



## Session 3.1 Hybrid and economic accounts

RW-2-REG

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Statistics



# Integration for sustainable development



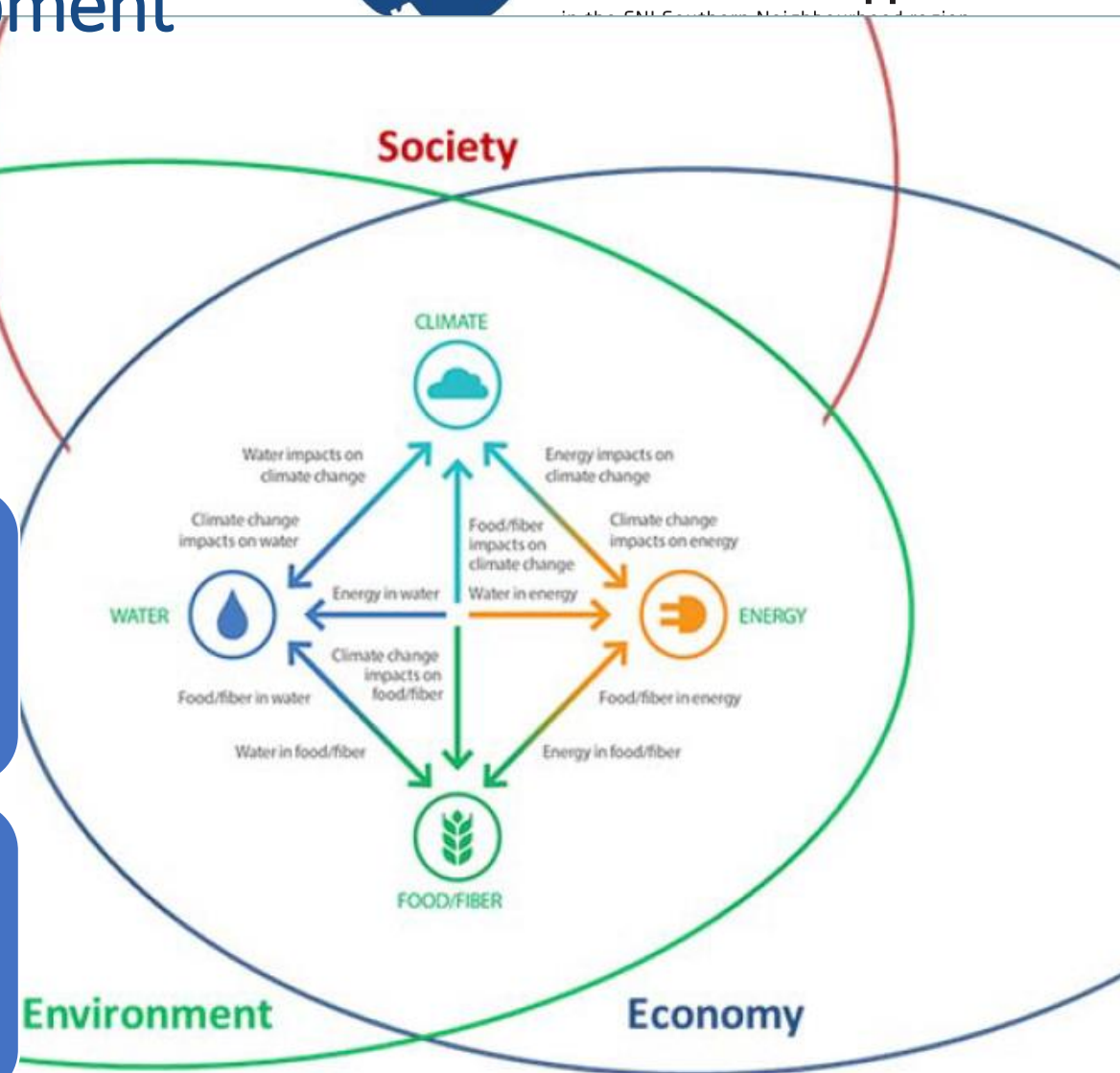
Water and  
Environment Support

by the EU Southern Neighbourhood



Sustainable management of the environment contributes to social and economic development

**Accounting** for the environment means nature can be **managed** as a valuable asset and **reflected in policy**



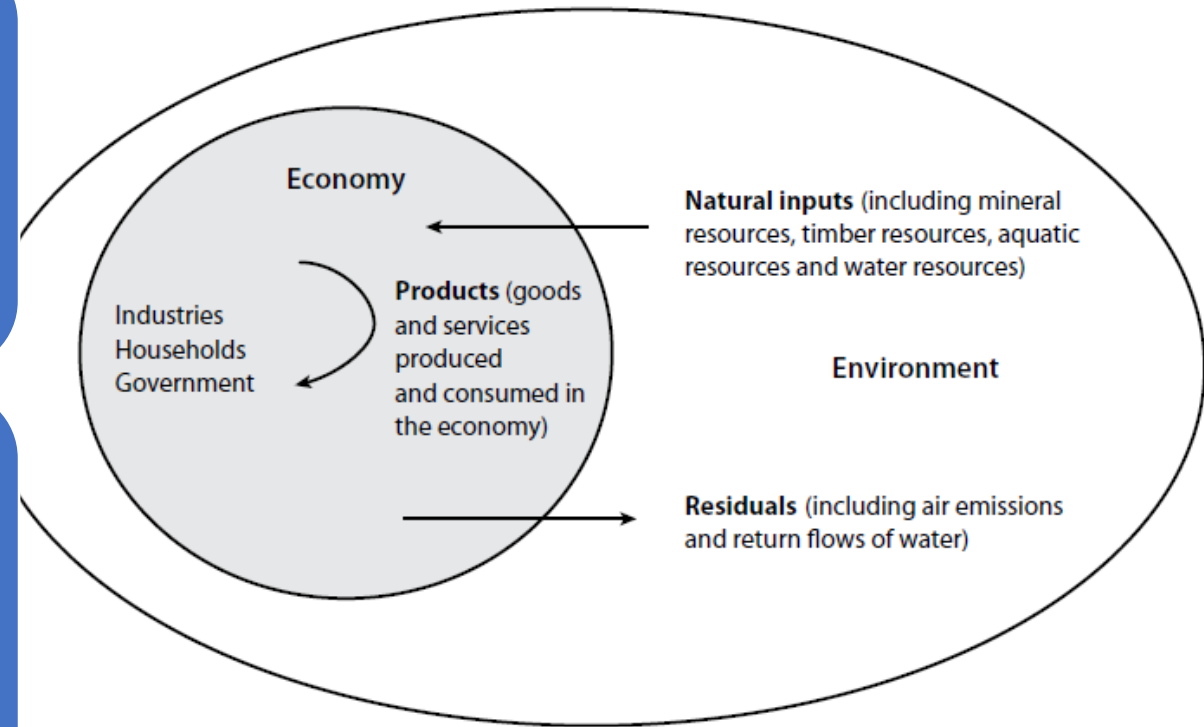
# International statistical standard



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System of Environmental and Economic Accounts (SEEA) provides the accounting framework and indicators for environmental macroeconomics.

The **SEEA Central Framework** was adopted as an international statistical standard by the UN Statistical Commission in 2012





# SEEA Central Framework

**SEEA** covers  
measurement in  
three main areas:

- physical flows of materials and energy within the economy and between the economy and the environment;
- stocks of environmental assets and changes in these stocks;
- economic activity and transactions related to the environment.

Economy functions  
through production  
and import of  
goods and services  
which;

- are consumed by enterprises, households or government;
- exported to the rest of the world;
- accumulated to be consumed or used in the future.



# SEEA Central Framework & SEEA Water



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SEEA-Water is a satellite system of the 2008 SNA and an elaboration of the SEEA framework.

Presentation of information in a consistent format which combines integrated physical and monetary data is one of the strongest features of the Central Framework enabling:

- provision of a wide range of information on specific themes: water, energy & air emissions.
- comparison of related information across different themes, and derivation of indicators that use both physical and monetary data.
- examination not only at national level but also at disaggregated levels, *for example, in relation to regions of the economy, or specific industries.*
- determination of economical sectors that are most relevant to specific indicators and how changes in the economic structure influence the evolution of indicators over time.

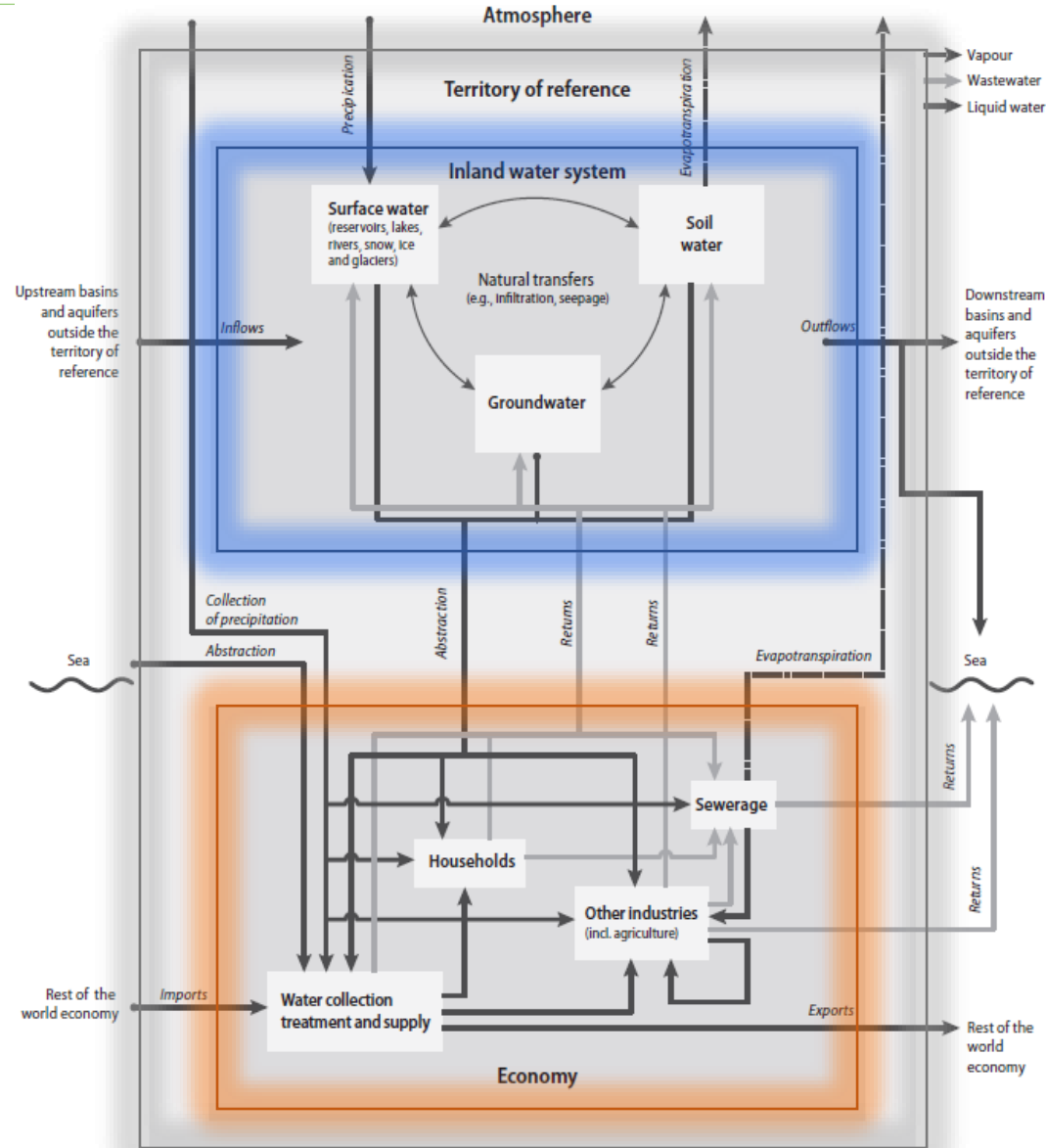


# Water resources & Economy



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Water accounting  
deals with  
interactions  
between and  
among different  
water resources  
and the economy



## Economy:

- abstracts water for activities involving consumption and production
- puts into place the infrastructure to mobilize, store, treat, distribute and return water into the environment



# Economy: main economic agents



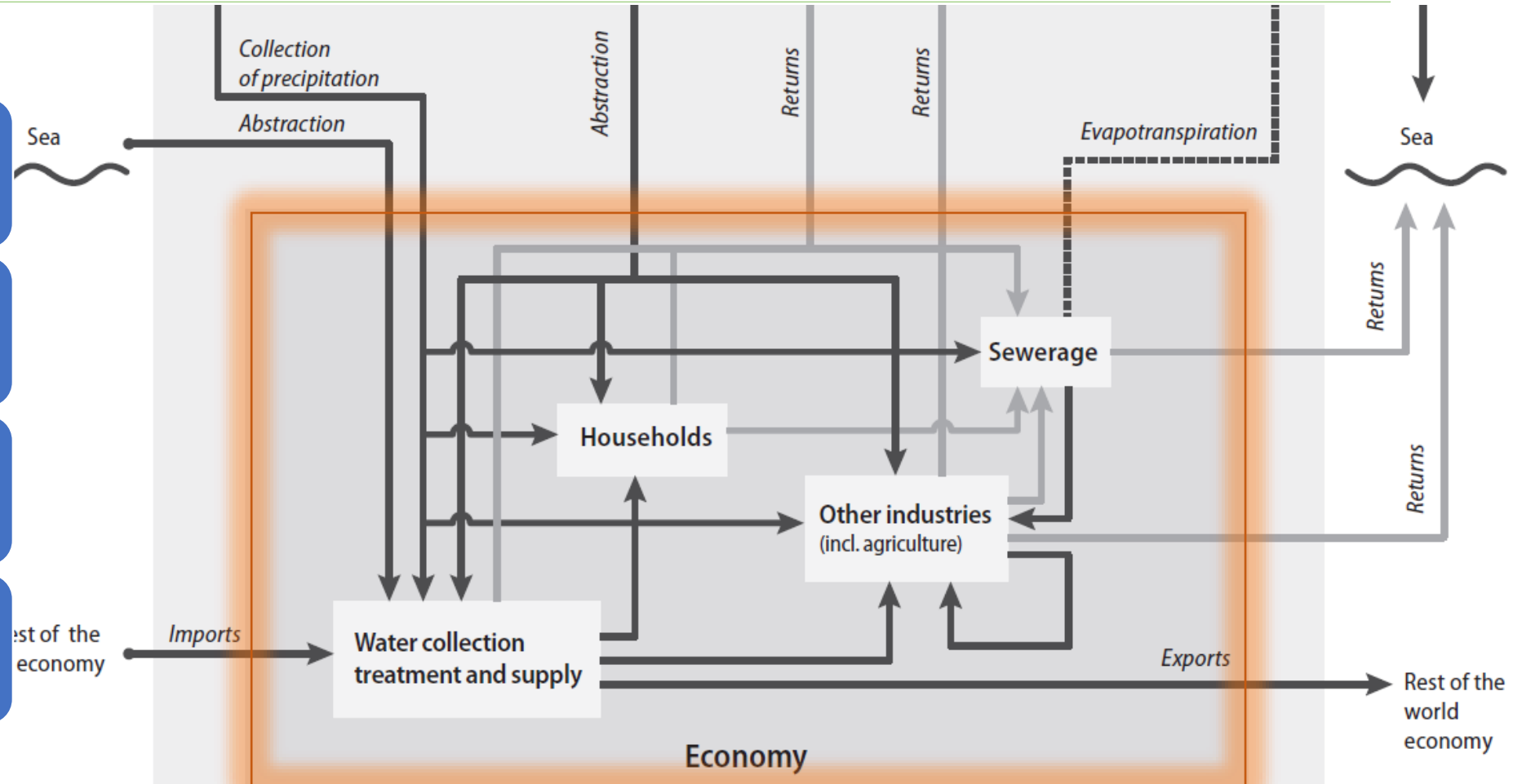
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Industry primarily involved in the collection, treatment and supply of water to households, industries;

Industry involved primarily in the collection, treatment and discharge of sewage

Other industries which use water as an input in their production processes;

Households, which use water to satisfy their needs or wants.





# Economy: exchanges within the economy



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Monetary transactions related to water exchanges:

- costs of collection, treatment and supply of water & that of sanitation services;
- fees and taxes paid for water and sanitation services;
- payments for access to the resource (e.g., water rights) as well as for discharging wastewater;
- the financing of these services (e.g. the sectors bearing the costs of the services);

Costs for environmental protection and resource management which *represent the economy's efforts to prevent environmental degradation or eliminate partly or totally the effects (after degradation has taken place). They include the **actual expenses incurred** (current and capital) by industries, households and the Government & the **financing**;*

Investments in infrastructure which *describes the cost of new investments, the depreciation of old investments, the cost of maintaining the water-related infrastructure, and the financing of these investments;*

Emission of pollutants into the environment which *enables the identification of pressures on the environment caused by various economic agents, namely, industries, households and the Government.*





# SEEA-Water framework



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links economic information with hydrological information in order to provide users with a tool for integrated analysis

shares a similar structure with 2008 SNA & uses concepts, definitions & classifications consistent with the 2008 SNA

introduces relationship between economy and environment in terms of abstractions, returns & emissions; *enabling analysis of the impact on natural assets caused by the activities of industries, households and government as they involve production & consumption (affecting both quality & quantity of water resources).*

allows integrated economic and environmental analyses: cost-effectiveness, scenario modelling, economic and environmental forecasting & evaluation of trade-offs.



# Economic accounts



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*Consist of an integrated sequence of accounts which describe the behavior of the economy, from the production of goods and services and the generation of income to how the income is made available to various units in the economy and how it is used by those units*

detailed in 2008 SNA & constructed for the products associated with ISIC Rev4

report the value of the service associated with the water exchange, as well as the value of the water exchanged

provide information on the value of the outputs produced (supplied) and their use for intermediate or final consumption and export purposes



# SNA Rules



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a product can be the result of domestic production (output) or production in another territory (import):

$$\text{Total supply} = \text{outputs} + \text{imports}$$

goods and services produced are used in various ways:

- industries to produce other goods and services (intermediate consumption);
- households and government to satisfy their needs or wants (final consumption);
- industries acquiring them for future use in the production of other goods and services (capital formation);
- the economy of another territory (exports).

$$\text{Total use} = \text{intermediate consumption} + \text{final consumption} + \text{gross capital formation} + \text{exports}$$

Total supply and total use have to be equal



# SNA Rules



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Gross value added is the value of output less the value of the goods and services, excluding fixed assets, consumed as inputs by a process of production (intermediate consumption). *It is a measure of the contribution to GDP made by an individual producer, industry or sector*

$$\text{Gross value added} = \text{output} - \text{intermediate consumption}$$

reduction in the value of the fixed assets used in production resulting from physical deterioration, normal obsolescence or normal accidental damage (consumption of fixed capital) is taken into account :

$$\text{Net value added} = \text{output} - \text{intermediate consumption} - \text{consumption of fixed capital}$$

value added generated is decomposed in the primary generation of income accounts for compensation of employees, taxes and subsidies on production and operating surplus :

$$(\text{Gross}) \text{ value added} = (\text{gross}) \text{ operating surplus} + \text{compensation of employees} + \text{taxes} - \text{subsidies}$$

Changes in stocks are the result of transactions on the asset (gross fixed capital formation), consumption of fixed capital, changes in the volume of the asset that are not due to transactions, such as changes in classification, discoveries and natural disasters, and changes in their price (holding gains/losses on assets):

$$\text{Closing stocks} = \text{opening stocks} + \text{gross fixed capital formation} - \text{consumption of fixed capital} + \text{other changes in volume of asset} + \text{holding gains/losses on assets}$$



# MONETARY SUPPLY & USE Table



**Water and  
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Monetary supply & use tables present aggregates of all available quantitative monetary data (€, \$, £,...) in terms of the supply & use of water within the economy for a period (generally a year).

*Supply and use tables illustrate the economic transactions associated with the use of water and the provisions of sewerage, wastewater and drainage services (also referred to as water related services).*

Monetary section covers:

supply of distributed water and water related services in the economy by the 'Water Supply, Sewerage and Drainage Services', 'Mining', 'Manufacturing', 'Electricity and Gas Supply' and 'Other' industries;

expenditure on water and water related services by industries, households and governments;

value added to the economy by the major water-using industries.



# MONETARY SUPPLY & USE table



**Water and  
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	Industry											
	Agriculture	Mining	Manu- facturing	Energy	Water supply	Sewerage	Other industries (a)	Industry Total	Taxes less subsidies on products, trade & transport margins	Actual Consumption		Total
										Households	Government	
Valuation of natural inputs (Ecosystem service of water provisioning)												896.0
Supply of water and sewerage services (\$m)												
Distributed water	-	-	-	-	175.6	-	-	175.6	0.4	-	-	176.0
Reused water	-	-	-	-	-	0.1	-	0.1	-	-	-	0.1
<b>Total supply of water products</b>	-	-	-	-	175.6	0.1	-	175.8	0.4	-	-	176.2
Sewerage Services	-	-	-	-	-	120.2	-	120.2	0.7	-	-	121.0
<b>Total supply of water products and sewerage services</b>	-	-	-	-	175.6	120.4	-	296.0	1.1	-	-	297.2
Intermediate consumption and final use (\$m):												
Distributed water	-	-	0.4	-	0.2	-	51.0	51.6	-	124.5	-	176.0
Reused water	-	-	-	-	-	-	0.1	0.1	-	-	-	0.1
<b>Total use of water products</b>	-	-	0.4	-	0.2	-	51.1	51.7	-	124.5	-	176.2
Sewerage Services	-	-	-	-	-	34.2	-	34.2	-	86.8	-	121.0
<b>Total use of water products and sewerage services</b>	-	-	0.4	-	0.2	34.2	51.1	85.9	-	211.3	-	297.2



# Hybrid and economic accounts



**Water and  
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in the ENI Southern Neighbourhood region

aligns physical information recorded in the physical supply and use tables with the monetary supply and use tables of the 2008 SNA

identifies those elements of the existing 2008 SNA which are relevant to water

referred to as “hybrid” flow accounts in order to reflect the combination of different types of measurement units in the same accounts (\$,£,€... & hm<sup>3</sup>)

physical quantities can be compared with matching economic flows

Provide information on the costs associated with water use and supply, such as water abstraction, purification, distribution and wastewater treatment





# HYBRID SUPPLY table (V1)



**Water and  
Environment Support**  
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**Monetary supply table** describes in monetary units the origin of products. It organizes information according to the 2008 SNA supply table where products are shown in rows and the producers are presented in columns

**Physical supply table** contains information on the volumes of water supplied to other economic units and discharged (returns) into the environment. (corresponds to the physical supply table)

**Total emission of pollutants** in physical units detail Gross emissions by industry for the sake of simplicity. Information on net emissions can also be shown in the same table. (corresponds to the emission accounts).



# HYBRID SUPPLY table (V1)



**Water and  
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Output at basic prices by industries classified according to ISIC Rev. 4;

Imports;

Other items to derive the total supply at purchasers' prices, namely:

- taxes and subsidies on products;
- trade and transport margins which include trade margins plus any transport charges paid separately by the purchasers in taking delivery at the required time and place.

	Output of industries (by ISIC category)								Imports	Taxes less subsidies on products	Trade and transport margins	Total supply at purchaser's price
	1-3	5-33, 41-43	35		36	37	38, 39, 45-99	Total output at basic prices				
			Total	(of which) Hydro								
1. Total output and supply (billions of currency units)	137.6	749.00	22.1	3.3	1.7	9.0	367.0	1 286.4	363.0	70.0	0.0	1 719.4
of which:												
1.a. Natural water (CPC 1800)	0.0	0.04	0.0	0.0	1.7	0.2	0.0	1.9	0.0	-0.1	0.0	1.8
1.b. Sewerage services (CPC 941)	0.0	0.00	0.0	0.0	0.0	8.8	0	8.8	0.0		0	8.8
2. Total supply of water (millions of cubic metres)	82.9	157.00	405.6	300.0	426.9	526.5	49.8	1 648.7	0.0			1 648.7
2.a. Supply of water to other economic units	17.9	127.60	5.6	0.0	379.6	42.7	49.1	622.5	0.0			622.5
of which:												
2.a.1. Wastewater to sewerage	17.9	117.60	5.6	0.0	1.4	0.0	49.1	191.6	0.0			191.6
2.b. Total returns	65.0	29.40	400.0	300.0	47.3	483.8	0.7	1 026.2				1 026.2
3. Total (gross) emissions of chemical oxygen demand (thousands of tons)	3 150.2	5 047.40	7 405.1	0.0	1 851.0	498.5	1 973.8	19 925.9				19 925.9



# HYBRID USE table (V2)



**Water and  
Environment Support**  
in the ENI Southern Neighbourhood region

**Monetary use table** provides information on the destination (use) in monetary units of products (by row) and, in particular, water-related products detailed by industries (by columns).

**Physical use table** contains information on the volumes of water abstracted from the environment and received from other economic units (corresponds to the physical use table).



# HYBRID USE table (V.2)



**Water and Environment Support**  
in the ENI Southern Neighbourhood region

intermediate consumption of industries: value of the goods and services consumed as inputs in production, excluding the using up of fixed assets

Actual final consumption Household: value of the goods or services delivered to households includes the costs that households actually incur in the purchase of products and social transfers in kind from governmental units and NPISHs

Actual final consumption Government corresponds to its collective consumption expenditures

Capital formation : total value of gross fixed capital formation and changes in inventories and acquisitions less the disposal of valuables

Exports : sale of products from residents to non-resident units

	Intermediate consumption of industries (by ISIC category)								Actual final consumption							
									Households							
	1-3	5-33, 41-43	35		36	37	38, 39, 45-99	Total industry	Final consumption expenditures	Social transfers in kind from Government and non-profit institutions serving households	Total					
1. Total intermediate consumption and use (billions of currency units)	72.9	419.4	9.9	1.1	1.10	1.7	157.8	664.0	321.4	131.4	452.8	53.6	506.4	146.0	403.0	1 719.4
of which:																
1.a. Natural water (CPC 1800)	0.2	0.3	0.02	0.0	0.00		0.2	0.8	0.6	0.4	1.0	-	1.0	0.0	0.0	1.8
1.b. Sewerage services (CPC 941)	0.4	2.4	0.1	0.0	0.03		1.0	3.9	2.4	2.4	4.9	-	4.9		0.0	8.8
3. Total use of water (millions of cubic metres)	159.1	200.2	408.1	300.0	428.70	527.2	53.4	1 776.7			250.3		250.3		0.0	2 027.0
3.a. Total abstraction (U1)	108.4	114.5	404.2	300.0	428.70	100.1	2.3	1 158.2			10.8		10.8			1 169.0
of which:																
3.a.1. Abstraction for own use	108.4	114.6	404.2	300.0	23.00	100.1	2.3	752.6			10.8		10.8			763.4
3.b. Use of water received from other economic units	50.7	85.7	3.9	-	0.00	427.1	51.1	618.5			239.5		239.5		0.0	858.0

# HYBRID USE table (V.2)



**Water and  
Environment Support**  
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Intermediate consumption refers to the value of the goods and services consumed as inputs in production, excluding the using up of fixed assets, which is recorded as consumption of fixed capital in value added. Intermediate consumption is valued at purchasers' prices.

Final consumption is measured in terms of actual final consumption rather than in terms of expenditures, which is the common practice in the 2008 SNA.

Monitor the link between the physical quantities of water and the monetary values of the goods and services delivered to households: generally water related services are not purchased directly by households but are provided to them by governmental and non-profit institutions serving households (NPISHs) free.

Actual final consumption measures the value of the goods or services delivered to households, regardless of whether they are paid by the households concerned or by governmental units and NPISHs through social transfers in kind.

Table V2 shows how the actual final consumption is computed from final consumption expenditures.



# HYBRID ACCOUNTS SUPPLY & USE table (V.3)



**Water and Environment Support**  
in the ENI Southern Neighbourhood region

Information on industries output produced, water-related output, intermediate consumption, including the cost of purchasing water and sewerage services, and value added

reliable market prices do not generally exist for water-related activities - *value of the output of these activities is deemed to be equal to the sum of the costs of production*

information on gross fixed capital formation for water-related infrastructure by industry, which represents investments in fixed capital related to water (infrastructure). It also shows the closing stocks of fixed assets for water supply and sanitation which represent the total value of infrastructure in place, disaggregated according to whether it relates to water supply or wastewater services.

basis for calculation of a consistent set of hydrological-economic indicators. information on social aspects that are important for water management as indicators on access to water and sanitation could be used to evaluate policy reforms and structural changes. Information on labour input may be important for analysing the impact of water allocation policies on employment.

	Industries (by ISIC category)								Rest of the world	Taxes less subsidies on products, trade and transport margins	Actual final consumption		Capital formation	Total
	1-3	5-33, 41-43	35		36	37	38, 39, 45-99	Total industry			House-holds	Government		
			Total	(of which) Hydro										
1. Total output and supply (billions of currency units) of which:	137.6	749.0	22.1	3.3	1.7	9.0	367.0	1 286.4	363.0	70.0				1 719.4
1.a. Natural water (CPC 1800)	0.0	0.04	0.0	0.0	1.7	0.2	0.0	1.9	0.0	-0.1				1.8
1.b. Sewerage services (CPC 941)	0.0	0.0	0.0	0.0	0.0	8.8	0.0	8.8	0.0	0.0				8.8
2. Total intermediate consumption and use (billions of currency units) of which:	72.9	419.4	9.9	1.1	1.1	1.7	157.8	664.0	403.0		452.8	53.57	146.0	1 719.4
2.a. Natural water (CPC 1800)	0.2	0.3	0.0	0.0	0.0	0.0	0.2	0.8	0.0		1.0	-		1.8
2.b. Sewerage services (CPC 941)	0.4	2.4	0.1	0.0	0.0	0.0	1.0	3.9	0.0		4.9	-		8.8
3. Total value added (gross) (= 1 - 2) (billions of currency units)	64.7	329.5	12.2	1.8	0.6	7.3	209.2	622.4	0.0					622.4
4. Gross fixed capital formation (billions of currency units) of which:	6.6	65.7	13.1		11.8	10.5	23.7	131.4						131.4
4.a. For water supply		0.311			11.8	1.3		13.4						13.4
4.b. For water sanitation		0.2				9.2	0.01	9.4						9.4
5. Closing stocks of fixed assets for water supply (billions of currency units)		5.2			197.1	22.2		224.4						224.4
6. Closing stocks of fixed assets for sanitation (billions of currency units)		2.4				115.7	0.1	118.2						118.2
7. Total use of water (millions of cubic metres)	159.1	200.2	408.1	300.0	428.7	527.2	53.4	1 776.7	0.0		250.3			2 027.0
7.a. Total abstraction	108.4	114.5	404.2	300.0	428.7	100.1	2.3	1 158.2			10.8			1 169.0
of which:														
7.a.1. Abstraction for own use	108.4	114.6	404.2	300.0	23.0	100.1	2.3	752.6			10.8			763.4
7.b. Use of water received from other economic units	50.7	85.7	3.9	-	0.0	427.1	51.1	618.5	0.0		239.5			858.0
8. Total supply of water (millions of cubic metres)	82.9	157.0	405.6	300.0	426.9	526.5	49.8	1 648.7	0.0		240.3			1 889.0
8.a. Supply of water to other economic units	17.9	127.6	5.6	0.0	379.6	42.7	49.1	622.5	0.0		235.5			858.0
of which:														
8.a.1. Wastewater to sewerage	17.9	117.6	5.6	0.0	1.4	0.0	49.1	191.6	0.0		235.5			427.1
8.b. Total returns	65.0	29.4	400.0	300.0	47.3	483.8	0.7	1 026.2			4.8			1 031.0
9. Total (gross) emissions of chemical oxygen demand (thousands of tons)	3 150.2	5 047.4	7 405.1		1 851.0	498.5	1 973.8	19 925.9			11 663.6			31 589.5

# Hybrid account for water supply & sewerage for own use (V.4)



**Water and  
Environment Support**  
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Identify explicitly the intermediate costs and outputs of water-related activities when they are carried out for own use by households and industries.

Economic units carry out abstraction for own use; Farmers who abstract water directly from the environment for irrigation purposes, power plants or other industrial establishments that directly abstract water for their own use, such as for cooling purposes.

Enterprises and households may operate their own wastewater treatment facilities: industrial wastewater treatment plants and septic tanks.

The costs associated with these activities do not appear explicitly in the tables described because they are incorporated within those of the principal activity.

2008 SNA rule: goods and services produced for own use are valued at the basic prices of the same goods or services sold on the market, provided they are sold in sufficient quantities to enable reliable estimates to be made of those average prices.

Reliable market prices do not generally exist for water-related activities, in SEEA-Water : the value of the output of these activities is deemed, by convention, to be equal to the sum of the costs of production, that is, as the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes (less subsidies) on production

The costs of water abstraction are directly linked for each industry to the volumes of water abstracted, and the costs of treating wastewater are linked with the volume of wastewater discharged after on-site treatment.





# Hybrid account for water supply & sewerage for own use (V.4)



**Water and Environment Support**  
in the ENI Southern Neighbourhood region

Hybrid accounts for own use are compiled for the following activities: Water collection, treatment and supply (ISIC division 36) & Sewerage (ISIC division 37)

Households as they may abstract water directly from the environment and often carry out activities of wastewater treatment with their septic tanks

reliable market prices do not generally exist for water-related activities - *value of the output of these activities is deemed to be equal to the sum of the costs of production*

*Specific surveys help to estimate the costs associated with the activities of water collection, treatment and supply, and wastewater treatment when they are carried out for own use*

		Industries (by ISIC category)								House- holds	Total industry
		1-3	5-33, 41-43	35		36	37	38, 39, 45-99	Total		
				Total	(of which) Hydro						
Water supply for own use	1. Costs of production (= 1.a + 1.b) (millions of currency units)	336.0	355.3	1 253.0	930.0	71.3	310.3	7.1	2 333.1	33.5	2 366.5
	1.a. Total intermediate consumption	162.6	171.9	606.3	450.0	34.5	150.2	3.5	1 128.9	16.2	1 145.1
	1.b. Total value added (gross)	173.4	183.4	646.7	480.0	36.8	160.2	3.7	1 204.2	17.3	1 221.4
	1.b.1. Compensation of employees	104.1	73.3	258.7	192.0	14.7	64.1	1.5	516.4	0.0	516.4
	1.b.2. Other taxes less subsidies on production	-1.7	-1.8	-6.5	-4.8	0.4	1.6	0.0	-8.0	0.5	-7.5
	1.b.3. Consumption of fixed capital	71.1	111.8	394.5	292.8	21.7	94.5	2.2	695.8	16.8	712.6
	2. Gross fixed capital formation (millions of currency units)	672.1	781.6	1 503.6	1 116.0			2.9	2 960.1	70.3	3 030.4
	3. Stocks of fixed assets (billions of currency units)	11.2	13.1	25.1	18.6			0.0	49.4	1.2	50.6
4. Abstraction for own use (millions of cubic metres) (from table III.3)		108.4	114.6	404.2	300.0	23.0	100.1	2.3	752.6	10.8	763.4
Sewerage for own use	1. Costs of production (= 1.a + 1.b) (millions of currency units)		121.0					6.1	127.1	18.2	145.2
	1.a. Total intermediate consumption (millions of currency units)		30.0					1.5	31.5	4.5	36.0
	1.b. Total value added (gross)		91.0					4.6	95.6	13.7	109.2
	1.b.1. Compensation of employees		27.3					1.4	28.7	4.1	32.8
	1.b.2. Other taxes less subsidies on production		-0.9					0.0	-1.0	-0.1	-1.1
	1.b.3. Consumption of fixed capital		64.6					3.2	67.8	9.7	77.5
	2. Gross fixed capital formation (millions of currency units)		266.2					2.4	268.6	38.1	306.7
	3. Stocks of fixed assets (millions of currency units)		3 354.1					30.5	3 384.6	480.2	3 864.9
4. Return of treated water (millions of cubic metres) (from table III.3)			10.0					0.5	10.5	1.5	12.0



**Water and  
Environment Support**  
in the ENI Southern Neighbourhood region

Thank you for your attention!

