

TECHNICAL NOTES

A. Conceptual Framework

Compendium of Philippine Environment Statistics (CPES)

The compendium covers a core set of environment statistics which is grouped into six components namely: 1) environmental conditions and quality; 2) environmental resources and their use; 3) residuals; 4) extreme events and disasters; 5) human settlements and environmental health; and 6) environment protection, management, and engagement.

As described in Framework for the Development of Environment Statistics (FDES), Basic Set of Environment Statistics has been set up following a progression of three tiers, based on the level of relevance, availability, and methodological development of the statistics. Tier 1 is the core set of environment statistics that serve as an agreed and limited set of environment statistics that are of high priority and relevance to most countries. Tier 2 includes environment statistics which are of priority and relevance to most countries but require greater investment of time, resources, or methodological development. It is recommended that countries consider producing them in the medium-term. Tier 3 includes environment statistics which are either of lower priority or require significant methodological development. It is recommended that countries consider producing them in the long-term.

Component 3: Residuals

This component contains statistics on the amount and characteristics of residuals generated by human production and consumption processes, their management, and their final release to the environment. Residuals are flows of solid, liquid and gaseous materials, and energy, that are discarded, discharged, or emitted by establishments and households through processes of production, consumption, or accumulation. The impacts and effects of residuals on human and ecosystem health differ based on one's nature, scale, and environmental dynamics (*UN FDES, 2013*). There are four subcomponents under this component: emissions to air, generation and management of wastewater, generation and management of waste, and release of chemical substances.

Statistics compiled under this component may help provide indicators to achieve the following Sustainable Development Goals (SDGs): SDG 2 - to end hunger, achieve food

security and improved nutrition, and promote sustainable agriculture, SDG 6 - to ensure availability and sustainable management of water and sanitation for all, SDG 9 - to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation, SDG 11 - to make cities and human settlements inclusive, safe, resilient and sustainable, SDG 12 - to ensure sustainable consumption and production patterns, and SDG 13 - to take urgent action to combat climate change and its impacts.

Subcomponent 3.1: Emissions to Air

Emissions to air are gaseous and particulate substances released to the atmosphere. This subcomponent covers the sources and quantities emitted by substance. The statistics on emissions to air can be used to define the maximum allowable level of emission as well as to inform the impacts of air pollution to humans.

There are three topics under this subcomponent. First is the emissions of greenhouse gases (GHGs) which includes statistics on both direct and indirect GHGs. The most essential direct GHGs are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), and the most essential indirect GHGs are sulphur dioxide (SO₂), nitrogen oxides (NO_x), and non-methane volatile organic compounds (NM-VOCs).

The second topic is the consumption of ozone depleting substances (ODSs) which covers statistics on Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Halons, Methyl chloroform, Carbon tetrachloride, Methyl bromide, and other ODS. The statistics reported worldwide have shown that the Montreal Protocol, which monitors ODS, has been very effective in phasing out the use of these substances.

The last topic for this subcomponent is the emissions of other substances. This involves particulate matters that can be harmful beyond the potential impact of dust, heavy metals (such as cadmium, lead and mercury), and other substances that are linked to environmental and health problems.

Subcomponent 3.2: Generation and Management of Wastewater

Wastewater is discarded water that is no longer needed by the owner or user. This subcomponent covers statistics on the generation, management, discharge, and pollutant content of wastewater. The statistics on wastewater are used to assess the volume of wastewater and levels of pollution which helps to properly manage the potentially harmful by-product of the human subsystem.

There are three topics under this subcomponent. First is the generation and pollutant content of wastewater. This includes statistics on the volume of water that is no longer required, thus discarded by the user and statistics on the amount of pollutants contained in wastewater before collection. The generation of wastewater is usually estimated based on the volume of water used.

The second topic is the collection and treatment of wastewater which may be treated before being discharged or directly discharged to the environment. This may involve statistics that describe the volume of water collected and transferred to treatment facilities or final place of discharge, volume of water treated by type of treatment (primary, secondary, and tertiary), and physical infrastructure related to wastewater collection and treatment such as number of treatment plants and their capacities. The pollutant content extracted in the treatment facilities and other relevant information may also be described by the statistics compiled under this topic.

The third and last topic for this subcomponent is the discharge of wastewater to the environment which captures information at the stage of final discharge of wastewater to the environment. This involves statistics on the total volume of wastewater discharged to the environment without treatment and after treatment. This may be by type of treatment and type of treatment facility (public, private, municipal, and industrial) and statistics on pollutant content of discharged wastewater.

Subcomponent 3.3: Generation and Management of Waste

Waste includes discarded materials, in solid or liquid state, that are no longer needed by the owner or user. This subcomponent covers statistics on the amount and characteristics of waste. A sustainable production, consumption, and management of natural resources are vital to reduce the waste generated by human activities and increase the waste that is being recycled or reused. This statistics helps in planning for the future management of waste and it is also needed to develop strategies to encourage waste reduction through reuse and recycling.

There are two topics under this subcomponent. First is the generation of waste which describes the amount of waste generated according to the type of waste and the generator. Another statistics is the amount of hazardous waste generated. Hazardous waste is a special group of waste that requires special management due to its toxic character. The amount of generated waste can be estimated with high reliability when the waste management system is well developed.

The last topic for this subcomponent is the management of waste which contains statistics on the amount of waste collected and transferred to treatment facilities or to their final disposal, amount of waste treated and disposed by type of treatment and disposal, the number and capacity of treatment and disposal plants and other relevant information. Relevant statistics such as the amount of recycled waste, imports and exports of waste and imports, and exports of hazardous waste may come from waste collection systems, treatment and disposal facilities operated by public or private companies that provide service for the waste generator.

Subcomponent 3.4: Release of Chemical Substances

This subcomponent is a special category which results from the dissipative uses of products that are released to the environment as part of production processes. Dissipative losses are material residues that are indirect result of production and consumption activity.

The release of chemical substances is a topic that deals with chemical fertilizers to enrich spoils and to protect plants and animals from disease. The statistics under this topic include the amount of natural and chemical fertilizers, pesticides and other chemicals (hormones and pellets) used by type of active ingredients, the area under application, and the method employed. These are used as a basis for estimating the chemicals which affect the environmental quality. These statistics are also found in Subcomponent 2.5: Biological Resources.

B. Concepts and Definitions

Indicators/Terms/Concepts	Definition
Carbon Dioxide	It is a colorless, odorless, and nonpoisonous gas resulting from fossil fuel combustion. It is normally a part of ambient air and produced in the respiration of living organisms (plants and animals) and considered to be the main greenhouse gas contributing to climate change. <i>(UN Environment Glossary Updated Web Version 2001)</i>
Controlled dump	It is the disposal site at which solid waste is deposited in accordance with the minimum prescribed

	standards of site operation. <i>(RA No. 9003 “Ecological Solid Waste Management Act of 2000”)</i>
Direct GHG emissions	These are emissions from sources that are owned or controlled by the reporting entity. <i>(Greenhouse Gas Protocol)</i>
Disposals of waste	These are waste elimination techniques comprising landfills, containment, underground disposal, dumping at sea, and all other disposal methods. <i>(UN Environment Glossary Updated Web Version 2001)</i>
Dissipative losses	These are material residues that are an indirect result of production and consumption activity. <i>(FDES Glossary, 2013)</i>
Dissipative uses of products	This covers products that are deliberately released to the environment as part of production processes. <i>(FDES Glossary, 2013)</i>
Dump	It is a site used to dispose of solid wastes without environmental controls. <i>(UN Environment Glossary Updated Web Version 2001)</i>
Emissions	These are substances released to the environment by establishments and households as a result of production, consumption and accumulation processes. <i>(FDES Glossary, 2013)</i>
Emissions to Air	These are gaseous and particulate substances released to the atmosphere by establishments and households as a result of production, consumption and accumulation processes. <i>(FDES Glossary, 2013)</i>
Greenhouse Gases	These are gases such as carbon dioxide, methane, and oxides of nitrogen, chlorofluorocarbons, and others that can potentially or reasonably be expected to induce global warming. <i>(RA No. 8749 “An Act Providing for a Comprehensive Air Pollution Control Policy and for other Purposes”)</i>

Hazardous wastes	These are wastes that, owing to their toxic, infectious, radioactive or flammable properties pose a substantial actual or potential hazard to the health of humans and other living organisms and the environment. <i>(Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997)</i>
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Hazardous waste treatment	This comprises two categories, which can be distinguished as physical hazardous waste treatment—an approach including phase separation such as through lagooning, filtration or centrifugation, and solidification into hard material allowing for landfill disposal—and thermal hazardous waste treatment—high temperature oxidation of wastes that converts them into gases and solid residues. <i>(UN Environment Glossary Updated Web Version 2001)</i>
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Hydrochlorofluorocarbons	These are compounds used as replacements for chloro—fluorocarbons (CFCs) in refrigeration because they are less active ozone depleters. <i>(Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997)</i>
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Hydrofluorocarbon emissions	These are a series of synthetic gases containing carbon, hydrogen and fluorine. The main sources of HFC emissions from industrial processes and industrial product use include emissions arising from foam blowing and the use of HFCs as a cover gas in metal production. <i>(Canada, Greenhouse Gas Emissions Report, 2008)</i>
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Indirect GHG emissions	These are emissions that are a consequence of the activities of the reporting entity but have occurred at sources owned or controlled by another entity. <i>(Greenhouse Gas Protocol)</i>
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Methane	It is a colorless, nonpoisonous, and flammable gaseous hydrocarbon created by anaerobic decomposition of organic compounds. It is a potent greenhouse gas. <i>(UN Environment Glossary Updated Web Version 2001)</i>
Methyl Bromide	It is an odorless, colorless gas used to control a wide variety of pests in agriculture and shipping, including fungi, weeds, insects, nematodes (or roundworms), and rodents. <i>(United States Environmental Protection Agency)</i>
Nitrous Oxide	It is a relatively inert oxide of nitrogen produced as a result of microbial action in the soil, use of fertilizers containing nitrogen, burning of timber, and so forth. This nitrogen compound may contribute to greenhouse and ozone-depleting effects. <i>(UN Environment Glossary Updated Web Version 2001)</i>
Open dump	It is a disposal area wherein the solid wastes are indiscriminately thrown or disposed of without due planning and consideration for environmental and health standards. <i>(RA No. 9003 "Ecological Solid Waste Management Act of 2000")</i>
Ozone depleting substances	These are chemicals that destroy the earth's protective ozone layer. <i>(Department of the Environment and Energy, Australian Government)</i>
Residuals	These are flows of solid, liquid and gaseous materials, and energy, that are discarded, discharged or emitted by establishments and households through the processes of production, consumption or accumulation. <i>(FDES Glossary, 2013)</i>
Sanitary landfill	It is a waste disposal site designed, constructed, operated, and maintained in a manner that exerts engineering control over significant potential environmental impacts arising from the development

	and operation of the facility. <i>(RA No. 9003 “Ecological Solid Waste Management Act of 2000”)</i>
Solid waste	This is all discarded household, commercial waste, non hazardous institutional and industrial waste, street sweepings, construction debris, agricultural waste, and other nonhazardous and nontoxic solid waste. <i>(RA No. 9003 “Ecological Solid Waste Management Act of 2000”)</i>
Solid waste management facility	This refers to any resource recovery system or component thereof; any system, program, or facility for resource conservation; any facility for the collection, source separation, storage, transportation, transfer, processing, treatment, or disposal of solid waste. <i>(RA No. 9003 “Ecological Solid Waste Management Act of 2000”)</i>
Treatment, Storage, and Disposal Facilities	These are the facilities where hazardous wastes are transported, stored, treated, recycled, reprocessed, or disposed of. <i>(DENR Administrative Order 2013-22)</i>
Waste	This covers discarded materials that are no longer required by the owner or user. <i>(FDES Glossary, 2013)</i>
Wastewater	This is discarded water that is no longer required by the owner or user. <i>(FDES Glossary, 2013)</i>
Waste Management	This includes collection, transport, treatment, and disposal of waste; control, monitoring, and regulation of the production, collection, transport, treatment, and disposal of waste; and prevention of waste production through in-process modifications, reuse, and recycling. <i>(UN Environment Glossary Updated Web Version 2001)</i>

C. Concepts and Definitions

Following the structure and statistics listed in the FDES, data available within the national statistical system were identified and requested from data source agencies or gathered from statistical publications. The collected data are checked for consistency and formatted into statistical tables. The data for Component 3 of the CPES were obtained from the following:

Data Item	Source
Emissions to Air	
<ul style="list-style-type: none"> ● Total emissions of direct greenhouse gases (GHGs) by gas: <ul style="list-style-type: none"> -Carbon dioxide (CO₂) -Methane (CH₄) -Nitrous oxide (N₂O) -Hydrofluorocarbons (HFCs) 	2010 Philippine Greenhouse Gas Inventory Report, Climate Change Commission
<ul style="list-style-type: none"> ● Consumption of ozone depleting substances (ODSs) by substance: <ul style="list-style-type: none"> -Hydrochlorofluorocarbons (HCFCs) -Methyl Bromide 	Environmental Management Bureau, Department of Environment and Natural Resources
Generation and Management of Wastewater	
<ul style="list-style-type: none"> ● Volume of wastewater generated, collected and treated by type (primary, secondary, tertiary) 	Maynilad Water Services, Inc., Manila Water Company, Inc.
<ul style="list-style-type: none"> ● Total volume of wastewater discharged to the environment without treatment and after treatment 	
Generation and Management of Waste	
<ul style="list-style-type: none"> ● Projection of waste generation by region 	Environmental Management Bureau, Department of Environment and Natural Resources
<ul style="list-style-type: none"> ● Amount of generated hazardous waste by region, by type 	
<ul style="list-style-type: none"> ● Number of solid wastes disposal facilities by region, by type 	
<ul style="list-style-type: none"> ● Amount of treated hazardous waste by region, by type 	
<ul style="list-style-type: none"> ● Number of registered treatment, storage and disposal facilities by region 	

D. Statistical Tables

- Table 3.1 Philippine Greenhouse Gas Emissions, 2010
- Table 3.2 Consumption of Ozone Depleting Substance, 2010 to 2019
- Table 3.3 Generation and Management of Wastewater, 2010 to 2019
- Table 3.4 Projection of Waste Generation by Region, 2010 to 2019
- Table 3.5 Amount of Generated Hazardous Waste by Region and by Type, 2010 to 2019
- Table 3.6 Number of Solid Waste Disposal Facilities by Region and by Type, 2010 to 2019
- Table 3.7 Amount of Generated Hazardous Waste by Region and by Type, 2010 to 2019
- Table 3.8 Number of Registered Treatment, Storage, and Disposal (TSD) Facilities by Region, 2010 to 2019

References

- Department of the Environment and Energy (2018). Ozone Depleting Substances. Available from <https://www.environment.gov.au/system/files/resources/07641a0e-f804-47d0-886b-ee36e7181586/files/factsheet-ozone-depleting-substances.pdf>
- National Solid Waste Management Commission (2014). "In the Philippines, the Solid Waste Management Division (SWMD) of the EMB is the primary office in charge of implementing Republic Act No. 9003 or the Ecological Solid Waste Management Act of 2000"
- United Nations (2013). Framework for the Development of Environment Statistics 2013. Sales No. 14.XVII.9. Available from <https://unstats.un.org/unsd/environment/fdes/FDES-2015-supporting-tools/FDES.pdf>
- United Nations (2008). Greenhouse Gas Emissions Report. Available from <https://unstats.un.org/unsd/environment/Censuses%20and%20Surveys/Canada,%20Greenhouse%20Gas%20Emissions%20Report,%202008.pdf>
- United Nations (1997). Glossary of Environment Statistics. Available from https://unstats.un.org/unsd/publication/seriesf/seriesf_67e.pdf
- United States Environmental Protection Agency. Phaseout of Ozone-Depleting Substances. Available from <https://www.epa.gov/ods-phaseout/methyl-bromide>