v01.00.000

Generic

Short name

Water consumption; for process; 1L; EU-27

Complete name

Water consumption; for process; consumption mix, at consumer; 1L; Europe, EU-27

Ecobilan identifier

CODDE-2978

External identifier

4914bea1-7535-4c8f-ab6a-1322e219515f

Version

01.00.000

Internal reference

d4dd6b7a-41c6-458b-93ad-69907ba302ce

Type

Material

Process with material

No

Configurable dataset

No

Date of availability

2024 10 15

Category

Water

Activity Type

Not applicable

Sectors

Information | Impact indicators | Inputs/Outputs

Process information

Description

This data set represents the production of 1 kg of water used for industrial processes. It represents average operation of conventional treatment for the production of tap water with a conventionnal deionization. This LCI data set includes: water pumping (from surface and ground water), treatment, storage and transport to the consumer. Conventional treatment for drinking water includes: coagulation, decantation, flocculation, sedimentation, filtration and disinfection. Conventionnal deionization is carried out by ion exchange. The water consumption mix in Europe is based on surface and ground water withdrawal per country given by AQUASTAT (reference year: 2020): 18.29% Italy, 16.0% Spain, 14.28% France, 13.28% Germany, 5.5% Greece, 4.71% Poland, 4.51% Netherlands, 3.49% Romania, 3.33% Portugal, 2.76% Bulgaria, 2.54% Hungary, 2.28% Belgium, 1.9% Austria, 1.63% Finland, 1.35% Sweden, 0.84% Ireland, 0.74% Czechia, 0.54% Slovenia, 0.53% Denmark, 0.46% Estonia, 0.36% Croatia, 0.30% Slovakia, 0.15% Cyprus, 0.11% Lithuania, 0.08% Latvia, 0.02% Luxembourg, 0.02% Malta. Water losses within the network are included (estimated to 20%). The treatment of water after consumption is not included.

Dataset key information

Synonymes

[0:100] [100:0]

General comment on dataset

The majority of water consumed in the world comes from a water distribution network to satisfy residential, commercial and industrial requirements. In the CODDE® database, we distinguish 3 types of water consumption: water for drinking, water for process and ultrapure water for process. These LCI data sets include: water pumping (from surface and ground water), treatment, storage and transport to the consumer. Water treatment varies depending on the level of purity expected. Water for drinking includes coagulation, decantation, flocculation, sedimentation, filtration, and disinfection. Water for process includes an additional step: deionization. Ultrapure water for process includes a more advanced deionization step. Ultrapure water is reserved to industries with high requirements such as microelectronics and pharmaceutical industries. Note 1: Water consumed directly from the natural environment without pretreatment is not studied in the CODDE® database. Note 2: The treatment of water after consumption is not included. To complete your LCA model, you need to add a water treatment.

Treatment, Standards, Routes

For process

Quantitative product or process properties

1 kg of water

Mix and location types

Consumption mix, at consumer

Other content

-

CAS number

Not applicable

Process information
Description
Dataset key information
Quantitative reference
Time representativeness
Geographical representativeness
Technological representativeness
End of life characteristics
Physical characteristics
Modeling and validation
LCI method and allocation
Data sources, treatment and representativeness
Completeness
Validation
Compliance
Data Quality Ranking
Administrative information
Commissioner and objective
Creator / Modeler of the dataset
Data entry by
Publication and ownership

Quantitative reference

Reference flow (category)

Product flow / Materials production / Water

Reference flow

water; de-ionised

Reference weight in kg

1.0

Functional unit

Produce 1 kg of water

Time representativeness

Reference year

2020

Validity of the data set

2030

Description of the temporal representativity

The main environmental aspect of this data set is the electricity production required to operate the water treatment plant. The reference year for electricity is 2020.

Geographical representativeness

Location

EU-27

Description of the geographical representativeness

The water is collected, treated and distributed in Europe.

Technological representativeness

Pictogram of technology

-

Flow diagram or picture

-

Description of the technology and process included

This LCI data set includes: water pumping (from surface and ground water [1]), treatment, storage and transport to the consumer. Conventional treatment for drinking water includes coagulation, decantation, flocculation, sedimentation, filtration and disinfection. Conventionnal deionization is carried out by ion exchange. LCI model includes energy inputs (electricity, diesel, heat) and chemicals substances (flocculation (aluminium sulfate, iron sulfate, polyacrylamide); filtration (silica sand, activated carbon); disinfection (oxygen, chlorine); softener (sodium hydroxide, sodium silicate, sodium tripolyphos)) required for a conventional water treatment plant. Water losses within the network is included (estimated to 20% [2]). The lost water returns to nature without treatment. Inventory was constructed from reported chemicals and energy inputs from European conventional plants ([3], [4], [5], [10], [11]). The main environmental aspect of this data is the electricity production required to operate the water treatment plant (average energy input, excluding water losses: ~0.4 kWh/m3 for drinking water (without desalination), ~6 kWh/m3 for process water and ~8.4 kWh/m3 for process ultrapure water).

Technological applicability

Process water is water that has been purified. Process water is used when drinking water (or top water) may adversely affect the mechanical or biological operation of industrial systems. This water is used for example for the maintenance of industrial machines and cooling systems.

End of life characteristics

Potential recyclability for dismantling (range 0 to 1)

0.0

Energy recovery potential for grinding (interval from 0 to 1)

0.0

Specific end-of-life treatment

false

Energy recovery potential for dismantling (range 0 to 1)

0.0

Potential recyclability for grinding (range 0 to 1)

0.0

Comments and advice

Physical characteristics

Lower heating value (MJ/kg)

Dimensions

Loss rate (%)

0.0 | - | 0.0

Renewable percentage (%)
0.0

Recycled content percentage (%)
0.0

Biogenic carbon content (kg)
0.0

Modeling and validation

LCI method and allocation

Type of dataset
Unit process black box

LCA methodology report

Principle of the LCI method
attributional

Deviations from the principle of the LCI method
None

LCI method approach
Allocation – mass

Deviations from the LCI method approach
None

Modeling constant
None

Deviations from the modeling constants
None

Data sources, treatment and representativeness

Principle of data cutoff and completeness
Cut-off rules for each unit process: Coverage of at least 95% of mass and energy of the input and output flows, and 98% of their environmental relevance (according to expert judgement). The water pumping from sea water is not considered in the LCI data set model.

Deviations from data cut off and completeness principles
None

Principles of data treatment and extrapolation
All data treated balancing with their contribution

Deviations from data treatment and extrapolations principles
None

Data selection and combination principles
All data selected and balancing with their contribution to the data set

Deviations from data selection and combination principles
None

Sampling procedure
Not applicable

Uncertainty adjustments
Not studied

Annual supply or production volume

Percentage of supply or production covered (%)
-

Data handling report
Documentation recorded in the LCIE Bureau Veritas' Quality System.

Data collection period
2024

Use advice for data set
The treatment of water after consumption is not included. To complete your LCA model, you need to add a water treatment.

Data sources used for this dataset
This data set is based on the expertise of LCIE Bureau Veritas in the industrial sector (including energy, transport, electrical, electronics, digital services), statistic data and literature. Additional sources: [1] AQUASTAT Dissemination System, Reference year: 2020 [2] Eaufrance, Water losses, Reference year 2015 [3] "Life Cycle Assessment of water treatment: what is the contribution of infrastructure and operation at unit process level?", ScienceDirect 2013 [4] "LCA of municipal wastewater treatment", ScienceDirect 2023 [5] Life cycle assessment of ultrapure water plant in semiconductor industry (Supandy, 2009) [6] OCDE, Treatment connection rate, Reference

year 2020 [7] European Environment Agency, Urban Waste Water Treatment map, Reference year 2020 [8] Wikipedia, General definitions [9] World Health Organization, Key facts of drinking water, Refrence year 2022 [10] Ultrapure Water Production, ScienceDirect 2019 [11] Evaluación ambiental de la integración de procesos de producción de agua con sistemas de producción de energía, 2009

Completeness

Product model completeness

All relevant flows quantified. The model is considered particularly complete. The energy consumption of the water treatment plant is modeled with the country's electricity production mix. The withdrawal flows (surface water and groundwater) are regionalized (allows to take into account the water stress of each country - influences the Water Use indicator). The desalination is taken into account for the countries with a withdrawal >1.5% of the total flow (concerned countries for CODDE® database: Algeria, Spain and China).

Completeness

All relevant flows quantified

Per Topic	Topic	Completeness
	Climate change	All relevant flows quantified
	Ozone depletion	All relevant flows quantified
	Summer smog	All relevant flows quantified
	Eutrophication	All relevant flows quantified
	Acidification	All relevant flows quantified
	Human toxicity	All relevant flows quantified
	Freshwater eco-toxicity	All relevant flows quantified
	Seawater eco-toxicity	All relevant flows quantified
	Terrestric eco-toxicity	All relevant flows quantified
	radioactivity	All relevant flows quantified
	Land use	No statement
	Non renewable material resource depletion	All relevant flows quantified
	Renewable material resource consumption	All relevant flows quantified
	Non renewable primary energy depletion	All relevant flows quantified
	Renewable primary energy consumption	All relevant flows quantified
	Particulate matter respiratory inorganics	All relevant flows quantified
	Species depletion	No statement
	Noise	No statement

Validation

General Review

-

Compliance

Compliance

System name
ISO 14040/44/67

Overall approval
Fully compliant

Review
Fully compliant

Nomenclature
Fully compliant

Documentation
Fully compliant

Methodological
Fully compliant

Quality
Not defined

System name
ILCD Data Network Entry Level

Overall approval
Fully compliant

Review
Fully compliant

Nomenclature
Fully compliant

Documentation
Fully compliant

Methodological
Fully compliant

Quality
Not defined

System name
PEP ecopassport® PCR ed3

Overall approval
Fully compliant

Review
Not defined

Nomenclature
Not defined

Documentation
Not defined

Methodological
Fully compliant

Quality
Not defined

System name
PEP ecopassport® PCR ed4

Overall approval
Fully compliant

Review
Not defined

Nomenclature
Not defined

Documentation
Not defined

Methodological
Fully compliant

Quality
Not defined

Data Quality Ranking

Overall Data Quality
2.0

Completeness
2.0

Methodological appropriateness and consistency
2.0

Time representativeness
2.0

Technological representativeness
2.0

Geographical representativeness
1.0

Parameter uncertainty
3.0

Administrative information

Commissioner and objective

Commissioner of dataset
LCIE Bureau Veritas

Project
CODDE® database

Intended applications
Dataset intended for use in the EIME software for carrying out Life Cycle Assessment (ISO 14040/44), Product Carbon Footprint (ISO 14067), and environmental product declaration (ISO 14025).

Creator / Modeler of the dataset

Dataset generator modeler
Damien PRUNEL

Data entry by

Data entry by
Damien PRUNEL

Converted original data set from

Official approval of data set by producer operator

Not applicable. Original data developped by LCIE Bureau Veritas.

Damien PRUNEL

Publication and ownership

Workflow and Publication Status

Data set finalised; entirely published

Copyright

Yes

Date of last revision

Thu, 22 Aug 2024

Registration authority

LCIE Bureau Veritas

Provider

LCIE Bureau Veritas

License type

License fee

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