The Hybrid and Economic Accounts of SEEAW

UNESCO-IHE

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Outline

- What are the hybrid accounts
- What do hybrid accounts measure
- Why compile them?
- Relationship of SEEAW to Eurostat NAMEA tables
- The seven hybrid and economic standard tables of SEEAW
- The hybrid tables and accounts
- Example from Australia
- Exercise using data from Australia

What do hybrid accounts measure?

- Physical flows of
  - Water and emissions (pollutants)
- Monetary flows of
  - Water and sewerage services
- Value of fixed assets (and fixed capital formation) for
  - Water supply and sewerage industries

Why compile hybrid accounts for water?

To identify

- The costs associated with production of water-related products and income generated by the production
- The investment in water-related infrastructure
- Costs of maintaining the infrastructure
- Fees paid by users for water-related services and subsidies received
- Help to design policies of cost-recovery and efficient water allocation

Water Framework Directive (FWD) and Hybrid Accounts

- WFD: increase in demand for water-related data
- **Use Hybrid Accounts which provide information on**
  - **Intensity of water use by branches of industry**
  - **The physical flows of supply of water services**
  - **Production costs of water services**
  - **Environmental taxes related to water**

- **at National and River Basin level**

NAMEA – National Accounts Matrix Including Environmental Accounts

- Used by Eurostat in their annual data collection up until now
- SEEAW and NAMEA are compatible
- Many differences are presentational not substantive
- NAMEA detailed in terms of industries identified and expands some flows identified in the tables
- http://epp.eurostat.ec.europa.eu/pls/portal/url/ITEM/2998A3FBBBBF59D6E0440003BA9322F9
- The aim of Eurostat is to adopt SEEAW by 2009

Eurostat – NAMEA

Many more industries than SEEAW

Operation of irrigation systems
Agriculture, hunting and forestry, except 01.41*
Fishing
Mining and quarrying of energy producing materials
Mining and quarrying, except energy producing materials
Manufacture of food products, beverages and tobacco
Manufacture of textiles and textiles products
Manufacture of leather and leather products
Manufacture of wood and wood products
Manufacture of pulp, paper, publishing and printing
Manufacture of coke, refined petroleum and nuclear fuel
Manufacture of chemicals, man-made fibres
Manufacture of rubber and plastic products
Manufacture of other non-metallic mineral products
Manufacture of basic metals and fabricated metal products
Manufacture of machinery and equipment n.e.c
Manufacture of electrical and optical equipment
Manufacture of transport equipment
Manufacturing n.e.c
Electricity, gas, steam and hot water supply
Collection, purification and distribution of water
Construction
Wholesale and retail trade, repair
Hotels and restaurants
Transport, storage and communication
Financial intermediation
Real estate, renting and business activities
Public administration for water
Public administration, except 75.12*
Education
Health and social work
Collection and treatment of sewage
Other community, social and personal services, except 90.01
Other and not broken down activities

Eurostat – NAMEA Self supply v SEEAW own use

Water supply for own use

- **1. Costs of production** (=1.a+1.b) (Monetary units)
  - 1. a. Total intermediate consumption
  - 1.b. Total value added (gross)
    - 1.b.1 Compensation of employees
    - 1.b.2 Other taxes less subsidies on production
    - 1.b.3 Consumption of fixed capital
- **2. Gross fixed capital formation** (Monetary units)
- **3. Stocks of fixed assets** (Monetary units)
- **4. Abstraction for own use** (Physical units)

Sewerage for own use

- **1. Costs of production** (=1.a+1.b) (Monetary units)
  - 1.a. Total intermediate consumption (Monetary units)
  - 1.b. Total value added (gross)
    - 1.b.1 Compensation of employees
    - 1.b.2 Other taxes less subsidies on production
    - 1.b.3 Consumption of fixed capital
- **2. Gross fixed capital formation** (Monetary units)
- **3. Stocks of fixed assets** (Monetary units)
- **4. Return of treated water** (Physical units)

Self-supply of water								Self-supply of wastewater collection and treatment						
Current expenditure								Current expenditure						
Intermediate consumption	Compen-sation of employees	Taxes related to self-supply of water	Less subsidies related to self-supply of water	Consump-tion of fixed capital	Gross fixed capital formation	Closing stock of fixed assets	Labour inputs in total hours worked	Intermediate consumption	Compen-sation of employees	Taxes related to self-supply of treatment and removal	Less subsidies related to self-supply of treatment and removal	Consump-tion of fixed capital	Gross fixed capital formation	Closing stock of fixed assets

The seven hybrid tables

- Hybrid supply table
- Hybrid use table
- Hybrid account for supply and use of water
- Hybrid account for water supply and sewerage for own use
- Government accounts for water-related collective consumption services
- National expenditure accounts for wastewater management
- Financing accounts for wastewater management

Hybrid use - scope

- Monetary flows of water within the economy
  - e.g. supply of water by the water supply industry (ISIC 36) to other industries
  - Equivalent to output in the SNA
- Monetary flows of water from the environment to the economy
  - e.g. abstraction of water for own use by agriculture ISIC 1
  - This goes beyond the SNA
- These flows are recorded in separate tables (5.3 and 5.4)

Hybrid supply

Hybrid Supply table (Table 5.1, page 66 of SEEAW) consist of 3 parts:

1) Monetary supply (in monetary units) (Output + imports);
2) Physical supply: water supplied to other units and discharged to the environment (in physical units);
3) Emission of pollutants (gross): pollutants added to water as a result of production and consumption.

Columns: Industries classified by ISIC

ISIC 36 main supplier of water, other industries also may supply water as secondary activity

Rows: Products classified by CPC ver. 2

Natural water + distribution services

Sewerage

CPC Version 2

- Natural water (CPC 1800)
  - Excludes bottled water (CPC 2441 - Waters (including mineral waters and aerated waters), not sweetened nor flavoured
- Sewerage services (CPC 941)
  - 9411 - Sewerage and sewage treatment services
  - 9412 - Septic tank emptying and cleaning services

Hybrid supply

For water the greatest value should be here

	Output of industries (by ISIC cat[illegible]s)												
			35										
	1	2-33, 41-43	Total	*of which*: Hydro	36	37	38,39, 45-99	Total output, at basic prices	Imports	Taxes on products	Subsidies on products	Trade and transport margins	Total supply at purchaser's price
1. Total output and supply (monetary units)													
of which:													
1.a Natural water (CPC 1800)													
1.b Sewerage services (CPC 941)													
2. Total supply of water (physical units)													
2.a - Supply of water to other economic													
2.b - Total returns													
3. Total (gross) emissions (physical units)													
Pollutants													
Note: Grey cells indicate zero entries by definition.													

For water the greatest value should be here

Note: use of basic price and purchase's price in table

SNA Term: Basic price

- The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale; it excludes any transport charges invoiced separately by the producer.

- **Relevant SNA Paragraphs** 6.205. 15.28. [3.82.]

From UNSD – Glossary of SNA
http://unstats.un.org/unsd/sna1993/glossary.asp?letter=B

SNA Term: Output

- Output consists of those goods or services that are produced within an establishment that become available for use outside that establishment, plus any goods and services produced for own final use.
- Relevant SNA Paragraph 6.38

But not intermediate consumption

From UNSD – Glossary of SNA Terms

http://unstats.un.org/unsd/sna1993/glossform.asp?getitem=423

SNA Term: Purchaser’s price

- Purchaser's price is the amount paid by the purchaser, excluding any deductible VAT or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser; the purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place.
- **Relevant Paragraphs** 6.215. 15.28. [2.73.] [3.83.]

From UNSD – Glossary of SNA
http://unstats.un.org/unsd/sna1993/glossary.asp?letter=P

Hybrid use table

Table 5.2 (page 70 of SEEAW) consists of two parts:

- Monetary use table

  Shows the destination of produce in terms of:

  - Intermediate consumption
  - Actual final consumption of households and government
  - Gross capital formation
  - Exports

Hybrid use table

Physical and monetary units

	Intermediate consumption of industries (by ISIC								Actual final consumption						
			35						Households						
	1	2-33, 41-43	Total	*of which*: Hydro	36	37	38,39, 45-99	Total industry	Final consumption expenditures	Social transfers in kind from Government and NPISHs	Total	Government	Capital formation	Exports	Total uses at purchaser's price
1. Total intermediate consumption and use (monetary units)															
of which: Natural water (CPC 1800)															
Sewerage services (CPC 941)															
2. Total value added (monetary units)															
3. Total use of water (physical units)															
3.a Total Abstraction															
of which: 3. a.1- Abstraction for own use															
3.b Use of water received from other economic units															

Note: Grey cells indicate zero entries by definition.

Note: purchase's price is recorded in this table

Final consumption

- In SEEAW final consumption for household is the actual final consumption of households not the final consumption expenditure by households
- This is a departure from SNA (which records the final consumption expenditure)
- It is done because in many countries household do not directly purchase water rather it is provide free or almost free by government

Final consumption expenditure and actual final consumption

- Total final consumption may be calculated as:
  - Final consumption expenditure

    = Total value of expenditures on individual and collective goods and services of households, not for profit Institutions supporting households (NPISH) and government
  - Actual consumption expenditure

    = Value of individual goods and services acquired by households plus the value of collective services provided by the government

(See box on page 68 of SEEAW)

Final consumption expenditure and actual final consumption

	Final consumption expenditure				
	Households (a)	NPSHIs individual (b)	Government		Total (a)+(b)+(c)+(d)
			Collective (c)	Individual (d)	
Total use of products	**43**	**5**	**2**	**50**	**100**

Actual Consumption			
Households		Government (c)	Total (a)+(b)+(c)+(d)
Final consumption expenditures (a)	Social transfers in kind from Government and NPISHs (b)+(d)		
43	**5+50 = 55**	**2**	**100**

Individual and collective goods and services

- Individual goods and services of government and NPISHs are those incurred for the benefit of individual households (e.g. supply of water to households by government, etc.)
- Collective goods and services of government are those incurred for the benefit of the community (e.g. water management, legislation and regulation)

The hybrid accounts

- Combine the physical and monetary supply and use tables for water in a single table for deriving hydrologic-economic indicators
- Table 5.3 (page 71) consists of 2 parts:
  - Monetary SUT [items 1-6]
    - Supply, use, value added and gross capital formation –total and water-related [1-4]
  - Stocks of water-related fixed assets [5, 6]
  - Physical SUT [items 7-9]
    - Use of water [7]
    - Supply of water [8]
    - Gross emissions [9]

Hybrid account for supply and use of water

	Intermediate consumption of industries (by ISIC categories)								Rest of the world	Taxes less subsidies on products, trade and	consumption	
	1	2-33, 41-43	35 Total	35 *of which*: Hydro	36	37	38,39, 45-99	Total industry			Households	Government
1. Total output and supply (Monetary units)												
of which:												
1.a Natural water (CPC 1800)												
1.b Sewerage services (CPC 941)												
2. Total intermediate consumption and use (Monetary units)												
of which:												
2.a Natural water (CPC 1800)												
2.b Sewerage services (CPC 941)												
3. Total value added (gross) (=1-2) (Monetary units)												
4. Gross fixed capital formation (Monetary units)												
of which:												
4.a For water supply												
4.b For water sanitation												
5. Closing stocks of fixed assets for water supply (Monetary units)												
6. Closing stocks of fixed assets for sanitation (Monetary units)												
7. Total use of water (Physical units)												
7.a Total Abstraction												
of which: 7. a.1- Abstraction for own use												
7.b Use of water received from other economic units												
8. Total supply of water (Physical units)												
8.a Supply of water to other economic units												
of which: 8. a.1- Wastewater to sewerage												
8.b Total returns												
9. Total (gross) emissions (Physical units)												
Pollutant 1												
Pollutant 2												

Hybrid account for supply and use of water

	Intermediate cons		
			3
	1	2-33, 41-43	Total
1. Total output and supply (Monetary units)			
of which :			
1.a Natural water (CPC 1800)			
1.b Sewerage services (CPC 941)			
2. Total intermediate consumption and use (Monetary units)			
of which :			
2.a Natural water (CPC 1800)			
2.b Sewerage services (CPC 941)			
3. Total value added (gross) (=1-2) (Monetary units)			
4. Gross fixed capital formation (Monetary units)			
of which :			
4.a For water supply			
4.b For water sanitation			
5. Closing stocks of fixed assets for water supply (Monetary units)			
6. Closing stocks of fixed assets for sanitation (Monetary units)			
7. Total use of water (Physical units)			
7.a Total Abstraction			
of which: 7. a.1- Abstraction for own use			
7.b Use of water received from other economic units			
8. Total supply of water (Physical units)			
8.a Supply of water to other economic units			
of which: 8. a.1- Wastewater to sewerage			
8.b Total returns			
9. Total (gross) emissions (Physical units)			
Pollutant 1			
Pollutant 2			
Pollutant ….n			

Hybrid accounts for water-related activities for own use

- Objective is to separately identify the cost and of providing water and sewerage services for own use in industries and households
- This is because the cost of providing these is incorporated into the value of the other outputs of the industries or is bourn by households
  - For example, in agriculture the cost of providing water for own use is incorporated into the output of crops (e.g. rice, wheat, cattle, etc)
- This goes beyond the output covered by SNA

Hybrid accounts for water-related activities for own use

- Hybrid accounts for own use are carried out for:
  - Water supply
  - Sewerage services
- For each the following is needed
  - Total intermediate consumption (rents, electricity)
  - Total gross value added
    - Wages
    - Taxes less subsidies
    - Consumption of fixed capital
  - Fixed capital formation
  - Stocks of fixed assets

Hybrid accounts for water-related activities for own use

- This is one of the most data intensive tables to produce
- Comprehensive data can probably only be collected from specially designed surveys
- Alternatively a variety of other information sources may be used to estimated data

Hybrid accounts for water supply and sewerage for own use

Physical and monetary units

		Industries (by ISIC categories)								Households	Total industry
		1-3	5-33, 41-43	35 Total	35 *of*	36	37	38,39, 45-99	Total		
Water supply for own use	**1. Costs of production** (=1.a+1.b) (Monetary units)										
	1. a. Total intermediate consumption										
	1.b. Total value added (gross)										
	1.b.1 Compensation of employees										
	1.b.2 Other taxes less subsidies on production										
	1.b.3 Consumption of fixed capital										
	2. Gross fixed capital formation (Monetary units)										
	3. Stocks of fixed assets (Monetary units)										
	4. Abstraction for own use (Physical units)										
Sewerage for own use	**1. Costs of production** (=1.a+1.b) (Monetary units)										
	units)										
	1.b. Total value added (gross)										
	1.b.1 Compensation of employees										
	1.b.2 Other taxes less subsidies on production										
	1.b.3 Consumption of fixed capital										
	2. Gross fixed capital formation (Monetary units)										
	3. Stocks of fixed assets (Monetary units)										
	4. Return of treated water (Physical units)										

Largest numbers for water supply are typically for agriculture and hydro-electricity.

Largest numbers for sewerage may be expected for manufacturing and mining.

Data sources

- National accounts
- Businesses reports
  - Annual reports, environmental reports, websites
- Government
  - Agency reporting and websites
  - Administrative data bases (especially tax)
- Surveys
  - Business surveys
  - Agricultural surveys
  - Household surveys
- Estimation based on case studies, other research and assumptions

Country experiences

Australia – Experimental monetary accounts

2003-04 http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4610.0.55.0042003-04?OpenDocument

2004-05 http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4610.0.55.0052004-05?OpenDocument

Water use in Australia and scope of the monetary account

	Self-extracted (GL)	Distributed Water (GL)	Reuse Water (GL)	In-Stream (GL)	Water Consumption (GL)
Agriculture	6,582	5,329	280		12,191
Mining	529	72	7	183	413
Manufacturing	246	341	13		589
Water Supply	11,160	2,045	39		2,083
Electricity and Gas	60,172	115	6	59,867	271
All other industries	862	1,561	78	386	1,021
Households	232	1,874	2		2,108
Total	79,783	11,337	425	60,436	18,676

Classification of products and assets

Four water products were identified:

1. Urban distributed water
2. Rural distributed water
3. Bulk water
4. Wastewater/sewerage services

Three assets selected for asset values:

1. Urban water supply infrastructure assets;
2. Urban sewerage infrastructure assets; and
3. Irrigation and drainage infrastructure assets

Primary data sources and reference year

Supply side:

- ABS Economic Activity Survey
- State government, industry association and company annual reports

Use Side:

- Households: State government reports, WSAA facts
- Agriculture: Water Use on Australian Farms
- Other industries: Economic Activity Survey
- Sewerage services: Environmental Protection Expenditure Account 1996-97

Reference year: 2003-04

Results – economic output

- Total output of water & sewerage services in was AUD$7.3 billion, of which;
  - sewerage services generated AUD$3.4 billion;
  - urban water sales generated AUD$3.3 billion;
  - bulk water sales AUD$0.5 billion; and
- sales of rural water were worth AUD$0.3 billion
- water supply industry supplied 8,296 GL of water

Results – expenditure on water

- Households highest expenditure AUD$2,046 million (59% of total), used 1,874 GL of water (23%)
- Agriculture spent AUD$293 million (8%) for 5,329 GL of water (64%)
- Victoria lowest annual consumption per household (204 KL) and lowest expenditure per household (AUD$205)
- Northern Territory highest annual consumption per household (453 KL) and highest expenditure per household (AUD$507)

Results – total value of infrastructure

- Total assets AUD$73.0 billion
- wastewater & sewerage assets - AUD$35.0 billion
- Urban water infrastructure assets - AUD$ 32.0 billion
- Irrigation and drainage assets - AUD$6.0 billion

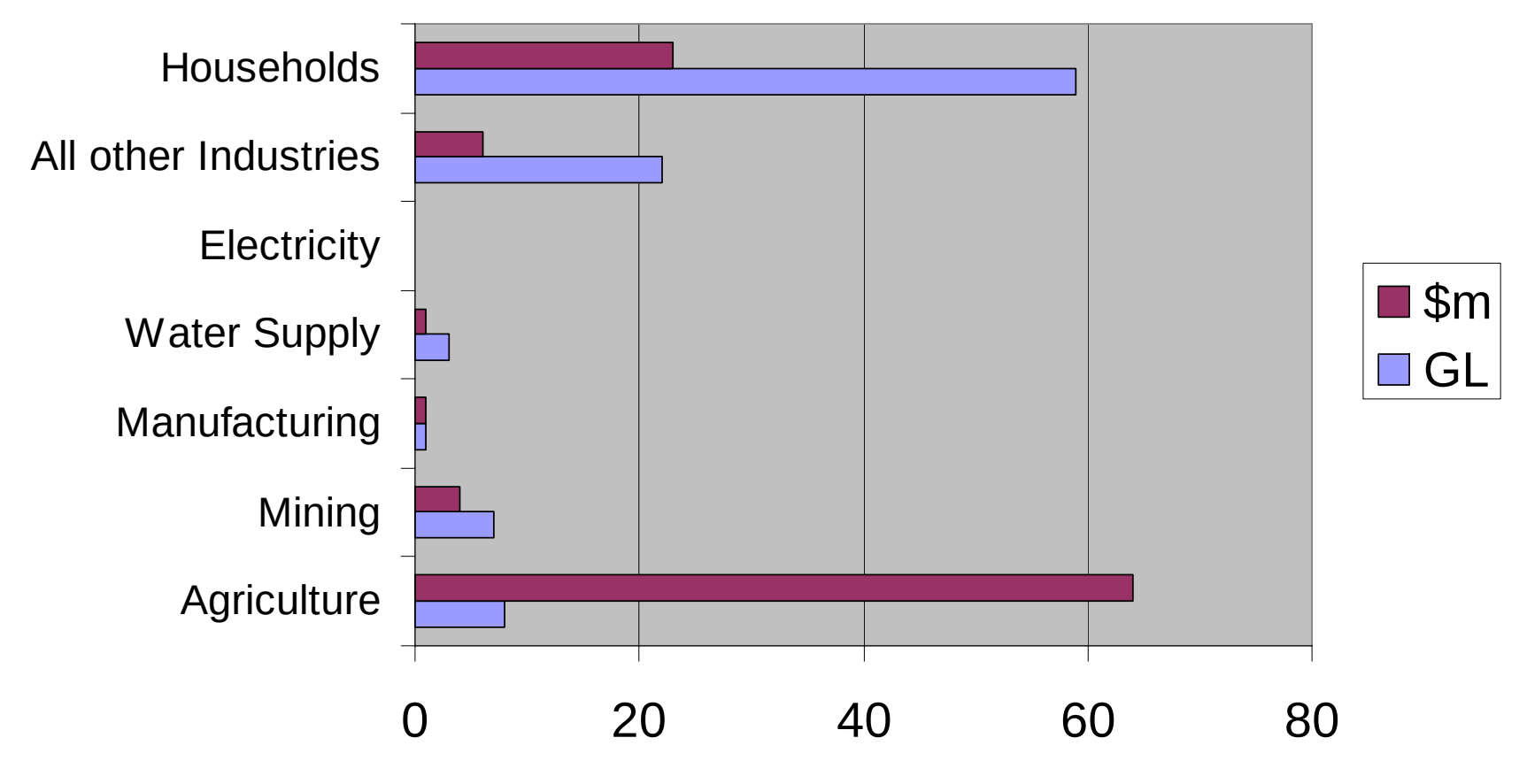
Simple hybrid use table from ABS

Note different reference years for monetary and physical

	Expenditure on water, 2003–04		*Physical use of water, 2004–05*	
	Distributed water $m	*Percent of total %*	*Distributed water GL*	*Percent of total %*
Intermediate consumption				
Agriculture, forestry & fishing	293	8	5,354	64
Manufacturing	235	7	341	4
Mining	51	1	72	1
Electricity & gas supply	92	3	115	1
Water supply, sewerage & drainage	2	0	23	0
Other Industries	746	22	531	6
Total intermediate consumption	1,419	41	6,436	77
Final consumption by households	2,047	59	1,874	23
Total use	3,466	100	8,310	100

Note: Monetary data in this table are considered experimental.

Monetary v physical use of distributed water (% of total use)



Brown = money, Blue = water

Government accounts for water-related activities

- Government expenditure on collective consumption services on water related activities are classified by Classifications of Functions of Government – COFOG
- It includes the following categories:
  - Wastewater management
  - Soil and groundwater protection
  - Environmental protection n.e. c.
  - Water supply

Government accounts for water-related activities

monetary units

	Government (ISIC 84) (by COFOG categories)			
	05.2 Wastewater management	05.3 (part) Soil and groundwater protection	05.6 Environmental protection n.e.c.	06.3 Water supply
1. Total output				
2. Intermediate consumption				
3. Value added (gross) (= 1-2)				

National expenditure accounts

- Aim at recording the expenditure of resident units and financed by resident units for environmental protection
- CEPA-2000 (Classification of Environmental Protection Activities) is the classification for EP It classifies:
  - EP activities (Activities whose primary purpose is the protection of the environment)
  - EP products (e.g. septic tanks)
  - Expenditures for EP (investment grants, taxes, subsidies, acquisition of land for EP, etc.)

Environmental Protection Expenditure related to water

- CEPA-2000 related to water include:
  - Wastewater management
    - Activities of sewerage, administration, use of specific products (e.g septic tanks) and specific transfers
  - Water management and exploitation
    - Activities for the collection, treatment and supply of water, legislation, administration and specific transfers

National expenditure accounts for wastewater management

- Table 5.6 (page 82 of SEEAW) includes, by row:
  - Use of wastewater services [Item 1]
  - Gross capital formation for producing EP services including acquisition of land [2]
  - Use of connected and adapted products (septic tanks and collecting sludge) [3]
  - Specific transfers (current and capital transfers, earmarked taxes, subsidies, etc.) [4]
  - National expenditure = Total domestic uses [5= 1+2+3+4] – the part financed by the ROW [6]

National expenditure accounts for wastewater management

	USERS/BENEFICIARIES					
	Producers		Final consumers			
	Specialised producers (ISIC 37)	Other producers	Households	Government	Rest of the world	Total
1. Use of Wastewater services (CPC 941 and CPC 91123)						
1.a Final consumption						
1.b Intermediate consumption						
1.c Capital formation	nr	Na				Na
2. Gross Capital Formation						
3. Use of connected and adapted products.						
4. Specific transfers						
5. Total domestic uses (=1+2+3+4)						
6. Financed by the rest of the world						
7. National expenditures (=5-6)						

Note: Grey cells indicate non relevant or zero entries by definition; nr not recorded to avoid double counting;

Na not applicable in the case of wastewater management

National expenditure for wastewater management

- Table 5.6 by column:
  - Specialized producers (ISIC 37 is the principal activity)
  - Other producers
  - Final consumers
  - ROW

Financing accounts

Purpose:

- To identify the financing sector of water related products and the beneficiaries
- It analyzes transfers (e.g. subsidies, investment grants, taxes) from whom to whom

Financing accounts

- Table 5.7 (page 83 of SEEAW) shows how wastewater is financed:
  - By row: Financing sectors – institutional sectors in the SNA
  - By column the Beneficiaries (same as table 5.6)

Financing accounts for wastewater management

monetary units

FINANCING SECTORS:	USERS/BENEFICIARIES					
	Producers		Final Consumers (Actual consumption)		Rest of the world	Total
	Specialised producers (ISIC 37)	Other producers	Households	Government		
1. General government 2. NPISHs 3. Corporations 3.a Specialised producers 3.b Other producers 4. Households						
5. National expenditure						
6. Rest of the world						
7. Domestic uses						

Hybrid account exercise: Compiling the Standard SEEAW Hybrid Account for water supply and use for Australia

- Use the data from the Australia Water Accounts and other information provided to populate the standard SEEAW Hybrid account for the supply and use of water.

- You do not have all of the information needed or some of the information is combined (e.g.. some data for the water supply and sewerage industries are combined, ISIC 36 and 37), so do this as best you can.

- For the missing or combined information think of ways you may be able to split the data or fill the data gaps. For the missing data think in terms of does the missing data currently exist? If so where; and how would you get it? If the data do not exist, how could produce or estimate it?

Resources for exercise

- Australian physical supply table 2004-05
- Australian physical use table 2004-05
- Australia industry gross value added 2004-05
- Water Supply and Sewerage Industries: Summary of Operations and Industry Value Added; Australia, 2001-02 to 2004-05
- Australian experimental monetary account 2004-05

Hybrid account for supply and use of water

Physical and monetary units

	Industries (by ISIC categories)									
			35							
	1	2-33, 41 43	Total	*which*: Hydro	36	37	38,39, 45-99	Total industry	Households	Rest of the world
1. Total output and supply (monetary units)										
of which: Natural water (CPC 1800)										
Sewerage services (CPC 941)										
2. Total intermediate consumption and use (monetary units)										
of which: Natural water (CPC 1800)										
Sewerage services (CPC 941)										
3. Total value added (gross) (= 1-2) (monetary units)										
Gross fixed capital formation for water-related infrastructure (monetary units)										
Total use of water (physical units)										
U1 - Total Abstraction										
of which: a.1- Abstraction for own use										
U2 - Use of water received from other economic units										
Total supply of water (physical units)										
S1 - Supply of water to other economic units										
S2 - Total returns										
Total (gross) emissions (physical units)										
Pollutants										

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