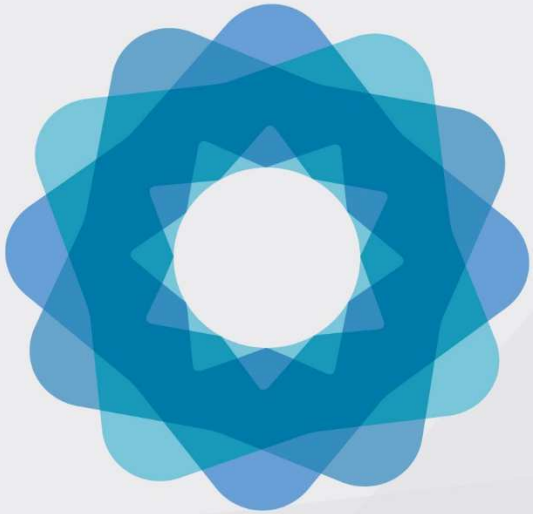

System of Environmental Economic Accounting

System of Environmental Economic Accounting

SEEA – Water Supply and use in physical terms

UNSD

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United Nations

Outline

- Types of SEEA – Water Accounts
- SEEA – Physical Water Flow Accounts (PWFA)

- What are physical supply and use tables for water ?
- Why compile physical supply and use tables for water ?
- Structure of the water PSUT
- How to record data in the water PSUT ?
- Hybrid tables
- Examples from the Dutch water accounts

SEEA – type Water Accounts

- Physical flow accounts: describe the physical flows of water (like energy or MFA) between the economy and the environment and within the economy
- Physical Stock Accounts: describe opening and closing stocks and changes therein during the accounting period of environmental assets
- Water Emission Accounts
- Hybrid Water Accounts
- Valution of Water Resources
- Water in Ecosystem Accounts

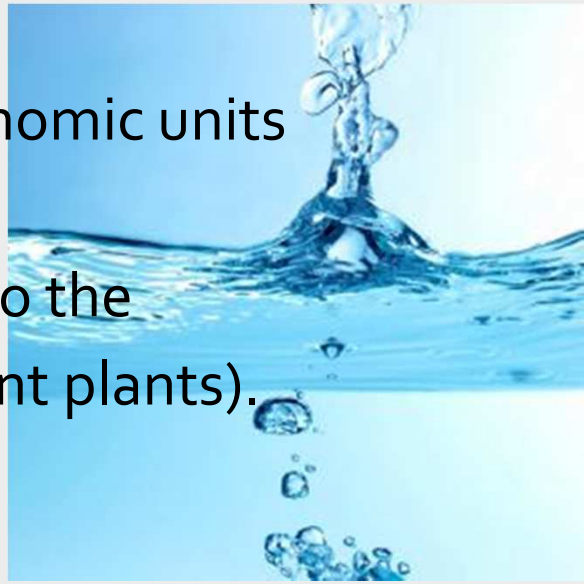
SEEA Central Framework

- Multi-purpose framework that describes the interaction between the economy and the environment
- Satellite account to the SNA:
  - Departs from same principles, definitions and classifications (e.g. residence)
  - Extensions/modifications:
    - Extended asset boundary
    - Classifications by purpose
    - Accounting in physical terms
    - Etc.
- SEEA integrates various types of statistics: economic statistics; energy and environment statistics

Physical Supply Use Tables for Water Overview

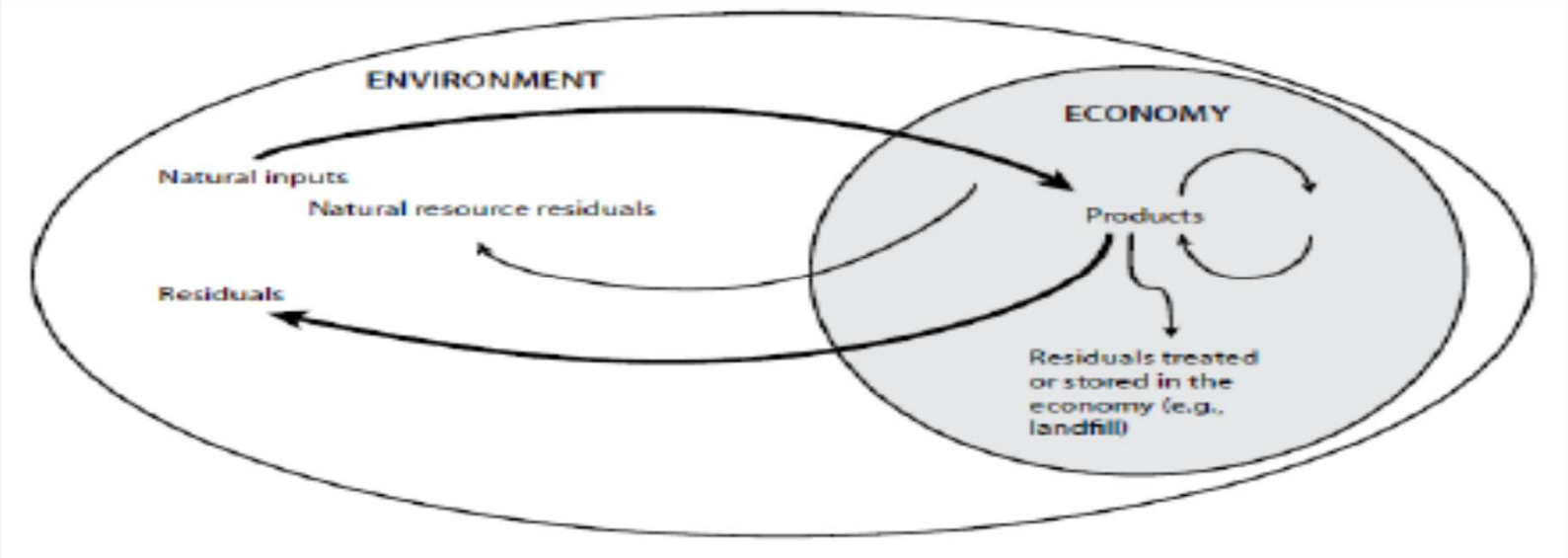
The ***Physical Supply and Use Tables*** (PSUT) measure;

1) The flows of water (i.e. volume) entering the economy, which are either abstracted from the environment or imported;
2) The flows of water between different economic units within the economy
3) Return flows of water from the economy to the environment (often via sewerage treatment plants).

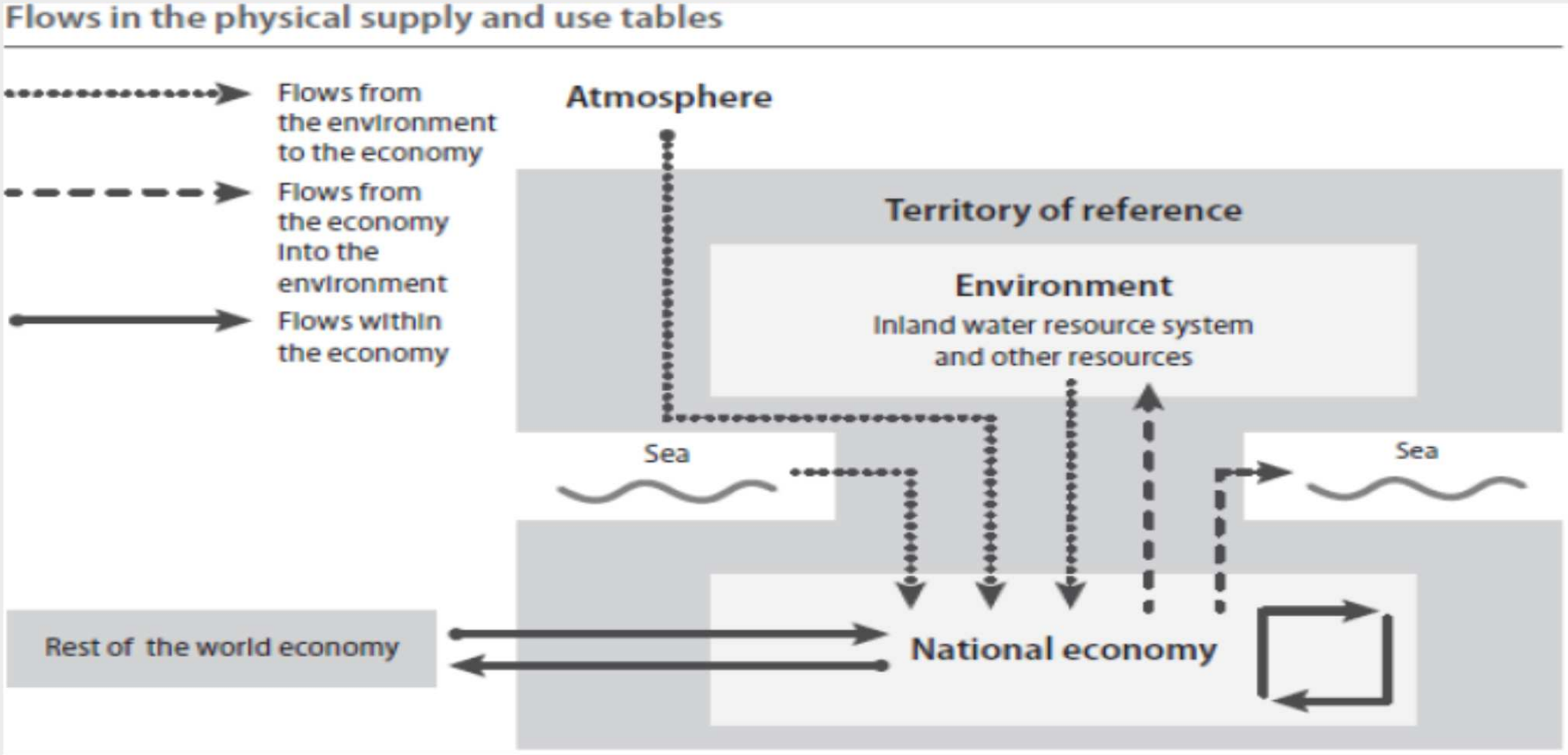


Physical flow in relation to the economy

Monitoring water flows



Physical Supply Use Tables for Water Overview



Flows from environment to economy

Water abstraction

Public water supply

Flows within the economy

industries

households

Flows from economy to environment

Sewerage

Why compile PSUT for water ?

PSUT are important because :

- They allow assessment and monitoring of the pressure on water quantities exerted from the environment
- They enable the identification of the economic agents responsible for the abstraction, use, and discharge of water into the environment
- They allow evaluation of alternative options for reducing water pressure
- In combination with monetary information on value added, indicators of water use intensity and productivity can be calculated.

Scope of PSUT for water

- The **inland water system** comprises of surface water (rivers, lakes, artificial reservoirs, snow, ice, glaciers), groundwater and soil water within the territory of reference.
- The PSUT records the abstraction of water from the inland water system, (and seas and oceans) by economic units; the distribution and use of this water by various economic units; and the returns of water to the inland water system and seas and oceans.
- Flows such as the evaporation of water from lakes and artificial reservoirs and flows between water bodies are considered flows within the environment and are recorded in the asset accounts (and not on PSUT)

Physical Supply-Use Tables (PSUT)

- **Columns:** industries (ISIC), households, the Rest of the world, flows to / from the environment

- **Rows:** five sections that organize information on

  (i) the abstraction of water from the environment;

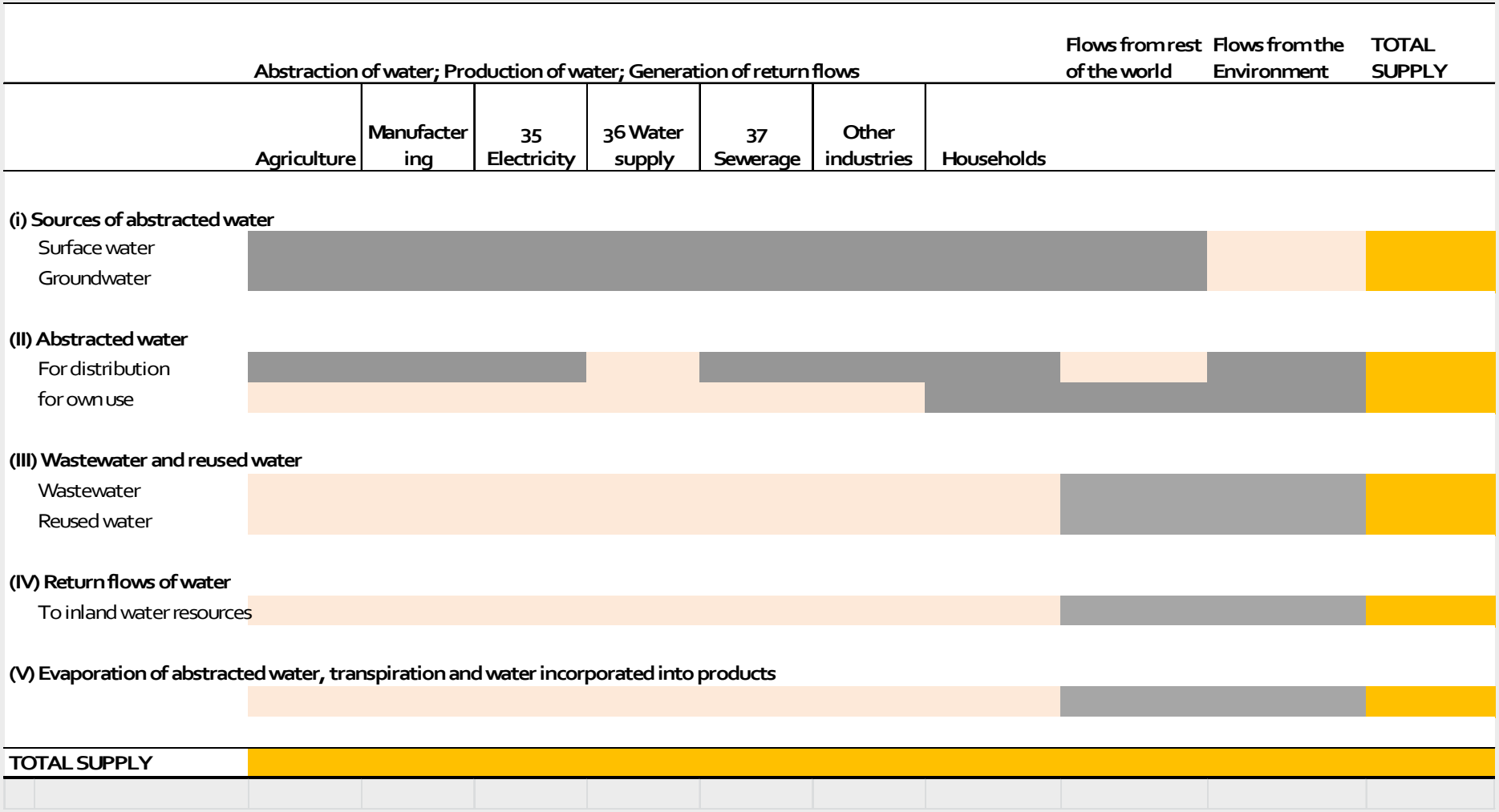
  (ii) the distribution and use of abstracted water across enterprises and households;

  (iii) flows of wastewater and reused water (between households and enterprises);

  (iv) return flows of water to the environment;

  (v) evaporation, transpiration and water incorporated into products.

Supply table



Use table

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows from rest of the world	Flows to the Environment	TOTAL USE
	Agriculture	Manufacturing	35 Electricity	36 Water supply	37 Sewerage	Other industries	Households			
(I) Sources of abstracted water										
Surface water										
Groundwater										
(II) Abstracted water										
Distributed water										
fow own use										
(III) Wastewater and reused water										
Wastewater										
Reused water										
(IV) Return flows of water										
To inland water resources										
(V) Evaporation of abstracted water, transpiration and water incorporated into products										
TOTAL USE										

Physical Supply Use Tables for Water Components

The SEEA – Central Framework PSUT for Water is divided into five components:

i) the abstraction of water from the environment;

ii) the distribution and use of abstracted water across enterprises and households;

iii) flows of wastewater and reused water (between households and enterprises);

iv) return flows of water to the environment and;

v) evaporation, transpiration and water incorporated into products.

1. Water abstraction

- **Abstraction** is defined as the amount of water that is removed from any source, either permanently or temporarily, in a given period of time.
- The abstraction of water is recorded in the **supply table** as being supplied by the environment.
- The same volume of water is recorded in the **use table**, "Sources of abstracted water", by the industry that undertakes the abstraction.
- Water may be abstracted from artificial reservoirs, rivers, lakes, groundwater and soil water.
- The capture of precipitation via, for example, the capture of water from the roofs of houses in water tanks, is recorded as abstraction via precipitation.
- **Abstraction of soil water** refers to the uptake of water by plants and is equal to the amount of water transpired by plants plus the amount of water that is embodied in the harvested product.

1. Water abstraction

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(i) Sources of abstracted water									
Surface water								20	20
Groundwater								100	100

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(I) Sources of abstracted water									
Surface water	20								20
Groundwater				100					100

2. Distribition and use of abstracted water

- Water that has been abstracted must either be a) used by the same economic unit which abstracts it (referred to as **abstracted water for own use**), or b) be distributed, possibly after some treatment, to other economic units (referred to as **abstracted water for distribution**).
- Part (ii) of the supply table, "Abstracted water", shows the supply of abstracted water by the industries undertaking the abstraction with the differentiation as to whether the water is for own use or for distribution.
- The use of this water is shown in part (ii) of the use table where the water available for use is shown as the intermediate consumption of industries, the final consumption of households or exports to economic units in the rest of the world.

2. Distribition and use of abstracted water

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(II) Abstracted water									
For distribution				90					90
for own use	20								20

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(II) Abstracted water									
Distributed water		30					60		90
fow own use	20								20

3. Flows of waste water and reused water

- **Wastewater** is discarded water that is no longer required by the owner or user.
- Wastewater can be discharged directly into the environment (in which case it is recorded as a return flow), supplied to a sewerage facility (ISIC 37) (recorded as wastewater to sewerage), or supplied to another economic unit for further use (reused water).
- In situations where wastewater flows to a treatment facility or is supplied to another economic unit, flows of water are recorded in part (iii) of the supply table, "Wastewater and reused water" and part (iii) of the use table.
- **Reused water** is wastewater supplied to a user for further use with or without prior treatment, excluding the reuse (or recycling) of water within economic units.

3. Flows of waste water and reused water

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(III) Wastewater and reused water									
Wastewater		20					40		60
Reused water									

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(III) Wastewater and reused water									
Wastewater					60				60
Reused water									

4. Return flows of water to the environment

- **Return flows of water** comprise all water that flow from an economic unit directly to inland water resources, the sea or to the land.
- In some cases these flows will comprise flows of wastewater direct to the environment from industries and households – i.e. flows of wastewater not sent to treatment facilities. In other cases these flows will comprise flows of water from treatment facilities following treatment.
- In the **supply table** these flows are shown as being supplied by the various industries and households either to the inland water system or to other sources, including the sea.
- Corresponding volumes of water are recorded in part (iv) of the **use table**, with the flows shown as being received by the environment.

4. Return flows of water to the environment

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(IV) Return flows of water									
To inland water resources					60				60

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(IV) Return flows of water									
To inland water resources								60	60

5. Evaporation of abstracted water, transpiration and water incorporated into products

- To fully account for the balance of flows of water entering the economy through abstraction and returning to the environment as return flows of water, it is necessary to record ***three*** additional physical flows:
- Flows of **evaporation** are recorded when water is distributed between economic units after abstraction, for instance during distribution via open channels or while in water storage tanks and similar structures.
- The **transpiration of water** occurs when soil water is absorbed by cultivated plants as they grow and is subsequently released to the atmosphere.
- Amounts of **water incorporated into products** (e.g. water used in the manufacture of beverages) is shown as supplied by the relevant industry, commonly a manufacturing industry.

→ Also Know as '***water consumption***' in SEEA – Water

5. Evaporation of abstracted water, transpiration and water incorporated into products

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(V) Evaporation of abstracted water, transpiration and water incorporated into products	20	10	0	10	0	0	20		60

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(V) Evaporation of abstracted water, transpiration and water incorporated into products								60	60

TOTAL

Rows: supply = use

Columns: Input = output

Physical supply table for water

	Abstraction of water; Production of water; Generation of return flows							Flows from the Environment	Total supply
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(i) Sources of abstracted water									
Surface water								20	20
Groundwater								100	100
(II) Abstracted water									
For distribution				90					90
for own use	20								20
(III) Wastewater and reused water									
Wastewater		20					40		60
Reused water									
(IV) Return flows of water									
To inland water resources					60				60
(V) Evaporation of abstracted water, transpiration and water incorporated into products									
	20	10	0	10	0	0	20		60
TOTAL SUPPLY	40	30	0	100	60	0	60	120	410

Physical use table for water

	Abstraction of water; Intermediate consumption; Return flows						Final consumption	Flows to the Environment	Total use
	1 Agriculture	10 Food industry	35 Electricity	36 Water supply	37 Sewerage	49 Transport	Households		
(I) Sources of abstracted water									
Surface water	20								20
Groundwater				100					100
(II) Abstracted water									
Distributed water		30					60		90
fow own use	20								20
(III) Wastewater and reused water									
Wastewater					60				60
Reused water									
(IV) Return flows of water									
To inland water resources								60	60
(V) Evaporation of abstracted water, transpiration and water incorporated into products									
								60	60
TOTAL USE	40	30	0	100	60	0	60	120	410

Water losses

- **Losses of water** comprise flows of water that do not reach their intended destination or have disappeared from storage. The primary type of losses of water are losses during distribution.
- **Water losses in distribution** is the volume of water lost during transport through leakages, theft and evaporation between a point of abstraction and a point of use, and between points of use and reuse.
- Losses **are recorded in water abstractions** from the environment, **leakages are recorded in water returns** and **may be separately recorded under water evaporation**

SEEA-W – PSUT (Use, detailed)

A. Physical use table (*millions of cubic metres*)		Industries (by ISIC category)							Households	Rest of the world	Total
		1-3	5-33, 41-43	35	36	37	38, 39, 45-99	Total			
From the environment	**1. Total abstraction (= 1.a + 1.b = 1.i + 1.ii)**	108.4	114.5	404.2	428.7	100.1	2.3	**1 158.2**	10.8		**1 169.0**
	1.a. Abstraction for own use	108.4	114.6	404.2	23.0	100.1	2.3	**752.6**	10.8		**763.4**
	Hydroelectric power generation			*300.0*				***300.0***			***300.0***
	Irrigation water	*108.4*						***108.4***			***108.4***
	Mine water							***0.0***			***0.0***
	Urban run-off					*100.0*		***100.0***			***100.0***
	Cooling water			*100.0*							
	Other		*114.6*	*4.2*	*23.0*	*0.1*	*2.3*	***144.2***	*10.8*		***155.0***
	1.b. Abstraction for distribution				405.7			**405.7**			**405.7**
	1.i. From inland water resources:	108.4	114.5	304.2	427.6	0.1	2.3	**957.1**	9.8		**966.9**
	1.i.1. Surface water	55.3	79.7	301.0	4.5	0.1	0.0	**440.6**	0.0		**440.6**
	1.i.2. Groundwater	3.1	34.8	3.2	423.1	0.0	2.3	**466.5**	9.8		**476.3**
	1.i.3. Soil water	50.0						**50.0**			**50.0**
	1.ii. Collection of precipitation					100.0	0.0	**100.0**	1.0		**101.0**
	1.iii. Abstraction from the sea			100.0	1.1			**101.1**			**101.1**
Within the economy	**2. Use of water received from other economic units**	50.7	85.7	3.9	0.0	427.1	51.1	**618.5**	239.5		**858.0**
	of which:										
	2.a. Reused water	*12.0*	*40.7*					***52.7***			***52.7***
	2.b. Wastewater to sewerage										
	2.c. Desalinated water										
	3. Total use of water (= 1 + 2)	**159.1**	**200.2**	**408.1**	**428.7**	**527.2**	**53.4**	**1 776.7**	**250.3**		**2 027.0**

SEEA-W – PSUT (Supply, detailed)

B. Physical supply table (*millions of cubic metres*)		Industries (by ISIC category)									
		1-3	5-33, 41-43	35	36	37	38, 39, 45-99	Total	Households	Rest of the world	Total
Within the economy	**4. Supply of water to other economic units**	17.9	127.6	5.6	379.6	42.7	49.1	**622.5**	235.5		**858.0**
	of which:										
	4.a. Reused water		10.0			42.7		**52.7**			**52.7**
	4.b. Wastewater to sewerage	17.9	117.6	5.6	1.4		49.1	**191.6**	235.5		**427.1**
	4.c. Desalinated water				*1.0*			***1.0***			***1.0***
Into the environment	**5. Total returns (= 5.a + 5.b)**	65.0	29.4	400.0	47.3	483.8	0.7	**1 026.2**	4.8		**1 031.0**
	Hydroelectric power generation			*300.0*				***300.0***			***300.0***
	Irrigation water	*65.0*						***65.0***			***65.0***
	Mine water							***0.0***			***0.0***
	Urban run-off					*99.7*		***99.7***			***99.7***
	Cooling water			*100.0*							
	Losses in distribution because of leakages				*24.5*			***24.5***			***24.5***
	Treated wastewater		*10.0*			*384.1*	*0.5*	***394.6***	*1.5*		***396.1***
	Other		*19.4*	*0.0*	*22.9*		*0.2*	***42.5***	*3.3*		***45.8***
	5.a. To inland water resources (= 5.a.1 + 5.a.2 + 5.a.3)	65.0	23.5	300.0	47.3	227.5	0.7	**664.0**	4.6		**668.6**
	5.a.1. Surface water			300.0		52.5	0.2	**352.7**	0.5		**353.2**
	5.a.2. Groundwater	65.0	23.5		47.3	175.0	0.5	**311.3**	4.1		**315.4**
	5.a.3. Soil water							**0.0**			**0.0**
	5.b. To other sources (e.g., sea water)		5.9	100.0		256.3		**362.2**	0.2		**362.4**
	6. Total supply of water (= 4 + 5)	**82.9**	**157.0**	**405.6**	**426.9**	**526.5**	**49.8**	**1 648.7**	**240.3**		**1 889.0**
	7. Consumption (= 3 - 6)	**76.2**	**43.2**	**2.5**	**1.8**	**0.7**	**3.6**	**128.0**	**10.0**		**138.0**
	of which:										
	7.a. Losses in distribution not because of leakages				0.5			**0.5**			**0.5**

Thank you

Exercise

SEEA