Data Generation on Water Abstraction and Water Use
UNSD Tables W2-W4A

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Wien

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Contents of the presentation

- Who is Michael Nagy?
- UNSD Questionnaire‘s tables W2-W4A
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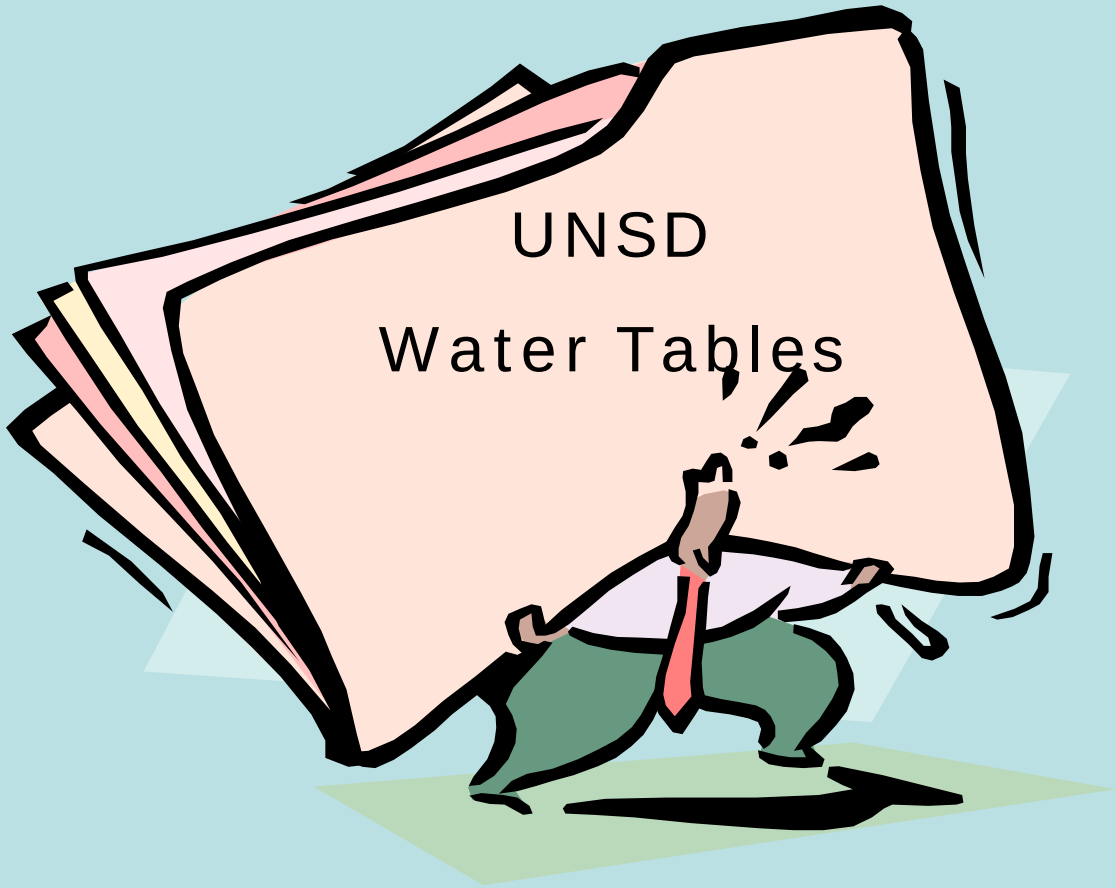
Who is Michael Nagy?

- Since 1998 working for the Austrian Umweltbundesamt (Federal Environment Agency)
- Fields of work related to this Workshop:
  - Austrian UWWTP database + related data politics
  - Preparation of national water data for international statistics (Eurostat)
  - Drafting of national reports for reporting under the UWWT-Directive (91/271/EEC)
  - Consultant of EC (DG ENV) for implementation of UWWT-Directive
  - Project manager in PHARE project for waste water statistics

Country comparison

Country	SYRIA	AUSTRIA
Area	185,180 km²	83,858 km²
Population	15.7 mio.	8.0 mio.
Population dens.	~ 85 / km²	~ 125 / km²
Coast	193 km	No sea
Av. precipitation	~ 225 mm (Damascus)	~ 1170 mm
Av. daily water cons. / person	~ 159 l	~ 145 l
Irrigated land	12,130 km² (6.6 %)	~ 157 km² (0.2 %)
UWWTPs	?	1,495


UNSD
Water Tables

Priority	Category	Unit	1990*
!	**Total fresh surface water abstracted (1)**	mio m^3/y	
!	*by* : Public supply (ISIC 41)	mio m^3/y	
!	Agriculture, fishing and forestry (ISIC 01-05)	mio m^3/y	
	of which for Irrigation	mio m^3/y	
!	Manufacturing industries (ISIC 15-37)	mio m^3/y	
	Production of electricity (ISIC 40)	mio m^3/y	
	Other economic activities	mio m^3/y	
	Households	mio m^3/y	
!	**Total fresh ground water abstracted (2)**	mio m^3/y	
!	*by:* Public supply (ISIC 41)	mio m^3/y	
!	Agriculture, fishing and forestry (ISIC 01-05)	mio m^3/y	
	of which for Irrigation	mio m^3/y	
!	Manufacturing industries (ISIC 15-37)	mio m^3/y	
	Production of electricity (ISIC 40)	mio m^3/y	
	Other economic activities	mio m^3/y	
	Households	mio m^3/y	
!	**Total gross fresh water abstraction (3)=(1)+(2)**	mio m^3/y	
	Water returned without use (4)	mio m^3/y	
	Imports of water (5)	mio m^3/y	
	Exports of water (6)	mio m^3/y	
	Desalinated water (7)	mio m^3/y	
	Total reuse of fresh water (8)	mio m^3/y	
!	**TOTAL fresh water available for use (9)=(3)-(4)+(5)-(6)+(7)+(8)**	mio m^3/y	
	Non-fresh water abstraction	mio m^3/y	

Table W2: Water Abstraction by Source

Total fresh surface water abstracted (part 1)

Total fresh groundwater abstracted (part 2)

Total freshwater available for use (part 3)

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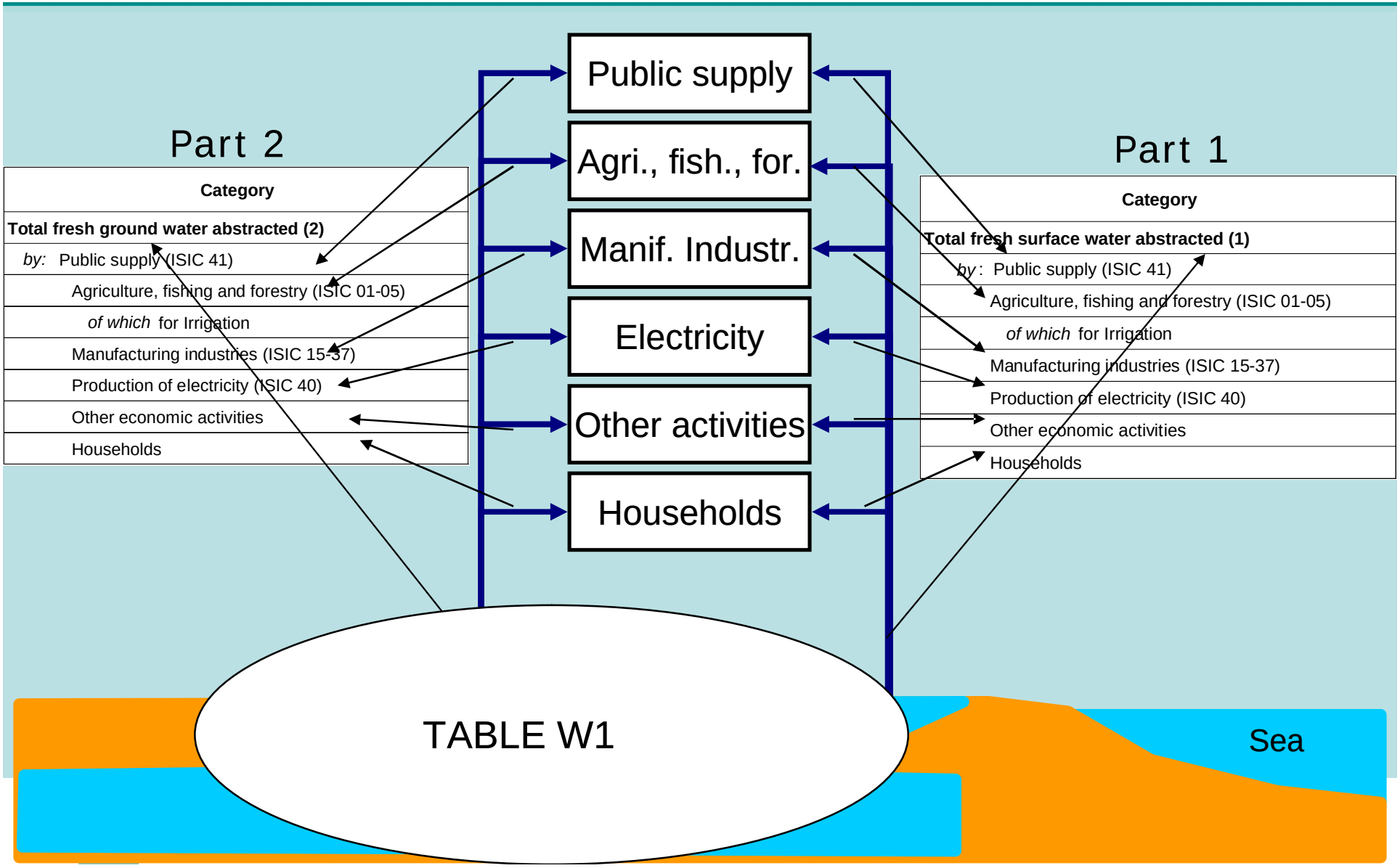
Table W2: Water Abstraction by Source – Water Scheme



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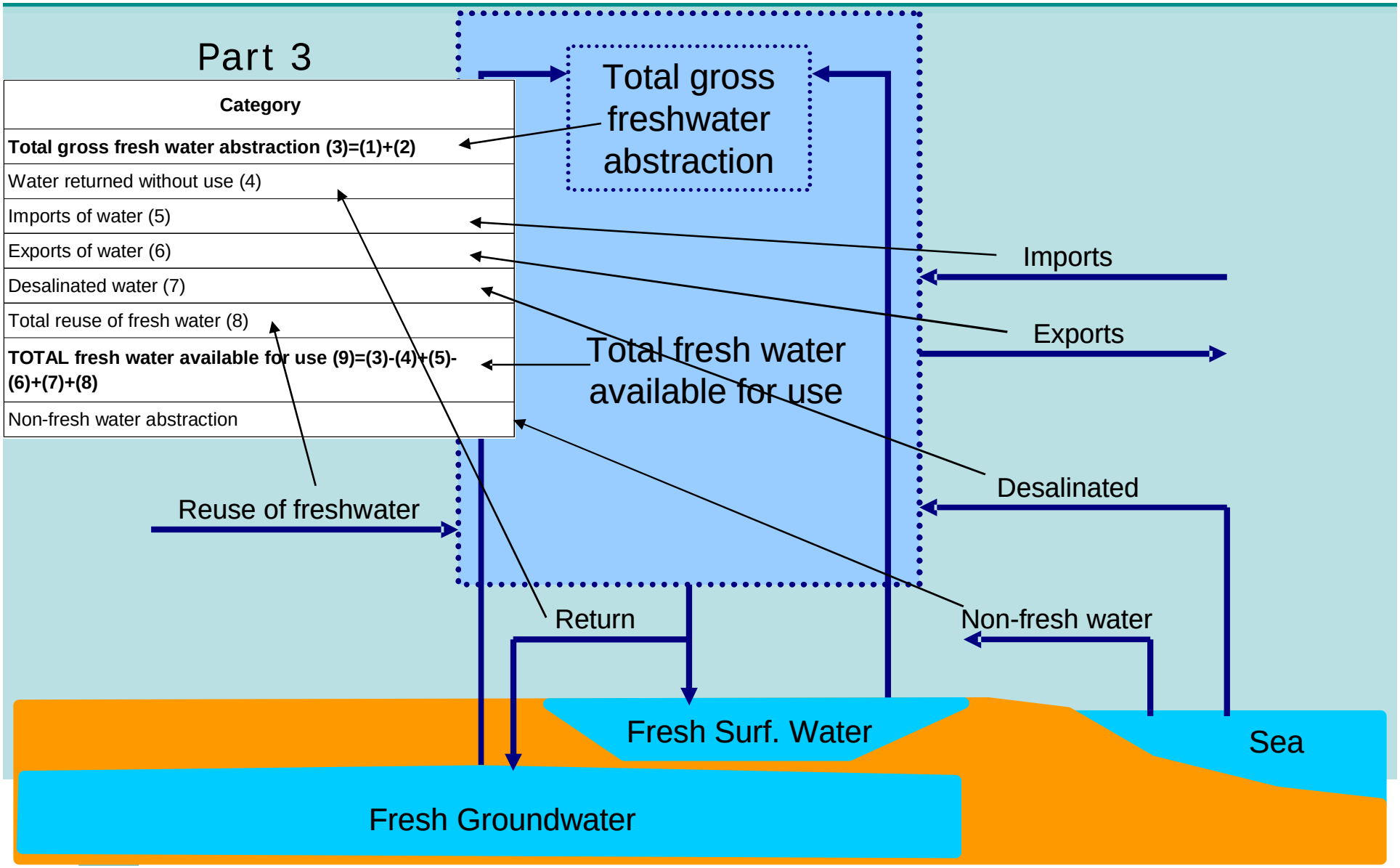

Table W2: Water Abstraction by Source – Definitions, Clarifications

- Fresh surface waters:
  - Includes bank-filtration
- Fresh ground water:
  - Includes springs
- Water returned without use:
  - Discharges into fresh waters without use
  - Primarily during mining and construction activities
  - Discharges into the sea are excluded
  - Not identical with water losses during transport
- Imports and exports:
  - Do not include bottled water

Table W3: Water Use by Supply Category and Activities

Priority	Category	Unit
!	**Total public water supply (ISIC 41) (1)**	mio m^3/y
	of which used by: All economic actitivites	mio m^3/y
	Agriculture, forestry, fishing (ISIC 01-05)	mio m^3/y
	of which for irrigation	mio m^3/y
	Manufacturing industries (ISIC 15-37)	mio m^3/y
	Production and distribution of electricity (ISIC 40)	mio m^3/y
	Other economic activities	mio m^3/y
	Households	mio m^3/y
	Self-supply (2)	mio m^3/y
	Other supply (3)	mio m^3/y
	Total water supply (4) = (1)+(2)+(3)	mio m^3/y
	Water losses during transport	mio m^3/y
!	Population connected to public water supply	**%**

Table W3: Water Use by Supply Category and Activities

Table W2 - ABSTRACTION

Priority	Category	Unit
!	**Total gross fresh water abstraction (3)=(1)+(2)**	mio m^3/y
	Water returned without use (4)	mio m^3/y
	Imports of water (5)	mio m^3/y
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	Desalinated water (7)	mio m^3/y
	Total reuse of fresh water (8)	mio m^3/y
!	**TOTAL fresh water available for use (9)=(3)-(4)+(5)-(6)+(7)+(8)**	mio m^3/y
	Non-fresh water abstraction	mio m^3/y

Total freshwater available for use (W2)

\- Water losses during transport (W3)

Total water supply (W3)

Table W3 – WATER USE

Priority	Category	Unit
!	**Total public water supply (ISIC 41) (1)**	mio m^3/y
	of which used by: All economic actitivites	mio m^3/y
	Agriculture, forestry, fishing (ISIC 01-05)	mio m^3/y
	of which for irrigation	mio m^3/y
	Manufacturing industries (ISIC 15-37)	mio m^3/y
	Production and distribution of electricity (ISIC 40)	mio m^3/y
	Other economic activities	mio m^3/y
	Households	mio m^3/y
	Self-supply (2)	mio m^3/y
	Other supply (3)	mio m^3/y
	Total water supply (4) = (1)+(2)+(3)	mio m^3/y
	Water losses during transport	mio m^3/y
!	Population connected to public water supply	**%**

Total water supply

Water losses during transport

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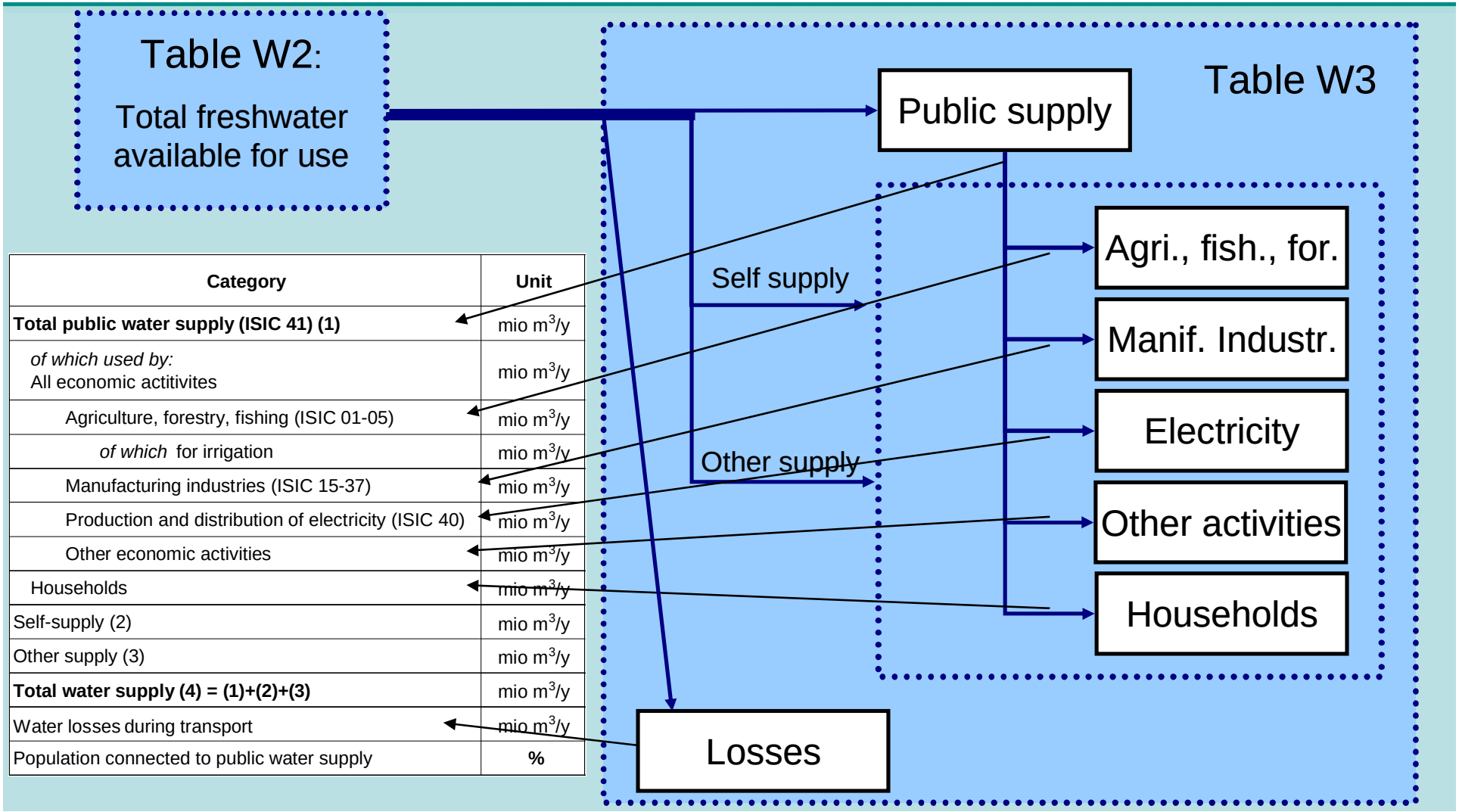

Category	Unit
Total public water supply (ISIC 41) (1)	mio m^3/y
of which used by: All economic actitivites	mio m^3/y
Agriculture, forestry, fishing (ISIC 01-05)	mio m^3/y
of which for irrigation	mio m^3/y
Manufacturing industries (ISIC 15-37)	mio m^3/y
Production and distribution of electricity (ISIC 40)	mio m^3/y
Other economic activities	mio m^3/y
Households	mio m^3/y
Self-supply (2)	mio m^3/y
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Population connected to public water supply	%

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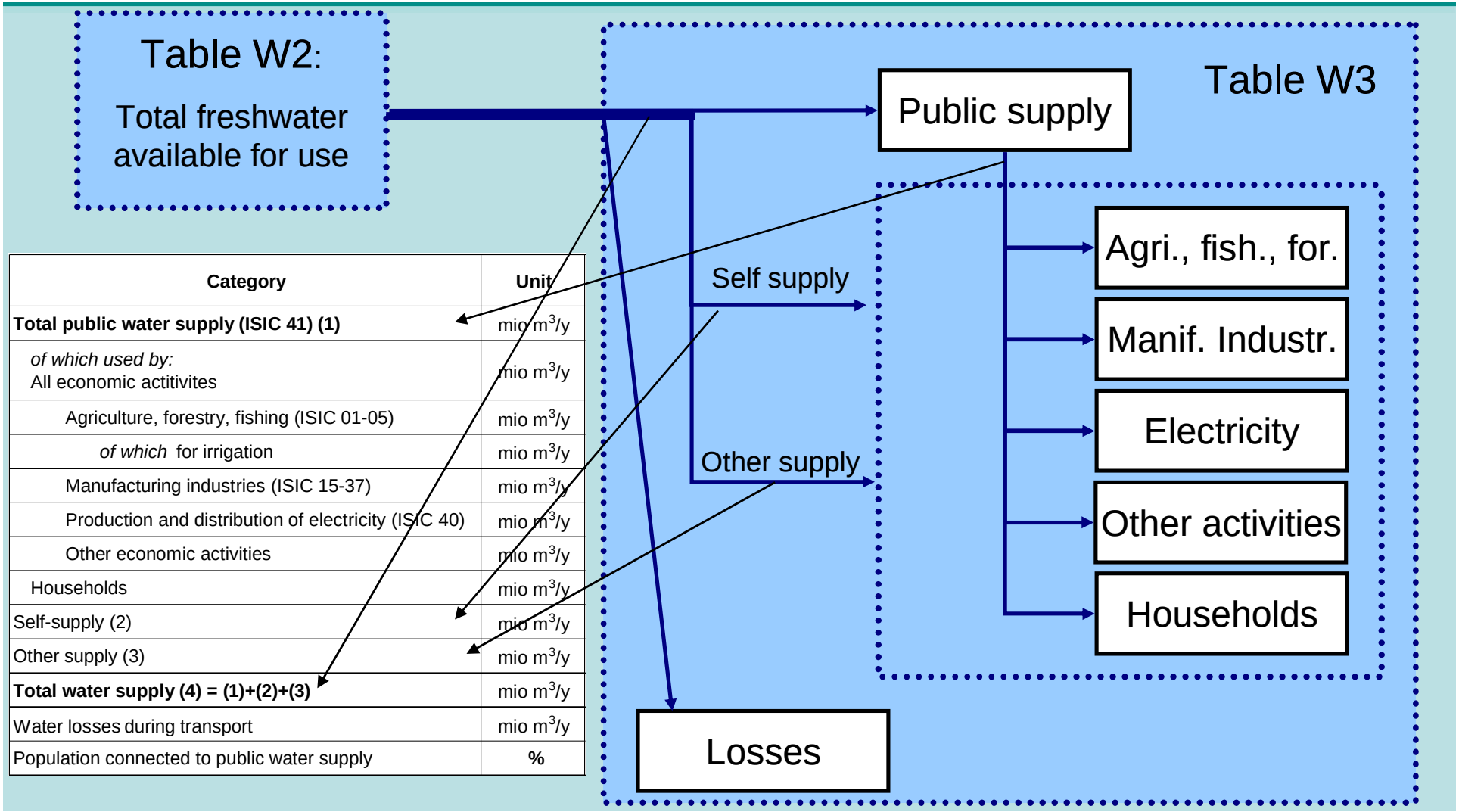

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Self-supply (2)	mio m^3/y
Other supply (3)	mio m^3/y
Total water supply (4) = (1)+(2)+(3)	mio m^3/y
Water losses during transport	mio m^3/y
Population connected to public water supply	%

Table W3: Water Use by Supply Category and Activities – Definitions, Clarifications

- Total public water supply:
  - Includes desalted sea water
  - Excludes system operation for agricultural purposes
  - Excludes deliveries of public water supply to another
- Self supply:
  - Includes water drawn from village wells
- Other supply:
  - e.g. supplies from commercial and industrial establishments
  - e.g. reusable water

Table W4A: Waste Water Generation

Priority	Category	Unit	1990*
!	**Total waste water generated**	1000 m^3/d	
	by: Agriculture, forestry and fishing (ISIC 01-05)	1000 m^3/d	
	Mining and quarrying (ISIC 10-14)	1000 m^3/d	
	Manufacturing Industries (ISIC 15-37)	1000 m^3/d	
	Production and distribution of electricity (ISIC 40)	1000 m^3/d	
	Construction (ISIC 45)	1000 m^3/d	
	Other economic activities	1000 m^3/d	
	Households	1000 m^3/d	

Table W4A: Waste Water Generation – Definitions, Clarifications

- Total waste water generated:
  - No further immediate value
    - quality
    - quantity
    - time of occurence
  - Cooling water is included
  - Not identical with water returned without use (W2)

AUSTRIAN EXAMPLES

Austrian Example – Administrative Background

- Statistics
  - 1 National Statistical Institute (Statistik Austria)
  - No direct surveys on water use and water abstraction
  - Connection rates to public water supply, etc.
- Water Management
  - 1 National Water Act
  - 9 Provinces administrate the Water Act (enforcement)
- Calculation and presentation of national water data
  - Federal Environment Agency: National and international reporting obligations
  - Austrian Gas- and Water Supply Association (AGWSA): Public water supply - voluntary

Austrian Example – Key players for data management

- Statistik Austria – Focal Point for ESTAT, National Surveys (connection rate to PWS, Agrarian Statistics, Material Input Survey, Energy Statistics...)
- Ministry of Agriculture, Forestry, Environment and Water Management – Water Act, Hydrographic Information
- 9 Provincial authorities – Enforcement and regional data collection
- Federal Environment Agency – National data collection
- Austrian Gas- and Water Supply Association (AGWSA) – Public water supply

Austrian Example – Background and assumptions for data calculation

- Water losses only considered in public water supply
  - Big supply networks and long water pipes
  - Data of good quality available at AGWSA
- Water consumption / person connected to PWS = water consumption / person not connected to PWS
- Cooling water is not considered as waste water (not valid for UNSD Questionnaire!)
- Waste water generated = water abstraction – consumptive use – cooling water

Austrian Example – Priorisation of available data

- 1. Metering of water abstraction / supply
  - Accuracy
  - Data flow to national institutions
- 2. Calculated with use factors
  - Derivation of factors
  - Calibration of factors
- 3. Estimation / calculation based on enforcement data
  - Permitted uses
  - Surveillance monitoring (is the permitted use exceeded?)

Austrian Example – Data availability / Sector (situation 1999)

- PUBLIC WATER SUPPLY (ISIC 41):
  - Annual reports based on metered volumes (AGWSA statistics)
  - ~ 65 % of population covered by reports
- DOMESTIC SECTOR:
  - Population connected to PWS 1981 and 1991 (Statistik Austria)
- MANUFACTURING INDUSTRY:
  - Annual data from survey until 1994 based on measurements and "plausible estimations" (Statistik Austria)
  - Cooling water included
- PRODUCTION OF ELECTRICITY (ISIC 40):
  - Cooling water is not measured
  - Information about produced electricity available from national reports
- IRRIGATION:
  - Data on irrigated area 1994 and 1999 (Statistik Austria)
  - Crop-specific irrigation volumes (studies, Farmers Assoc.)

Austrian Example – Public Water Supply

Available data:

- Abstraction, supply and losses of most of the water works (AGWSA)
- Population supplied by AGWSA water works (AGWSA)
- Population connected to PWS (Statistik Austria) – every 10 years

Calculation:

Step 1: data collected in AGWSA statistics were assigned to provinces

Step 2: water pumpage and supply figures were grossed up on the basis of inhabitants connected to the public water supply

Province of Upper Austria 1996

STATISTIK AUSTRIA data

a) Inhabitants: 1.381 mio.

b) Population connected to PWS: 74.4 % ≈ 1,027 mio. people

AGWSA data

c) Pumpage by AGWSA water works: ~ 50 mio. m³

d) Population supplied by AGWSA water works : 689,180 ≈ 67.1% of population connected to PWS

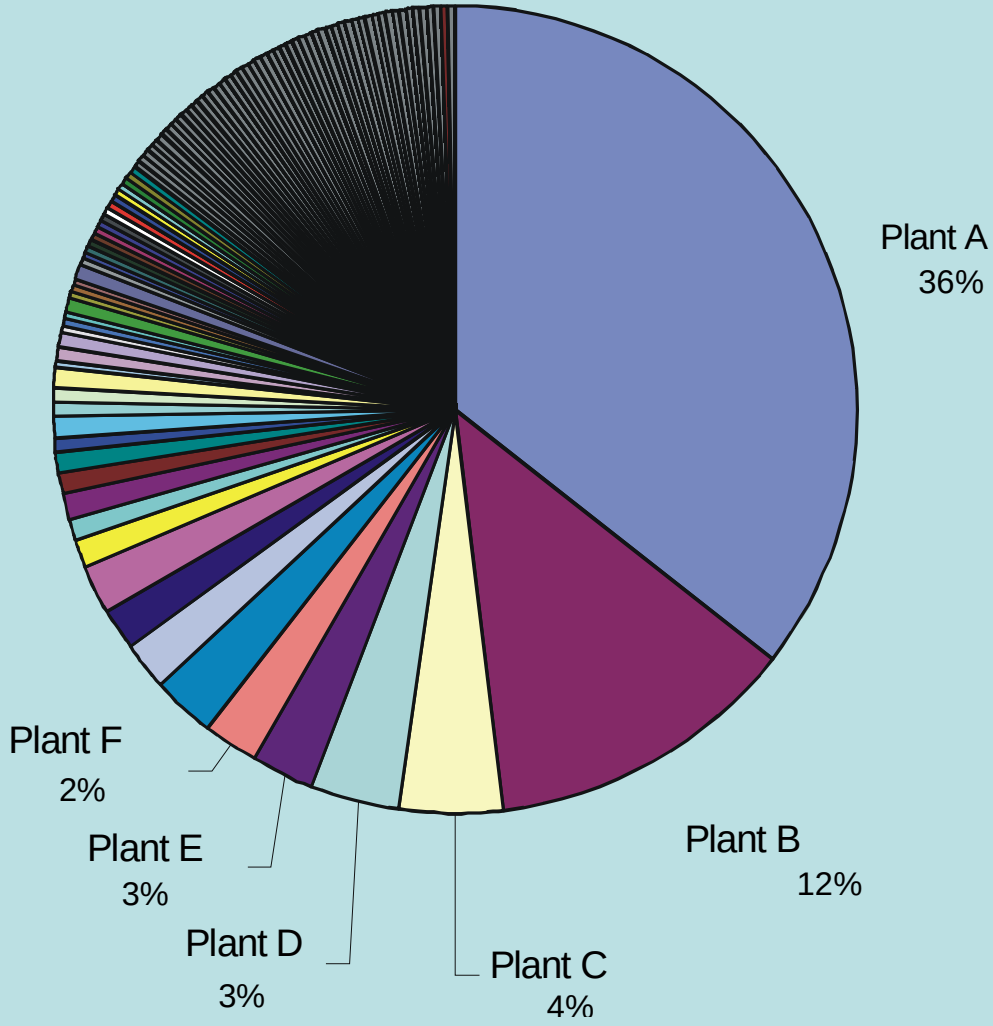
Final calculation: $\frac{c)}{d)} = \frac{50\ \text{mio. m}^3}{67.1\%} = 74.5\ \text{mio. m}^3$

Austrian Example – Self Supply of Households

- Assumptions:
  - Water consumption / person connected to PWS = water consumption / person not connected to PWS
  - No losses during transport (à abstraction = use)
- Data sources:
  - Statistik Austria: Total population and population connected to PWS
  - AGWSA: Average annual water consumption / person
- Calculation:
  - (Total population – population connected to PWS) x average water consumption

Austrian Example – Industrial Water Use

6 industrial plants cover
60 % of water use



Austrian Example – Industrial Water Use

- Individual information about dominating users from annual questionnaires
- + grossed up representative samples of „typical users / sector“ (Industry Statistics)
- Probably full survey every 6 years in the future

Austrian Example – Irrigation

Available data

- Metered data
  - only from water cooperatives available
  - available only on regional level
- Irrigated area from Agrarian Statistics
- Climatic information
- Crop specific irrigation volumes
  - Studies
  - Regional Farmers Associations

Austrian Example – Irrigation

Calculation

Objectives of the calculation

- Taking into account regional and system-specific differences
- Taking into account actual climatic conditions

Calculation - “mixed approach”

Step 1: Collection of metered data

Step 2: Assessment of climatic conditions for each year and region

Step 3: Calculation of region-specific irrigation value / ha by using national data (irrigated area, crop- and climate specific volumes)

Step 4: Final calculation:

$$\left(\sum \text{metered volumes}\right) + \text{remaining area} \times \text{region specific irrigation value}$$

Austrian Example – Cooling Water in Caloric Power Plants

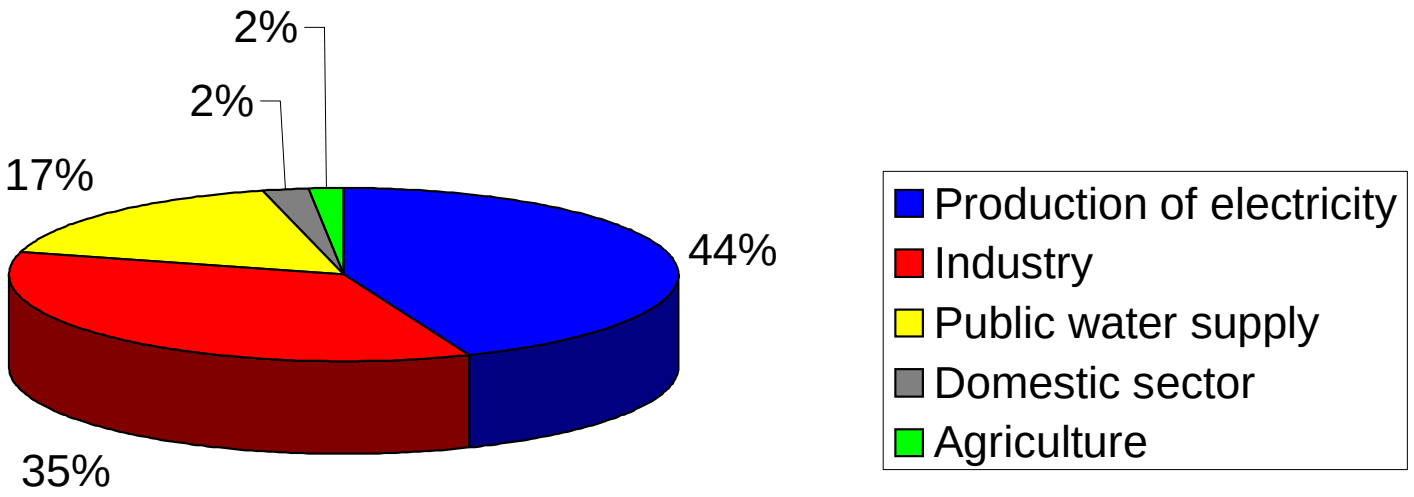
Available data

- Electricity produced by caloric power plants for each region and year (Energy Statistics of Statistik Austria)
- Estimated or measured use of cooling water of a few plants

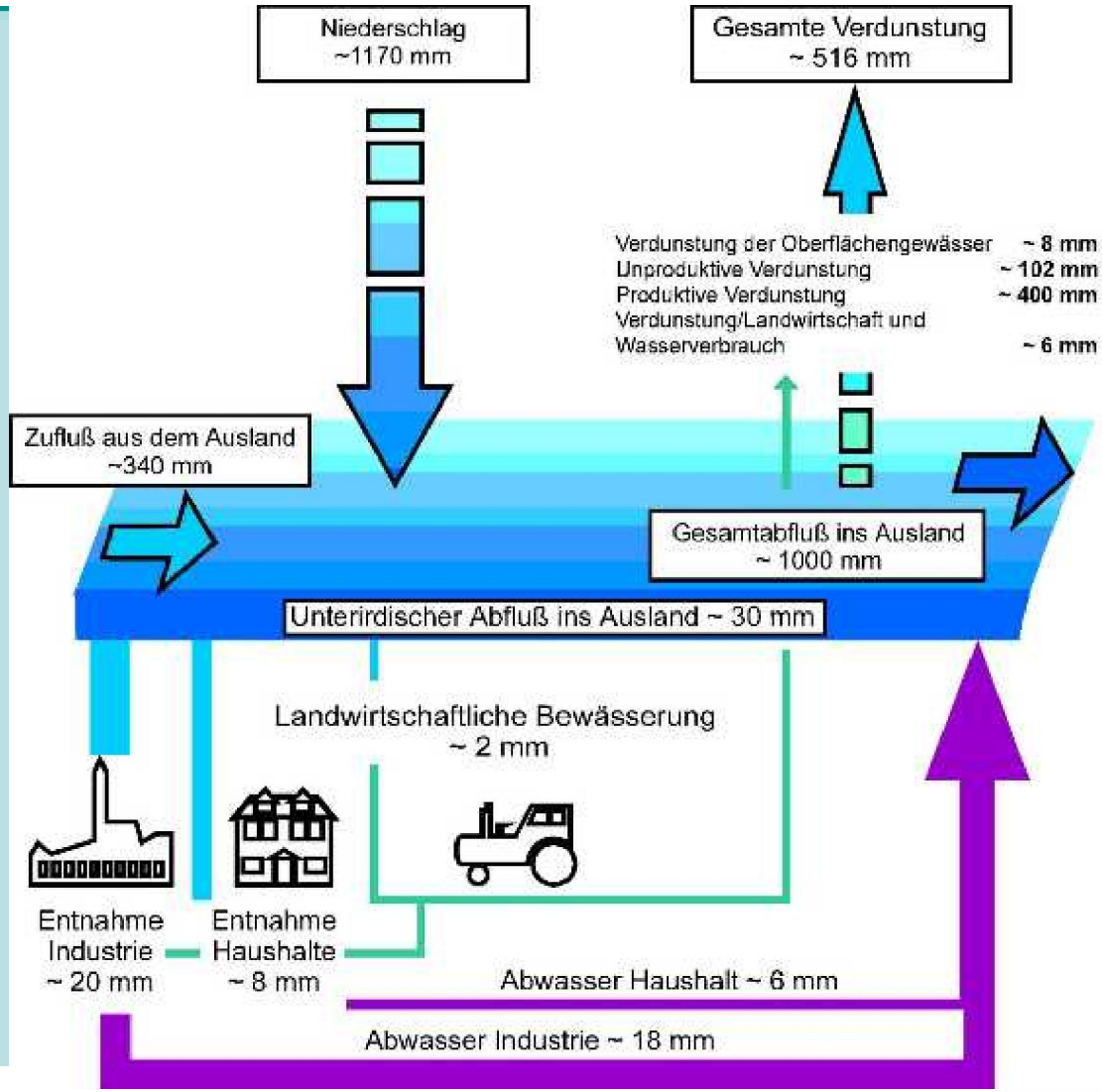
Calculation

(Average m^3/GWh) x produced electricity

Austrian Example – Total National Supply



Austria – Long Term Average Water Balance



Conclusion

Data on water uses is often a by-product

- Economic needs (e.g. acounting of actually used water of water cooperatives)
- Material input statistics
- Enforcement (surveillance monitoring of the authority, self-monitoring of the operator)
- ...

Conclusion

Usually there are many national partners involved

- Authorities
- National Statistical Institutes
- Professional associations or cooperatives
- Environment Agencies
- Universities
- ...

Conclusion

Consistency of data requires

- Agreed terminology (glossary, water flow schemes)
- Defined data flows (law, bilateral contracts etc.)
- Duplicable calculation methodologies
- ...

Thank you very much for your attention!

Michael Nagy