to be attributed to future energy use. Each EAC scheme will have established criteria and/or procedures for the purchase, transfer, and retirement of EACs that should be followed.

Resources:
Details on specific EACs can be found at the links provided above. Additionally, an overview of how EACs can be applied in a GHG accounting program can also be found at the link below:

- Greenhouse Gas Protocol - Scope 2 Guidance - https://ghgprotocol.org/scope_2_guidance

Does your facility purchase Carbon Offsets? *(Ref ID - enpurchco)*

Answer Yes if: Your facility purchased and retired carbon offsets for the reporting period. If another business entity (e.g., Manufacturing group or brand partner) purchased and retired the offset on behalf of your facility, it must have been registered/retired under your facility's name and location (i.e., legal business entity name and address) as listed on their Worldly account.

Note: If your facility purchased, but did not retire carbon offsets for the reporting period, you should answer No to this question.

If you answer Yes to this question, you will be asked the following sub questions to provide details on your carbon offsets:

- What was the registry the offset was registered under?
- If Other, please describe.
- How many carbon offsets (in Metric Tons CO2e) were purchased and retired in the reporting period?
- Please upload your purchase invoices or other supporting documents.

Suggested Uploads

- Documentation that demonstrates your facility purchased/retired offsets or that offsets were registered and retired on behalf of your facility in the reporting period (e.g., documentation from the relevant carbon offset registry or scheme that shows the offsets have been used/retired).

What is the intent of the question?

- The intent of this question is for companies to report whether they have purchased and retired carbon offsets in the FDM reporting period.

Technical Guidance:

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Carbon offsets are market-based instruments that are designed to lower the amount of GHG in the atmosphere (mainly CO_2). Offsets provide credits that can be purchased and applied to reduce an organization's carbon footprint by accounting for CO_2 emission reductions that occur elsewhere. Carbon offsets fund specific projects that either lower CO_2 emissions, or sequester CO_2, meaning they take some CO_2 out of the atmosphere and store it. Common examples of projects include reforestation, construction of renewable energy infrastructure, carbon-storing agricultural practices, and waste and landfill management.

There are a number of carbon offset schemes that are available globally, and the specific requirements relating to the purchase and use of offsets are typically defined by the jurisdiction or scheme under which they are issued. Several carbon offset schemes are listed below:

- CDM Registry (Clean Development Mechanism) - https://cdm.unfccc.int/about/index.html
- American Carbon Registry (ACR) - https://americancarbonregistry.org/
- Gold Standard Registry - https://www.goldstandard.org/resources/impact-registry
- Climate Action Reserve (CAR) - https://www.climateactionreserve.org/
- Social Carbon Registry - https://www.socialcarbon.org/
- Plan Vivo Registry - https://www.planvivo.org/
- Verified Carbon Standard (VCS) Registry - https://verra.org/programs/verified-carbon-standard/
- Climate, Community, & Biodiversity Standards (CCBS) Registry - https://www.climate-standards.org/ccb-standards/

Carbon Offset projects typically allow users to purchase a specified amount of Carbon equivalents in tonnes (tonnes of CO2e) and are registered in a tracking system as part of the offset scheme. Offsets will have several unique identification and data attributes associated with them such as:

- Project name/type
- A unique identification number or Registry system ID
- Total of carbon offset (in CO2e)

Retiring Carbon Offsets

Once the end user of the offset claims the carbon credit to offset their emission, it is then retired and no longer available to be used. Each carbon offset scheme/registry will have established criteria and/or procedures for the purchase and retirement of offsets that should be followed.

Resources:

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Details on specific carbon offset schemes can be found at the links provided above. Additionally, an overview of how offsets can be applied in a GHG accounting program can be found in the GHG Protocol at the link below:

- Greenhouse Gas Protocol – Corporate Standard - https://ghgprotocol.org/corporate-standard

Energy Use Data Reporting Questions (from Energy Section of FDM)

In the Energy Section of FDM you will be required to input energy usage data for the applicable sources selected in the Site section of FDM.

IMPORTANT: The sources in the Energy section are determined by the Energy questions that you answered in the Site section. If there are sources that your facility uses that do not appear in this section, please go to the Site section Energy questions and update the necessary selections.

Please complete the following question to provide details on the energy mix of the purchased steam for the reporting period: *(Ref ID - ensteammixtable)*

If your facility reported purchased steam as an energy source, you will be asked to complete the following questions to provide details on each applicable steam source.

- What is the percentage (%) of each energy source?
  - **Note:** Here you must list the energy source mix (%) used to generate your facilities purchased steam.
- How many separate sources of steam are received at the facility?
  - **Note**: You may report on up to three (3) steam sources)
- What percentage of steam used at the facility is received from this source?
- Please indicate the unit of measure used to monitor the steam pressure from this source
- What is the pressure of the steam received at the facility from this source?
- What is the temperature of the steam received at the facility from this source (Celsius)?
- Please upload any reference documents

Suggested Uploads

- Documentation that supports the reported energy source and steam characteristics reported in the questions above (e.g. inventory of steam sources, energy source breakdown, temperature/pressure monitoring records, etc.)

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Please complete the following questions to provide details on your monthly energy consumption for Domestic/Production use during this reporting period. *(Ref ID - ensourcetracktabledomestic and ensourcetracktableproduction)*

Based on how your facility tracks energy use, you will be asked to complete a series of tables with the following questions to provide tracking details and usage quantities for each applicable energy source.

- Does your facility use this energy source (for domestic/production use, or in this facility type)?
- Does your facility track its energy use from this source?
- What is the quantity of energy used by this source during this reporting year?
- Unit of Measure
- Which method was used to track this energy source?
- What was the frequency of measurement?
- Provide any additional comments.

Notes:

- If you do not track domestic and production energy use separately, you will complete one (1) table to report combined energy usage data for domestic and production energy.
- If you reported more than one (1) facility type in the Site sections of FDM, you will be required to report energy usage data for each facility type.

IMPORTANT: Careful consideration should be used to not double report energy usage for domestic and productions use or across multiple facility types.

Suggested Uploads

- Documentation that demonstrates the facility has identified and is tracking energy consumption for all applicable energy sources. (e.g., an inventory and/or tracking records for energy sources, energy purchase invoices or metering records etc.)

What is the intent of the question?

The intent of this question is for facilities to demonstrate that they have identified and track energy use from all energy sources.

Technical Guidance:

Measurement of energy use from all sources is the foundation of energy management and the overall sustainability program for a company. Measurement of all energy sources allows you to identify areas of significant energy use, detect any abnormal consumption, establish energy reduction targets, and calculate GHG emissions.

When establishing your energy tracking and reporting program, start by doing the following:

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- Map out business and operational processes to identify sources of energy use.
    - **Note:** Energy consumed by facilities or tenants on-site that are NOT owned or controlled by your facility should be excluded from your energy reporting in FDM.
- Establish procedures to collect and track energy use data:
    - Use utility bills to determine the quantity of purchased electricity, steam, and other sources where applicable.
    - Track other fuels used for onsite energy generation such as diesel in generators and coal in boilers owned or controlled by the facility.
    - Install sub-meters to track the amount of renewable energy generated if renewable energy is generated in-house.
    - If estimation techniques are used to determine energy use, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g., daily, weekly, monthly consumption records) in a format that is easy to review [e.g., spreadsheet (e.g., Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g., Excel, csv)] and maintain relevant supporting evidence for review.

Note: Refer to the introduction section of the Energy Guidance for additional tips on establishing an effective tracking and reporting program.

Please complete the following questions to provide details on your monthly energy/fuel consumption for company owned and controlled vehicles during this reporting period. *(Ref ID - ensourcetracktablevehicle)*

If your facility tracks energy/fuel use from company owned or controlled vehicles, you will be asked to complete a table with the following questions to provide tracking details and usage quantities for each applicable energy/fuel source.

- Does your facility track its energy/fuel use from this source?
- What quantity of energy/fuel is used by this source during this reporting year?
- Unit of Measure
- Which method was used to track this energy/fuel source?
- Provide any additional comments.

IMPORTANT: Careful consideration should be used to not double report energy usage. For example, if your facility uses fuels for vehicles onsite, you **should not** report the energy for these sources unless it has been separately tracked and/or subtracted from the facility's energy use for the respective energy source reported in the overall facility energy consumption data for non-vehicular use.

Suggested Uploads

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- Documentation that demonstrates the facility has identified and is tracking energy/fuel consumption energy sources used for company owned and controlled vehicles. (e.g., an inventory and/or tracking records for energy/fuel use, energy purchase invoices or metering records etc.)

What is the intent of the question?

The intent of this question is for facilities to demonstrate that they have identified and track energy/fuel consumption for all energy sources used for company owned and controlled vehicles.

Technical Guidance:

Measurement of energy/fuel use for company owned and controlled vehicles is an important part of understanding your facility's energy and carbon footprint. It also allows you to identify areas of significant energy use, detect any abnormal consumption, establish energy reduction targets, and calculate GHG emissions.

Note: The principles and technical guidance provided for question above and in the introduction section of the Energy Guidance should also be applied for tracking and reporting energy/fuel use for company owned and controlled vehicles.

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Water

General Introduction

There is a finite amount of water on Earth. The increase in global demand for water not only creates a risk for your business but creates a risk for your community and planet on a broader scale. The operational, environmental, and financial impacts of water use are key issues for facility operations. Driving efficient water use and reductions throughout facility operations is an important area of focus for all factories.

Additional details and criteria for reporting water data in FDM is provided in the guidance below along with useful technical guidance and resources to support your facility in the management and reduction of water usage.

IMPORTANT: The sources in the Water section are determined by the Water applicability questions that you answered in the Site section. If there are sources that your facility uses that do not appear in this section, please go to the Site section Water questions and update the necessary selections.

Water Use at Your Facility

In FDM, water use is categorized as either used for production or domestic purposes as defined below:

- **Water used for Production:** Water used in manufacturing processes or operations used to make goods (e.g., dyeing or rinse water, steam generation, water used in mixtures applied to the product, cleaning of equipment components or tools that contact the product during the manufacturing process, etc.)

- **Water used for Domestic Purposes:** Water used for washrooms, sanitation, food preparation, landscape irrigation, non-contact cooling etc.

FDM requires facilities to select the sources of water used at their facility. FDM includes a list of predefined sources that can be selected. The table below provides a description of the available water source options in FDM. These are categorized blue and grey water sources.

Water Source	Description
Blue Water Sources	

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Blue water is fresh surface and groundwater, in other words, the water in freshwater lakes, rivers and aquifers	
Surface Water	Water that is naturally occurring on the Earth's surface (ice sheets, ice caps, glaciers, icebergs, ponds, lakes, rivers / streams, wetlands, bogs, etc.) Surface water has a low concentration of dissolved solids, is of an acceptable quality, and/or requires minimal treatment to be used for domestic, municipal, or agricultural applications.
Groundwater	Water in soil beneath the soil surface, usually under conditions where the pressure in the water is greater than the atmospheric pressure, and the soil voids are substantially filled with the water. Non-renewable groundwater is generally located at deeper depths and cannot be replenished easily or is replenished over very long periods of time. They are sometimes referred to as “fossil” groundwater sources.
Municipal Blue Water	Water provided by a municipality or other public provider that is generated by blue water.
Municipal Water (Origin Unknown)	Water provided by a municipality or other public provider with unknown origin (e.g., blue, or grey water)
Brackish surface water/seawater	Water in which the concentration of salts is relatively high (over 10,000 mg/l). For comparison, seawater has a typical concentration of salts above 35,000 mg/l. Brackish water is saltier than fresh water, but not as salty as seawater. It may result from mixing of seawater with freshwater, as in estuaries, but also certain human activities can produce brackish water. Brackish water is hostile to the growth of most terrestrial plant species.
Condensate from External Steam Source	Water that is generated from the condensate of steam sources that are not located at the facility.
Rainwater	Water in the form of precipitation (e.g., rain, snow) that is harvested within the facility either from the roof or other surfaces and stored for use.
Grey Water Sources Grey water is water that has been polluted by human activity (e.g., industrial, or domestic sources)	
Municipal Grey Water	Water provided by a municipality or other public provider that is generated by grey water.
Recycled Water	Wastewater that has been treated using physical, chemical, and/or any additional treatment processes to meet a quality which allows the water

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	to be used again in a process or for domestic purposes. For example, wastewater that has gone through a membrane filtration process and used back in the industrial operation is considered recycled water. This does not include water cycled in operations such as cooling towers and non-contact heat exchange operations.
Reuse Water	Wastewater discharged from one process that is used directly in another process without treatment. This does not include water cycled in operations such as cooling towers and non-contact heat exchange operations.
Treated Wastewater from External Source	Wastewater that has been discharged and treated by an external source (e.g., other manufacturing facility) using physical, chemical, and/or any additional treatment processes to meet a quality which allows the water to be used again in a process.
Untreated Wastewater from External Sources (treated internally)	Wastewater that has been discharged by an external source (e.g., other manufacturing facility) and treated at your facility using physical, chemical, and/or any additional treatment processes to meet a quality which allows the water to be used again in a process.

Water Data Quality

Accurately tracking and reporting water use data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand a facility's water use footprint and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing a water tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in FDM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g., small quantity exceptions).
- **Accuracy** – Ensure that the data input into the water tracking program is accurate and is derived from credible sources (e.g., calibrated meters, established scientific measurement principles or engineering estimates, etc.)
- **Consistency** – Use consistent methodologies to track water data that allows for comparisons of water use over time. If there are any changes in the tracking

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methods, water sources, or other operations that impact water use data, this should be documented.
- **Transparency** – All data sources (e.g., water bills, meter readings, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external data quality checks) should be defined and performed on water data as well as the processes used to collect and track data to ensure reported data is accurate.

Reporting Water Use Data in FDM:

Before reporting water use data in FDM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✓ Review source data (e.g., utility invoices, meter logs, etc) against aggregated totals to ensure it is accurate.
- ✓ Compare the current data with historical data. Any significant changes (e.g., an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✓ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✓ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✓ Review any assumption or estimation methodology/calculations to ensure accuracy.

Do Not:

- X Report data that is not accurate (e.g., the data source is unknown or has not been verified).

- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g., engineering calculations).

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Water Applicability Questions (from Site Section of FDM)

The following applicability questions are completed on the Site Section of FDM and will be used to pre-populate sources in the water data reporting section of FDM.

1. Select all water sources used by your facility: *(Ref ID: watsource)*

- Water Source Category
  - Blue Water
    - Surface Water
    - Groundwater
    - Municipal Blue Water
    - Municipal Water (Origin Unknown)
    - Brackish surface water/seawater
    - Condensate from External Steam Source
    - Rainwater
  - Grey Water
    - Municipal Grey Water
    - Recycled Water
    - Reuse Water
    - Treated Wastewater from External Source
    - Untreated Wastewater from External Sources (treated internally)

Note: For information on the definitions of the above water sources, please refer to the introduction section of the Water guidance.

After selection your water sources and based on your water question applicability responses, you will be asked the following series of questions to provide additional details on your water sources and consumption tracking:

Are you able to identify and track domestic and production water use separately? *(Ref ID: wattrackdomprodsep)*

- Yes
- No

Note: Refer to the definitions of domestic and production water use in the Introduction section of the Water Guidance.

Answer Yes If: Your facility tracks water use tracks domestic and production water use separately.

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If you answer Yes to this question, you will be asked to complete two (2) tables to provide details on your facility's domestic and production water use for each applicable water source.

Note: If your facility selects multiple facility types in the Site section of FDM (e.g., Finished Product Assembler and Material Production), a separate table for production water use will be displayed for each selected facility type.

If you answer No to this question, you will be asked to complete a single table to provide details on your facility's total water use for each applicable water source.

Would you like to track water use by the meter?*(Ref ID - watsourcemetertrack)*

- **Answer Yes if**: You track the quantity of water used at your facility by meter.

Note: Tracking water use by a meter(s) is defined as the use of an onsite fixed meter(s) and/or sub-meter(s) (either mechanical or digital including all types of meters used to measure liquid volume) that is owned or accessible to the facility to obtain meter readings to verify the quantity of water used onsite.

If you answer Yes to this question, you will be asked the following sub questions to indicate how many meters your facility uses to track water use:

- How many meters would you like to track for your Domestic water use?
- How many meters would you like to track for your Production water use?
- **Note**: You may enter up to 30 meters for domestic and production tracking.

If you answer No to this question, It is recommended that you provide additional comments in the water tracking table to describe how your facility tracks water usage.

Water Use Data Reporting Questions (from Water Section of FDM)

In the Water Section of FDM you will be required to input water usage data for the applicable sources selected in the Site section of FDM.

IMPORTANT: The sources in the Water section are determined by the Water questions that you answered in the Site section. If there are sources that your facility uses that do not appear in this section, please go to the Site section Water questions and update the necessary selections.

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Please complete the following questions to provide details on your monthly water consumption for Domestic/Production use during this reporting period. *(Ref ID - wattrackdomtable and wattrackprodtable)*

Based on how your facility tracks water use, you will be asked to complete a series of tables with the following questions to provide tracking details and usage quantities for each applicable water source.

- Does your facility use this water source for Domestic/Production Use?
- Does your facility track its water use from this source?
- What quantity of water was used from this source for Domestic/Production Use during this reporting year?
- Unit of Measure
- Which method was used to track this water source?
- What was the frequency of measurement?
  Provide any additional comments

Notes:

- If you do not track domestic and production water use separately, you will complete one (1) table to report combined water usage data for domestic and production water.
- If you reported more than one (1) facility type in the Site sections of FDM, you will be required to report water usage data for each facility type.

IMPORTANT: Careful consideration should be used to not double report water usage for domestic and productions use or across multiple facility types.

Suggested Uploads:

- Documentation that demonstrates the facility has identified water sources and is tracking water consumption for applicable water sources. (e.g., an inventory and/or tracking records for water sources, water purchase invoices or metering records, etc.)

What is the intent of these questions?

The intent of these questions is to help facilities understand the sources of the water they are using, and the quantity of water used from each source.

Technical Guidance

Identifying and measuring water use from all sources is the foundation of a water management program and the overall sustainability program for a company. Measurement of all water sources allows you to identify areas of significant water use, detect any abnormal consumption, and establish water use baselines and reduction

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targets. Additionally, tracking domestic and production water use separately can help facilities further identify specific areas for improvement and conservation efforts.

When establishing your water tracking and reporting program, start by doing the following:

- Mapping out business and operational processes to identify water sources, areas/processes that consume water.
- Establish procedures to collect and track water use data:
    - Use utility bills to determine the quantity of purchased water.
    - Determine methods to track water consumption from other applicable sources, such as rainwater, recycled water, etc.
    - Install sub-meters to track the amount of water used on-site.
    - If estimation techniques are used to determine water use, the calculation methodology should be clearly defined and be supported by verifiable data.
    - Take inventory of how the site obtains water and gathers information on where the water comes from and who or what supplies the water.
- Record tracking data (e.g., daily, weekly, monthly consumption records) in a format that is easy to review [e.g., spreadsheet (e.g., Microsoft Excel) or similar data analytics program that allows export of data in a readable format (e.g., Excel, csv)] and maintain relevant supporting evidence for review.

Note: Refer to the introduction section of the Water Guidance for additional tips on establishing an effective tracking and reporting program.

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Wastewater

General Introduction

Wastewater can be a significant contributor to pollution and contamination of surrounding natural systems and communities if not managed, treated, and/or disposed of appropriately. The operational, environmental, and financial impacts of wastewater are key issues for facility operations. Driving efficient water use and reducing the amount of contaminants discharged to the environment from facility operations is an important area of focus for all factories.

Additional details and criteria for reporting wastewater data in FDM is provided in the guidance below along with useful technical guidance and resources to support your facility with the management wastewater.

IMPORTANT: The sources in the wastewater section are determined by the wastewater applicability questions that you answered in the Site section. If there are sources that your facility uses that do not appear in this section, please go to the Site section wastewater questions and update the necessary selections.

Wastewater at Your Facility

Wastewater can be generated from a variety of sources. In FDM, wastewater is categorized as follows:

- **Domestic Wastewater:** Wastewater originating from domestic/sanitary usage such as toilets, bathing, personal laundry and kitchens**.**
- **Industrial Wastewater:** Water that has been used for manufacturing processes and no longer meets the quality standard for beneficial use (e.g., wastewater from production, lubrication, cooling, maintenance, cleaning of production machines, etc.)
- **Stormwater:** Water that originates from precipitation (e.g., rainwater) that accumulates on and runs off **roofs**, hard standing surfaces, car parks, etc. (sometimes referred to as surface water run-off)

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The table below provides examples of common wastewater sources that are characterized as either domestic or industrial wastewater in the FDM.

Domestic Wastewater	Industrial Wastewater
• Dormitory wastewater • Canteen/kitchen wastewater • Office wastewater • Non-contact cooling water • Blowdown from compressors or boilers	• Process Wastewater • Facility maintenance wastewater • Waste gas treatment facility wastewater • Coal/waste/Sludge pile leachate • Contact cooling water

Wastewater Treatment

The most appropriate or effective options to treat wastewater will depend on a number of factors, including, the composition and volume of the wastewater, applicable legal requirement, available external infrastructure (e.g., offsite treatment facilities). In FDM, a facility's wastewater treatment is categorized as one of the following:

- **On-site Wastewater Treatment Only**: This is treatment that is performed onsite at a facility in a wastewater treatment plant used managed/operated by the facility. After on-site treatment, the wastewater is discharged to the environment.

- **Zero-Liquid Discharge (ZLD):** ZLD is a type of onsite treatment that is designed so no water leaves a facility in liquid form. At a facility with on-site ZLD treatment system, almost all wastewater is treated and recovered such that the only water discharged from the facility exists by evaporation or as moisture in the sludge from treatment plant operations. A facility is not considered to have a ZLD treatment system if there is any industrial liquid discharge (Source: ZDHC Knowledgebase – Glossary: https://knowledge-base.roadmaptozero.com/hc/en-gb/sections/360002796277-Glossary).

- **On-site Wastewater Treatment + Offsite Treatment**: This is treatment that is initially performed onsite at a facility then discharged to an offsite 3rd party treatment plant for additional treatment (also referred to as partial onsite treatment).

- **Off-site Wastewater Treatment Only**: This is treatment that is performed offsite by a 3rd party wastewater treatment service provider that may be government or privately owned/operated. With offsite treatment, the facility's untreated wastewater is discharged directly to the off-site treatment facility.

- **Septic System**: Septic systems are underground wastewater treatment structures that use a combination of natural/primary processes to treat wastewater. The process typically involves solids settling within the septic tank and ends with wastewater being discharged to the soil via a drainfield.

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Reporting wastewater data in the FDM:

Before reporting wastewater data in FDM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✓ Review source data (e.g., meter logs, invoices, etc) against aggregated totals to ensure it is accurate.
- ✓ Compare the current data with historical data. Any significant changes (e.g., an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✓ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✓ Ensure the proper units are reported and verify any unit conversions from source data to reported data. **Note:** FDM requires that wastewater data be entered in cubic meters (m^3).
- ✓ Report the data source (e.g., meters, invoice, estimates) and frequency of measurement (e.g., daily, monthly, etc).
- ✓ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✓ Add notes in the “Provide any additional comments” field to describe any data assumptions, estimation methodology, or other relevant comments on the reported quantity.

Do Not:

- X Report data that is not accurate (e.g., the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g., engineering calculations).

Wastewater Applicability Questions (from Site Section of FDM)

The following applicability questions are completed on the Site Section of FDM and will be used to pre-populate sources in the wastewater data reporting section of FDM.

Does your facility generate industrial wastewater? *(Ref ID: wwtypeind)*

- Yes
- No

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Note: For the definition of industrial wastewater refer to the Introduction section of the Wastewater Guidance.

Does your facility have Zero Liquid Discharge? *(Ref ID: wwtypezld1)*

- Yes
- No

Note: For the definition of Zero Liquid Discharge (ZLD) refer to the Introduction section of the Wastewater Guidance.

Do you treat industrial and domestic wastewater together? *(Ref ID: wwtreat)*

- Yes
- No

Where is your industrial/domestic/combined wastewater treated? *(Ref ID: wwtreatindlocation1)*

Facilities will be required to answer the applicable questions to indicate where their industrial, domestic, or combined wastewater is treated.

Note: For the definition of wastewater treatment location refer to the Introduction section of the Wastewater Guidance

- Treated Onsite Only and directly discharged to the environment after treatment.
- Treated Offsite Only.
- Treated Onsite and then discharged to Offsite for further treatment.
- Sent to a Septic system onsite (applies domestic wastewater only)
- Zero Liquid Discharge
- Not Treated

Wastewater Use Data Reporting Questions (from Wastewater Section of FDM)

In the Wastewater Section of FDM you will be required to input wastewater discharge data for the applicable sources selected in the Site section of FDM.

IMPORTANT: The sources in the wastewater section are determined by the Wastewater questions that you answered in the Site section. If there are discharge

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sources at your facility that do not appear in this section, please go to the Site section Wastewater questions and update the necessary selections.

What was the total quantity of wastewater discharged from your facility during this reporting period? (If ZLD facility, What was the total quantity of wastewater processed through your facility during this reporting period?) (in cubic meters - m3) *(Ref ID: wwtrackamt)*

You will be required to complete a table with the following questions to provide details on your facility's wastewater discharge for each applicable wastewater type (domestic/production/combined).

- What was the total quantity of wastewater discharged from your facility during this reporting period? (in cubic meters - m^3)
    - Note: If your facility operates a ZLD treatment system, you must report the total quantity of wastewater processed through your ZLD facility during the reporting period
- Provide any additional comments.
- Please upload documentation.

Suggested Uploads:

- Documentation that demonstrates the facility tracked the volume of wastewater discharged from applicable sources. (e.g., tracking records for wastewater discharge, metering records/logs, wastewater treatment invoices, documented estimation methodology, etc.)

What is the intent of the question?
The intent of this question is for facilities to demonstrate that they are tracking the volume of wastewater discharged from the facility.

Technical Guidance:
Wastewater tracking allows visibility into daily operations and which operations impact wastewater volume. Knowing your wastewater volume is also linked to potential environmental impact and operational costs.

Wastewater tracking should include all wastewater generated from all manufacturing and/or commercial activities at the facility (domestic and industrial). Tracking should also include wastewater that is reused/recycled at the facility.

When establishing your water tracking and reporting program, start by doing the following:

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- Mapping out facility areas and processes to identify where wastewater is generated and discharged.
- Establish procedures to collect and track wastewater data:
    - Install on-site meters or use metered invoices from off-site treatment facilities.
    - If estimation techniques are used to determine the amount of wastewater generated, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g., daily, weekly, monthly records) in a format that is easy to review (e.g., Microsoft Excel or similar data analytics program that allows export of data in a human readable format) and maintain relevant supporting evidence for review.

Tracking Wastewater Volume

The most accurate way to track wastewater volume is using a metering system. Mechanical meters and ultrasonic meters are widely used to track wastewater volume. Facilities should install meters at all wastewater discharge points before wastewater is discharged to the environment. If the facility has its own effluent treatment plant (ETP), the meter should be installed at the outlet of the wastewater treatment facility. Facilities should collect data from the meters regularly in order to track accurate wastewater discharge volumes. This method applies to both domestic and industrial wastewater.

If a facility does not have meters to track its wastewater discharge volume, an estimation method can be used which may include any of the following estimation techniques listed below.

- If the facility has accurate data (meters or invoices) on incoming water volume for production process and domestic use, the facility may estimate wastewater discharge volume using the incoming water volume. The facility may need to account for water use or loss for things like cooling tower evaporation loss or irrigation when estimating wastewater volume.
- Use of any official environmental reports that contain data on wastewater discharge volume (e.g., Environmental Impact Assessment reports, Environmental permit applications, Government's compliance report or offsite wastewater treatment invoices).
    - **Note:** In some cases, wastewater treatment invoices from offsite wastewater treatment facilities may not provide the treated wastewater volume. Instead, the invoice would indicate the total treatment fee (e.g., 100 USD) with unit treatment cost ($1 USD/$m^3$). In this case, a facility may need to manually calculate and record wastewater volume with the total treatment fee and unit cost (e.g., total treatment fee ÷ unit treatment cost = wastewater volume).
- If the facility has no documentation which indicates the amount of incoming water, then they can estimate industrial wastewater volume based on different production processes and equipment specific consumption.

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- For example, in a dyeing mill, the dyeing recipe may have water needed for each dyeing batch, or the dyeing machine may also have specifications on how much water is required for each batch. The facility would need to collect the production volume of each dyeing recipe and production volume of each dyeing machine. Then the facility would be able to manually calculate using production water use of each recipe per machine and water needed of each recipe/machine, multiply by respective production volume. Lastly, sum up all production water use. This estimated production water volume could be considered as the estimated amount of industrial wastewater discharged. Facilities may also need to account for any loss due to evaporation during production processes.

A tool available to help calculate water use from different sources can be found here: http://waterplanner.gemi.org/calc-waterbalance.asp.

Domestic Wastewater Tracking (including Septic Systems):

Tracking the flow rate and discharge volume of domestic wastewater with on-site meters is not a common practice but it is highly encouraged to accurately track the volume and quantity of domestic wastewater discharged.

If domestic wastewater discharge metering data or actual discharge data is not available, the facility could consider estimating wastewater discharge based on the site's total water use, the estimated amount used for domestic purposes and then minus an estimated amount due to losses (e.g., evaporation).

- For example, a site with domestic only wastewater who used 150m^3 of municipal water per month estimates that 10% of the water is lost due to evaporation and leaks would report 135m^3 of wastewater discharged (150m^3 – 10%).

Water use in a facility can also be estimated by the number of persons, number and types of facilities, taps, toilets, shower, irrigation etc. based on any available local/regional data or manufacturer's specifications (e.g., rated litres per flush for toilet fixtures).

Note: If an estimation technique is used, this should be fully documented, applied consistently and based on reasonable estimation factors that are derived from relevant sources (e.g., manufacturer's specifications, regional data on sewerage volume per person/day, etc.)

Note: Refer to the introduction section of the Wastewater Guidance for additional tips on establishing an effective tracking and reporting program.

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Air Emissions

General Introduction

Air emissions from industrial processes and manufacturing operations have the potential to emit pollutants into the air that impact the environment, human health and contribute to climate change.

As governments and industry stakeholders continue to focus on reducing environmental impacts, more stringent requirements and regulations may be imposed. By proactively managing and working to reduce impacts of your facility's air emissions, you can reduce your exposure to regulatory risks or new requirements from business partners.

Additional details and guidance on reporting air emission data in FDM is provided in the guidance below along with useful technical guidance and resources to support your facility in the management of emissions to the air.

Reporting Air Emissions in FDM

FDM allows facilities to track and report emission data for refrigerants used/emitted onsite.

IMPORTANT: The refrigerant sources in the Air Emissions section are determined by the air emissions questions that you answered in the Site section. If there are refrigerant sources at your facility that do not appear in this section, please go to the Site section Air Emissions questions and update the necessary selections.

Before reporting refrigerant data in FDM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✓ Review source data (e.g., equipment maintenance records, servicing logs, refrigerant purchase invoices, etc.) against aggregated totals to ensure it is accurate.
- ✓ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✓ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✓ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✓ Report the proper tracking method in FDM (e.g., measured, leakage rate, estimate)

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Do Not:

- X Report data that is not accurate (e.g., the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g., leakage rate or other engineering calculations).

Air Emissions Data Quality

Accurately tracking and reporting air emissions data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand the facility's air emissions and identify the specific actions that will help reduce environmental impacts.

When establishing an air emissions tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all emission sources.
- **Accuracy** - Ensure that the data input into the air emissions tracking program is accurate and is derived from credible sources (e.g., based on established scientific measurement principles or established emissions estimation methodologies, etc.)
- **Consistency** - Use consistent methodologies to track air emissions data that allows for comparisons of emissions over time. If there are any changes in the tracking methods, sources, or other operations that impact air emissions data, this should be documented.
- **Transparency** – All data sources and assumptions used (e.g., estimation techniques and calculation methodologies) should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external) should be defined and performed on air emissions data as well as the processes used to collect and track data to ensure reported data is accurate.

Air Emissions Applicability Questions (from Site Section of FDM)

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The following applicability questions are completed on the Site Section of the FDM and will be used to pre-populate sources in the Air Emissions data reporting section of the FDM.

Does your facility contain any of the following operations equipment?

(Ref ID: airsourceops)

- Refrigerant containing device (other than air conditioning system)
- Air conditioning (Cooling)

Do you know what refrigerants your facility uses? *(Ref ID: airrefrigerant)*

Note: Refrigerants used within owned and operated vehicles will be in scope of FDM reporting.
Answer Yes if: Your facility knows which specific refrigerants are used at your facility.

If you answer Yes, you will be asked to select the refrigerant(s) that are used at your facility.

Notes:

- A predefined list of specific refrigerants will be available for you to select from.
- If the refrigerants used are not on the list, you should select “Other” to access the advanced refrigerant selection feature which includes additional refrigerants that can be selected.

If you answer No, you will not be able to report refrigerant data in FDM.

Suggested Uploads

- An inventory or list of refrigerants used onsite.

What is the intent of the question?
The intent of this question is to ensure that facilities understand which refrigerants are used at their facilities.

Technical Guidance
Refrigerants such as CFCs and HCFCs commonly used in air conditioning, cooling and refrigeration equipment can contain ODS that are contributors to GHG emissions and climate change due to their relatively high global warming potentials (GWPs). Refrigerants are often emitted to the air through equipment leaks or during servicing or disposal of refrigerant containing equipment.

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Knowing which refrigerants are used onsite will help facilities plan for phasing out the use of ozone depleting substances (ODS) at their facility in accordance with good environmental practices and current or future regulatory requirements. More information on phasing out Ozone Depleting Substances can be found here: https://www.epa.gov/ods-phaseout

Air Emission Data Reporting Questions (from Air Emission Section of FDM)

In the Air Emissions Section of FDM you will be required to input air emissions data for the applicable refrigerant sources selected in the Site section of the FDM.

IMPORTANT: The refrigerant sources in the air emissions section are determined by the air emissions questions that you answered in the Site section. If there are refrigerant emissions at your facility that do not appear in this section, please go to the Site section Air Emissions questions and update the necessary selections.

Do you want to report emissions from this refrigerant for this period?

(Ref ID: airrefrigreport)

Note: In the reporting table, you will be asked to answer this question, and the applicable questions listed below for each refrigerant in use at your facility.

Answer Yes if: There were emissions of the listed refrigerant(s) during the reporting period.

If you answer Yes, you will be asked to complete the following questions for each applicable refrigerant:

- Quantity of refrigerant added to existing equipment during the reporting period
- Unit of measure
- What method was used to track refrigerant use?
- Please upload your action plan or methods used to fix the leak

Suggested Uploads

- An inventory of refrigerants used onsite with the quantity of each refrigerant added to existing equipment for the reporting year.
- Documentation of the methodology used to track refrigerant use (e.g., leakage rate or consumption calculation methodology)
- Documented plans or actions taken to fix refrigerant leaks, if applicable.

What is the intent of the question?

The intent of this question is to allow facilities to report the quantity of refrigerant(s) emitted in the reporting period.

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Technical Guidance
Refrigerants are often emitted through equipment leaks and servicing. Most modern equipment is designed to minimize leaks however over time, leaks do occur. Having to add refrigerants to existing equipment generally indicates the system has a leak.

Tracking refrigerant use is an important part of managing refrigerants use onsite. Tracking refrigerant use allows facilities to monitor how much refrigerant has been released to the environment as well as identify problematic or leaking equipment.

It is also important to have an action plan to fix the leaks and/or upgrade equipment to eliminate refrigerant leakage.

When establishing your tracking and reporting program, start by doing the following:

- Map out all facility equipment (production and operational equipment) to identify equipment that contain refrigerants.
    - This should include identifying the specific refrigerant type that is used in the equipment (e.g., R-22).
- Establish procedures to determine how much refrigerant is released (e.g., through leaks, disposal, etc) from each piece of equipment.
    - In general, the amount of refrigerant released is equal to the amount of refrigerant that is added to the equipment (see Calculating Leak Rate below)
    - Refrigerant purchase invoices, or service records may also be helpful in determining quantities released.
    - If estimation techniques are used, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g., monthly, annual leakage or top-up records) in a format that is easy to review [e.g., spreadsheet or similar data analytics program that allows export of data in a human readable format (e.g., Microsoft Excel)] and maintain relevant supporting evidence for review.

Calculating a Leakage Rate
When determining the quantity of refrigerants emitted from a piece of equipment, it is generally considered that the amount of refrigerant emitted is equal to the amount that was added to the equipment after a period of time to return the equipment back to a full charge.

- For example, if you recharge the refrigerant in a Chiller unit to a full charge, then after one year of operation you need to add 0.5kg to fully recharge the unit, then it is assumed that the 0.5kg was emitted due to leaks or servicing throughout the year.

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When tracking refrigerant emissions, a facility can directly measure and record the amount of refrigerant added to a piece of equipment in the reporting year or a leakage rate can be determined and used to estimate emissions.

The leakage rate is typically expressed as the percentage of a full charge that would be lost in a 12-month period. The example below is one way to calculate a leak rate.

1. Take the kilograms (kg) of refrigerant you added to recharge the system to a full charge and divide it by the kg of refrigerant in the normal full charge for the system.
2. Determine the number of days that have passed between charges (e.g., how many days between the last time refrigerant was added and this time refrigerant was added), then divide by 365 (the number of days in a year).
3. Take the kg of refrigerant determined in step 1 and divide it by the number of days determined in step 2.
4. Lastly, multiply by 100% (to determine a percentage).

For example:

Chiller #1

- Refrigerant Added = 1kg
- Full charge = 5kg
- Days between charges = 275

Leakage rate = (1kg ÷ 5kg) ÷ (275 ÷ 365) x 100% = 26.5%

Therefore, this Chiller unit loses/emits 1.33kg (26.5% of a full charge) of refrigerant in a year.

Note: Leakage rates may also be used to determine preventative maintenance schedules or when equipment may need additional service or replacement.

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Waste

General Introduction

Waste from industrial processes and manufacturing operations have the potential to impact the environment, human health, and local ecosystem.

As governments and industry stakeholders continue to focus on reducing waste and promoting more sustainable manufacturing practices, more stringent requirements and regulations may be imposed. New materials and technologies are also being developed to reduce and recapture waste and work towards a circular economy that is more sustainable. By proactively managing and working to minimize waste generated from your facility, you can reduce impacts on the environment, exposure to regulatory risks or new requirements from business partners and contribute to a more sustainable future.

Additional details and criteria for reporting waste data in FDM is provided in the guidance below along with useful technical guidance and resources to support your facility in the management of waste.

IMPORTANT: The sources in the waste section are determined by the waste applicability questions that you answered in the Site section. If there are sources of waste at your facility that do not appear in this section, please go to the Site section Waste Questions and update the necessary selections.

Waste at Your Facility

Waste is any material or substance that has no further use and is discarded from a facility which can pollute or contaminate the environment and surrounding communities.

In FDM, wastes are categorized as follows:

- **Non-hazardous Waste:** is any waste that causes no harm to human or environmental health. Non-hazardous waste usually includes both non-hazardous production waste as well as domestic waste. Examples of non-hazardous waste include:
    - Non-hazardous production waste such as textile, leather, plastic, paper, metal, or packaging waste, etc.
    - Domestic waste such as food waste and sanitary wastes including household waste from the office and/or dormitory areas (e.g., toilet paper, yard/garden waste, glass, and food packaging), etc.

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- **Hazardous Waste:** is any waste that could cause harm to public health and/or the environment because of its chemical, physical, or biological characteristics (e.g., it is flammable, explosive, toxic, radioactive, or infectious). Hazardous wastes can be liquids, solids, or gases. Examples of hazardous waste include:
    - Hazardous production waste such as used chemicals, chemical containers/drums, waste oils, contaminated materials (e.g. materials that contain other substances that are hazardous waste such as rags containing solvents), etc.
    - Waste from facility operations such as wastewater treatment sludge if hazardous, fly ash, fluorescent light bulbs, electronic waste, batteries, etc.

Reportable Wastes in FDM

FDM requires that facilities track and report waste generation data for the specific waste categories listed below.

Non-hazardous Wastes	Hazardous Wastes
● Textile Waste ● Leather Waste ● Rubber Waste ● Metal (broken needles, metal swarf, etc.) ● Plastic ● Paper ● Cans ● Wood ● Food Waste ● Glass ● Cartons ● Foams (EVA, etc.) ● Pre-Water treatment sludge (Non-Hazardous) ● General or unspecified waste ● Slag (Non-Hazardous) ● Other	● Empty chemical drums and containers (without proper cleaning) ● Film and Printing Frame ● Pre-water treatment sludge (Hazardous) ● Expired/unused/used chemicals (waste oil, solvents, reactants, etc.) ● Compressed gas cylinders (refrigerants, etc.) ● Contaminated materials ● Batteries ● Fluorescent light bulb ● Ink cartridges ● Waste oil and grease (from cooking) ● Waste oil and grease (from production, maintenance, etc. - not cooking) ● Metal sludge ● Empty containers (cleaning, sanitizing, pesticides, etc.) ● Electronic Waste ● Coal combustion residuals (fly ash and bottom ash/coal slag) ● Slag (Hazardous) ● Other

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Note: The legal classification of hazardous waste may differ from one country or jurisdiction to another. Facilities should, at minimum, follow local regulatory requirements and definitions for classifying wastes as hazardous or non-hazardous. If legal requirements do not exist, it is recommended that facilities use industry guidelines or internationally recognized definitions of hazards wastes (such as those listed in the Basel Convention http://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.asp). Additionally, where industry guidelines are more stringent than local requirements, it is recommended that facilities follow industry guidelines.

Waste to be Excluded from FDM Reporting Scope:
The following waste materials should not be reported in the FDM, as these types of waste are not generated from a "business as usual" situation**:**

- Medical waste
- Major construction and demolition projects waste
- Waste from natural disasters such as flood, fire, tornado, hurricane.

Waste Disposal Methods in FDM

FDM requires facilities to indicate how their wastes are currently being disposed of. FDM includes several predefined waste disposal methods that can be selected. The table below provides a description of the available waste disposal method options in the FDM. These are categorized into Preferred, Less Preferred and Least Preferred options based on their associated environmental impacts.

Waste Disposal Method	Description
Preferred Options (Material Recovery)	
Reuse	Pre or post-consumer wastes are reused to make new or second hand products without modification or additional manufacturing steps before using the waste.
Recycle (including Upcycle)	Pre or post-consumer wastes are reprocessed to produce new items of equal (or better) quality (e.g., textile to textile recycling or processing plastic bottles into fabric).
Downcycle	Pre or post-consumer wastes are recycled and processed to produce material or products of lesser economic value (e.g., recycled textiles used for rags, carpet padding, or sound insulation products).
Less Preferred Options (Energy Recovery or Non-valorized Disposal)	
Incineration with energy recovery for Non-Recyclables only	Energy recovery from the process of incinerating non-recyclable waste. **Note:** Recycling

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	infrastructure and capabilities may differ among regions and countries.
Energy Recovery - Residual Management (e.g., Physical / Chemical / Biological Treatment)	Energy Recovery as a form of residual management, ie. Sludge Treatment that leads to Biogas Generation, heat generation from biological treatment (composting), energy generation from any such activity that does not include "Incineration"
Onsite incineration without energy recovery for Non-Recyclables	Incineration of non-recyclable wastes onsite at the facility that does not recover energy from the incineration process.
Offsite incineration without energy recovery for Non-Recyclables	Incineration of non-recyclable wastes offsite at a third-party facility that does not recover energy from the incineration process.
Non-valorized disposal - Other Treatment	Any disposal method that does not recover usable materials or attributes of the waste such as converting them into more useful by products like raw materials, fuels, or other sources of energy.
Non-valorized disposal - Responsibly Managed Landfills (for waste that cannot be managed in any of the options under Preferred options or Less Preferred Options)	In FDM, responsibly managed landfills aligns with the ZDHC Disposal Pathways definitions for landfills with significant control measures as defined in the ZDHC Sludge Management Document Version 1.0. available here: https://www.roadmaptozero.com/output, and as described below: Landfills with **Significant Control Measures** are landfills that control both leachate and gas produced from the materials placed in the landfill and are engineered to store waste in a manner that is safe to the surrounding environment. For purposes of the WW Guideline, significant control measures are defined as: ● Lined landfill such that the permeability of no more than 1 x 10-7 cm/sec is achieved. This is most often achieved using a synthetic composite liner on top of a packed natural clay liner but can also be achieved through two synthetic liners. ● Leachate is collected above the liner and removed for proper treatment and disposal. Leak detection and collection is implemented beneath the primary liner and above the secondary liner. ● Gas produced from aerobic and anaerobic decomposition is collected and safely used or disposed of. This gas is primarily carbon dioxide or methane but can include sulphurous

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	compounds. Depending on the content of the gas, carbon dioxide can be vented directly to the atmosphere or collected, filtered, and used beneficially. ● Monitoring and documentation are maintained for the life of the landfill. Landfills with **Limited Control Measures** are landfill types that do not meet the description requirements specified in the Landfill with Significant Control Measures section. The permeability, leachate and gas control, and documentation are generally less restrictive. Leachate control may be non-existent or consist of simple collection and drain to local sewer lines. Gases may be vented versus stored, treated and used. Monitoring requirements for these types of landfills are less stringent – requiring less frequent sampling, inspections, and records for a shorter time depending on the local laws and regulations.
Least Preferred Options	
Energy Recovery (e.g., Incineration with energy recovery for Recyclables)	Energy recovery from the process of incinerating of recyclable waste. **Note:** Material recovery is the preferred method for recyclable wastes. **Note:** Recycling infrastructure and capabilities may differ among regions and countries.
Landfill/Dumping with No Control Measures	In FDM, landfill/dumping with no controls aligns with the ZDHC Disposal Pathways definitions for landfills with limited or no control measures as defined in the ZDHC Sludge Management Document Version 1.0. available here: https://www.roadmaptozero.com/output, and as described below: Landfills with **Limited Control Measures** are landfill types that do not meet the description requirements specified in the Landfill with Significant Control Measures section. The permeability, leachate and gas control, and documentation are generally less restrictive. Leachate control may be non-existent or consist of simple collection and drain to local sewer lines. Gases may be vented versus stored, treated and used. Monitoring requirements for these types of landfills are less stringent – requiring less frequent

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	sampling, inspections, and records for a shorter time depending on the local laws and regulations. Landfills with **No Control Measures** are landfills constructed with no control measures. Any landfill that has not been designed to contain waste, limit percolation, or control leachates from exposure or entering the environment is considered a landfill with no control measure. This includes dump piles and holes with no lining or packing to limit waste exposure to the ground and/or groundwater. There may be few or no monitoring requirements for these types of landfills. In many cases, these types of landfills are constructed by simply digging a hole and then filling the hole with waste, or it may consist of filling a naturally occurring depression with waste.
Onsite Incineration without energy recovery for Recyclables	Incineration of recyclable wastes onsite at the facility that does not recover energy from the incineration process.
Offsite incineration without energy recovery for Recyclables	Incineration of recyclable wastes offsite at a third-party facility that does not recover energy from the incineration process.
Other	Any other waste disposal method that does not fit the description of the above noted methods. **Note**: A detailed description of the other methods should be provided.

Waste Data Quality

Accurately tracking and reporting waste data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand a facility's wastes and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing a waste tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in FDM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g., small quantity exceptions).
- **Accuracy** – Ensure that the data input into the waste tracking program is accurate and is derived from credible sources (e.g., calibrated scales, invoices, established scientific measurement principles or engineering estimates, etc.).

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- **Consistency** – Use consistent methodologies to track waste data that allows for comparisons of waste quantities over time. If there are any changes in the tracking methods, waste sources, or other operations that impact waste data, this should be documented.
- **Transparency** – All data sources (e.g., invoices, weighing records, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external data quality checks) should be defined and performed on waste data as well as the processes used to collect and track data to ensure reported data is accurate.

Reporting Waste Data in FDM

Do:

- ✓ Review source data (e.g., weighing records, invoices/manifests, etc) against aggregated totals.
- ✓ Compare the current data with historical data. Any significant changes (e.g., an increase or decrease of over 10%) should be attributable to known changes.
- ✓ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✓ Ensure the proper units are reported and verify any unit conversions.
- ✓ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✓ Verify how waste is disposed and ensure reported the disposal method (e.g., landfill, recycle, incineration) is accurate.
- ✓ Ensure waste vendors have the appropriate licenses to handle each waste type.

Do Not:

- X Report data that is not accurate or if data is unknown or has not been verified.
- X Report estimated data that is not supported by verifiable and reasonably accurate estimation methodology and data (e.g., engineering calculations).

Waste Applicability Questions (from Site Section of FDM)

The following applicability questions are completed on the Site Section of FDM and will be used to pre-populate sources in the waste data reporting section of the FDM.

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Which non-hazardous waste streams does your site produce? Select all that apply: *(Ref ID: wstsourcenh)*

- Textile Waste
- Leather Waste
- Rubber Waste
- Metal
- Plastic
- Paper
- Cans
- Wood
- Food Waste
- Glass
- Cartons
- Foams (EVA, etc.)
- Pre-water treatment sludge (Non-Hazardous)
- Slag (Non-Hazardous)
- General or unspecified waste
- Other

If you select textile waste, you will be asked the following sub question:

- **Does your facility segregate textile waste on material composition?**
    - **Answer Yes if:** Your facility separates textile waste based on its composition which is defined as separating textile wastes that are made up of different raw materials or fibres. For example, natural fibres from plants, animals, or minerals (e.g., cotton, wool, silk), synthetic fibres from man-made materials (e.g., polyester, nylon), or blended fibres (e.g., a mix of natural and synthetic fibres).
    - **Note:** If all textiles waste your facility generates is the same composition you should answer Yes to this question.

Suggested Uploads

- A waste inventory of all non-hazardous waste streams generated at the facility.

What is the intent of the question?

The intent is to ensure facilities are aware of all non-hazardous waste types (both production and domestic waste) produced at the facility and track the quantity and disposal methods of each waste type.

Which <u>hazardous</u> waste streams does your site produce? Select all that apply: *(Ref ID: wstsourceh)*

- Empty chemical drums and containers (without proper cleaning)

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- Film and Printing Frame
- Pre-water treatment sludge (Hazardous)
- Expired/unused/used chemicals (waste oil, solvents, reactants, etc.)
- Compressed gas cylinders (refrigerants, etc.)
- Contaminated materials
- Batteries
- Fluorescent light bulb
- Ink cartridges
- Waste oil and grease (from cooking)
- Waste oil and grease (from production, maintenance, etc. - not cooking)
- Metal Sludge
- Empty containers (cleaning, sanitizing, pesticides, etc.)
- Electronic Waste
- Coal combustion residuals (fly ash and bottom ash/coal slag)
- Slag (Hazardous)
- Other

Suggested Uploads

- A waste inventory of all -hazardous waste streams generated at the facility.

What is the intent of the question?

The intent is to ensure facilities are aware of all hazardous waste types produced at the facility and track the quantity and disposal methods of each waste type.

Waste Data Reporting Questions (from Waste Section of FDM)

In the Waste Section of FDM you will be required to input waste disposal data for the applicable non-hazardous and hazardous waste sources selected in the Site section of the FDM.

IMPORTANT: The sources in the waste section are determined by the waste questions that you answered in the Site section. If there are sources at your facility that do not appear in this section, please go to the Site section waste questions and update the necessary selections.

Please complete the following questions to provide details on your monthly non-hazardous waste generation for each waste type during the reporting year. *(Ref ID - wstsourcenhtable)*

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To report non-hazardous waste data, you will be asked to complete a table with the following questions to provide tracking details and waste quantities for each applicable non-hazardous waste source.

- Description of waste steam
- What quantity of this waste stream did you generate during the reporting period?
- Unit of Measure
- Which method was used to track this waste stream?
- How was this waste disposed of?
    - **Note**: If the waste stream is disposed of using more than one method, please select the method that represents how the majority of the waste stream is disposed of and provide comments in the sub questions below.
- Describe your waste management and disposal processes for this waste stream.
- Upload a copy of the permit and/or any other documentation relevant to this waste stream.

Suggested Uploads

- A waste inventory of all non-hazardous waste streams generated at the facility.
- Waste quantity/disposal tracking records that show the quantity of wastes disposed of in the reporting year (e.g., waste manifests, internal tracking records)
- Documentation of the permit and/or any other documentation relevant to this waste stream (e.g., storage/disposal permits, licenses of waste transporter, treatment, and disposal facility, etc.)

What is the intent of the question?

The intent is to allow facilities to report the quantity and disposal methods of each waste type for the reporting period.

Technical Guidance:

Identifying all of the facility's waste streams and tracking waste quantities, provides facilities important information that can be used to identify opportunities to reduce waste and quantify these reductions.

Note: The guidance below also generally applies to hazardous waste management covered in the FDM question related to hazardous waste.

Creating a Waste Inventory:

Developing a waste inventory is an important first step in waste management. When establishing your waste tracking and reporting program, start by doing the following:

- Determine what types of waste are generated.
- Determine where (location and processes) waste is being generated.
- Establish procedures to collect and track waste data:
    - Examples include on-site scales, waste invoices/manifests, receipts for waste materials that are sold, etc.

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    - If estimation techniques are used to calculate the amount of waste, the methodology should be clearly defined and be supported by verifiable data.
- Record data (e.g., daily, weekly, monthly waste quantities) in a format that is easy to use and review such as Microsoft Excel.

Estimating Waste Quantity Data

In some cases, calculating annual waste quantities may require estimation. Any estimation methodology used should include documented and verifiable processes that includes details on the following:

- The calculation methodology and any data or assumptions used.
- Any production volume or facility operating data used in the calculations.
- Description of any updates or changes to the calculation methodology

Note: If an estimation technique is used, the methodology should be applied consistently and based on reasonable estimation factors that are derived from relevant data (e.g., actual weights of a representative sample of the waste).

An example of how waste quantity data can be estimated is provided below:

- A facility generates waste in barrels which are sealed when full and sent weekly for disposal. Weighing every barrel may not be possible. Therefore, the average weight of a full barrel can be determined by weighing a representative sample of barrels and then multiplying this average weight by the number of barrels disposed each week or month as shown below:
    - Average weight of a barrel = 25kg (based on representative weights of barrels from different days, months, production scenarios, etc.)
    - Number of barrels disposed of in 1 month = 65
    - Total waste for this source in 1 month = 1,625kg (25kg x 65 barrels)

- Similarly, the same methodology above could be used to estimate food or sanitary waste from a canteen or dormitory by collecting representative weight measurements of the average bag or bin and then multiplying the average weight by the number of bags or bins disposed of per month.

Note: Refer to the introduction section of the Waste Guidance for additional tips on establishing an effective tracking and reporting program.

Please complete the following questions to provide details on your monthly hazardous waste generation for each waste type during the reporting year. *(Ref ID - wstsourcehtable)*

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To report hazardous waste data, you will be asked to complete a table with the following questions to provide tracking details and waste quantities for each applicable hazardous waste source.

- Description of waste steam
- What quantity of this waste stream did you generate during the reporting period?
- Unit of Measure
- Which method was used to track this waste stream?
- How was this waste disposed of?
    - **Note**: If the waste stream is disposed of using more than one method, please select the method that represents how the majority of the waste stream is disposed of and provide comments in the sub questions below.
- Is this hazardous waste transporter, treatment, and disposal facility licensed and permitted?
- Upload a copy of the permit and/or any other documentation relevant to this waste stream
- Describe your waste management and disposal processes for this waste stream.

Suggested Uploads

- A waste inventory of all hazardous waste streams generated at the facility.
- Waste quantity/disposal tracking records that show the quantity of wastes disposed of in the reporting year (e.g., waste manifests, internal tracking records)
- Documentation of the permit and/or any other documentation relevant to this waste stream (e.g., storage/disposal permits, licenses of waste transporter, treatment, and disposal facility, etc.)

What is the intent of the question?

The intent is to allow facilities to report the quantity and disposal methods of each waste type for the reporting period.

Technical Guidance:

Identifying all of the facility's hazardous waste streams and tracking waste quantities, provides facilities important information to ensure compliance with applicable regulations and information that can be used to identify opportunities to reduce waste and quantify these reductions.

Note: The legal classification of hazardous waste may differ from one country or jurisdiction to another. Facilities should, at minimum, follow local regulatory requirements and definitions for classifying wastes as hazardous or non-hazardous.

Reporting Hazardous Waste Data in FDM

The guidance provided in the Technical Guidance above for non-hazardous wastes should also be applied to hazardous waste tracking and reporting.

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Estimating Waste Quantity Data
In most cases, local laws require the detailed tracking and reporting of hazardous waste quantities, however in some cases, calculating annual waste quantities may require estimation. Any estimation methodology used should include documented and verifiable processes that includes details on the following:

- The calculation methodology and any data or assumptions used.
- Any production volume or facility operating data used in the calculations.
- Description of any updates or changes to the calculation methodology

Note: If an estimation technique is used, the methodology should be applied consistently and based on reasonable estimation factors that are derived from relevant data (e.g., actual weights of a representative sample of the waste).

An example of how waste quantity data can be estimated is provided below:

- A facility disposes of empty chemical drums or full drums (containing liquid hazardous waste) Weighing every drum may not be possible. Therefore, the average weight of an empty or full drum can be determined by weighing a representative sample of drums and then multiplying this average weight by the number of drum disposed each week or month as shown below:
    - Average weight of a drum = 20kg (based on representative weights of drums from different days, months, production scenarios, etc.)
    - Number of drums disposed of in 1 month = 10
    - Total waste for this source in 1 month = 200kg (20kg x 10 drums)

- Similarity, the same methodology above could be used to estimate other hazardous waste quantities such as printing screens or fluorescent light bulbs.

Note: Refer to the introduction section of the Waste Guidance for additional tips on establishing an effective tracking and reporting program.

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