Water accounts consultation support

EU wide exercise for the "Blueprint 2012"

Report 1: target, methodology and data used

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Version history

Version	Date	Author	Status and description	Distribution
0	*12/07/2012*	*PCR*	*Pre-draft for internal and DG consultation*	*To ROU, BWE, P Gammeltoft, J Delsalle, H Faergemann*
1	*25/6/2012*	*PCR*	*Populated draft (except Industry and final balances).* *For pre-review and possible diffusion as 1st information*	*J Delsalle, G le Gall, M Basso, P Campling*
1-1	*30/6/2012*	*PCR*	*Inserting data and assessments from the WISE domestic water collection*	*J Delsalle, G le Gall, M Basso, P Campling+ NSV1*
1-2	*3/07/2012*	*PCR*	*Full inserting of WISE + WFD MP data prior to i) inserting industrial data and ii) inserting WEI data results*	*G le Gall, M Basso, P Campling*
1-3	*5/7/2012*	*GLG*	*Inserting adjustments*	*G le Gall, M Basso, P Campling*
1-4	*5/07/2012 to 9/7/2012*	*PCR*	*Completing former remarks, snow* *Industrial datasets*	

Abbreviations

Contents

1 Presentation document

1.1 *Purpose of the consultation*

DG Env has launched, after public consultation, a process to carry out the computation of water balances under the SEEAW framework, nicknamed "European water accounts". This work has been contracted to a consortium led by Pöyry and comprising SCM (data reconstruction support) and Vito (water uses data in relation with energy and industry).

The EEA has contributed by providing the reference system 'Ecrins v1), climatic data, river run-off (collected data) and a large support in human population and urban / domestic water uses.

The outcomes of this first comprehensive exercise are manifold:

1. Provision of input / output (I/O) tables (sub-basin and monthly resolution) under the SEEAW framework,
2. Provision of comprehensive (because completed) of fundamental data sets (detailed in further sections);
3. Provision of comprehensive computed data sets ready for processing and assessments beyond the strict frame of the SEEAW I/O tables.

1.2 *Scope of this document*

The final results require some checking, possibly needing some calibration of the water balances. In order not to delay the consultation, the supporting documents have been elaborated in two reports:

- This reports that comprises the source methodology summary;
- The data sets required for computation of water balances and the methodological adjustments,
- The analysis of each data source, on a summarized way, so that each Member state can:
    - o Best understand the possible inaccuracies in the results next submitted, according to the data that can have been collected for this territory,
    - o Immediately react and propose alternate or supplementary data that could not have been mobilised during the work, and possibly envisaging new computation of results accordingly.

1.3 *Basic principles of water balances within SEEAW*

1.3.1 The SEEA principles

The SEEA (systems of Environmental and economic accounting). The SEEA aims at intertwining economy and the environmental components. The SNA, as a basis for national accounts is now accepted by all countries (except North Korea and Cuba); the SNA is the source of nomenclature for all accounts.

The purpose of the SEEA 2003[1] is to explore how sets of statistical accounts can be compiled which will permit investigation and analysis of the interaction between the economy and the environment. Policy makers setting environmental standards need to be aware of the likely consequences for the economy. Recent legislations at the EU level explicitly demand these relationships to be made, to implement soundly the "polluter pays" principle that applies indeed to much more actors than polluters.

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[1] This chapter is directly inspired by the SEEA 2003 manual; and is and edited summary of many paragraphs taken from the SEEA 2003 manual.

The paramount ambition of the SEEA is to allow links to be made to economic series which impose first and foremost to harmonise the environmental data, with the likely simplifications that are required. Does a certain type of activity which is environmentally sensitive play a particularly large role in international trade of the country or provide strategic resource (products, many employment opportunities)? If common units can be used, the possibility of aggregation and the presentation of simple indicators are facilitated.

The SEEA is based upon building blocks that are:

1. Physical flow accounts, that expresses flows between the environment and the economy (e.g. water abstractions / returns);
2. SNA flow accounts , this is only economic fluxes;
3. Environmental assets, that can be expressed in monetary and physical units, depending on the category
4. Valuation and environmental adjustments. Still very conceptual.

The water accounts exercise carried out under the demand by the DG Env aims at blocks 1 and 3, so that hooking to block 2 could be possible.

1.3.2 The SEEAW definition and necessary adjustments

The SEEAW has been designed to link the economic information, that makes explicit how much and by which ways water taken from the environment is being used as economical component, with hydrological information in order to provide the users with a tool for integrated analysis. The SEEAW takes the perspective of the economy and looks at the interaction of the economy with the hydrological system.

Its implementation is educated by manual, the IRWS (International Recommendations for Water Statistics), issued in 2009 and was used as basis for implementing the SEEAW at the European level. It completes the basic concepts and distinguishes the inland water resource system that mimics the hydrological cycle in the environment and the economy. The economy part relates to the inland water resource systems by abstractions from and returns to the environment.

The EEA developed the implementation of the SEEAW principles at the European level. These principles are sketched in Figure 1.1. The important elements of adjustments are the space and time resolution of the calculations. The rules set by the SEEAW make the distinction between:

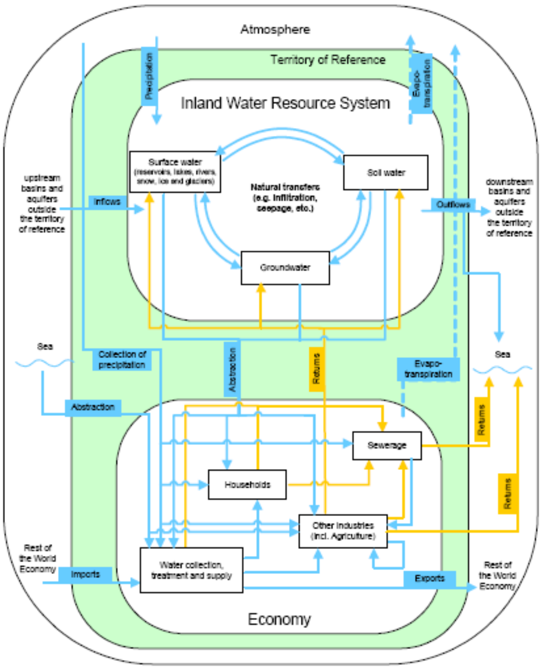
- The “territory of reference” which is the area at which resolution the I/O table is compiled;
- The “Inland water resource system” within this territory that receives water from rain, other territories and export to the sea or other territories of reference
- The “Economy” within this territory of reference, which resource system is the natural provider ; however imports and exports of water can be done from any external system (other natural resource / other economic systems)
- The “statistical unit”, despite not defined in the figure, constitutes the elementary element of analysis which values are aggregated at the level of the territory of reference.

Making the water accounts operational require defining the space resolution and the time resolution. Most past applications of the SEEAW resulted in nation level and year aggregates. In the case of the European implementation, these simplistic resolutions were adjusted, after analysing the key constraints of water accounting that are summarized as:

- Money can be spared and loaned, water can be spared, not loaned; hence the time resolution must be short enough to identify water demand and resource that may temporarily match. The monthly step has been chosen because being the best compromise between sound ness and feasibility;

- Money can be transferred without physical device, water cannot. Hence the area of accounting must be spall enough to make water needs and water resource adding and subtracting. If special piping is required, it is a transfer, not plus and minus in the I/O table. The sub-basin area (a few 10,000km2) has been taken as “territory of reference “ and the elementary components of catchments (FECs, river segments, individual lake, etc) as “statistical units”.

Figure 1.1: Main flows within the inland water resource system and the economy



1.3.3 SEEAW results presentation

The SEEAW results are assets and supply and use tables, which fac-simile is reported below.

Figure 1.2: Facsimile of the assets accounts table, as demanded by the SEEAW 2007

Table 6.1: Asset accounts

Millions cubic metres

	EA.131 Surface water						
	EA.1311 Artificial Reservoirs	EA.1312 Lakes	EA.1313 Rivers	EA.1314 Snow, Ice and Glaciers	EA.132 Groundwater	EA.133 Soil water	Total
1. Opening Stocks	1,500	2,700	5,000	0	100,000	500	109,700
Increases in stocks							
2. Returns	300	0	53		315	0	669
3. Precipitation	124	246	50			23,015	23,435
4. Inflows	1,054	339	20,137		437	0	21,967
4.a. From upstream territories			17,650				17,650
4.b. From other resources in the territory	1,054	339	2,487	0	437	0	4,317
Decreases in stocks							
5. Abstraction	280	20	141		476	50	967
6. Evaporation/Actual evapotranspiration	80	215	54			21,125	21,474
7. Outflows	1,000	100	20,773	0	87	1,787	23,747
7.a To downstream territories			9,430				9,430
7.b To the sea			10,000				10,000
7.c To other resources in the territory	1,000	100	1,343	0	87	1,787	4,317
8. Other changes in volume							0
9. Closing Stocks	1,618	2,950	4,272		100,189	553	109,583

Note: Grey cells indicate zero entries by definition.
Source: SEEAW-land.

The standard table for asset accounts for water resources is presented in Figure 1.2. The columns refer to the water resources as specified in the asset classification, and the rows describe in detail the level of the stocks and the changes therein due to economic activities and natural processes.

Exchanges of water between water resources are also described in more detail in a separate table (Table 6.2 in SEEAW 2007), displayed in Figure 1.3.. This table, which expands the information in rows 4.b and 7.c of Table 6.1, displayed in Figure 1.2, provides information on the origin and destination of flows between the water resources of a territory of reference. This table is also useful for the calculation of internal renewable water resources and for reducing the risk of double counting when assessing separately this indicator for surface and groundwater due to the water exchanges between these resources

Figure 1.3: Facsimile of the matrix of flows between water resources, as demanded by the SEEAW 2007

Table 6.2: Matrix of flows between water resources

Millions cubic metres

	EA.131 Surface water						
	EA.1311 Artificial Reservoirs	EA.1312 Lakes	EA.1313 Rivers	EA.1314 Snow, Ice and Glaciers	EA.132 Groundwater	EA.133 Soil water	Outflows to other resources in the territory
EA.1311 Artificial Reservoirs			1,000				1,000
EA.1312 Lakes			100				100
EA.1313 Rivers	1,000	293			50		1,343
EA.1314 Snow, Ice and Glaciers							0
EA.132 Groundwater			87				87
EA.133 Soil water	54	46	1,300		387		1,787
Inflows from other resources in the territory	1,054	339	2,487	0	437	0	4,317

Source: SEEAW-land.

The supply and use tables are built on the same pattern as the assets tables are.

Figure 1.4: Facsimile of the physical supply and use table for water, as demanded by the SEEAW 2007

Table 3.1: Standard physical supply and use tables for water

Physical use table

Physical units

		Industries (by ISIC categories)									
		1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total	Households	Rest of the world	Total
From the environment	**1. Total abstraction** (=1.a+1.b=1.i+1.ii)										
	1.a. Abstraction for own use										
	1.b. Abstraction for distribution										
	1.i. From water resources:										
	1.i.1 Surface water										
	1.i.2 Groundwater										
	1.i.3 Soil water										
	1.ii. From other sources										
	1.ii.1 Collection of precipitation										
	1.ii.2 Abstraction from the sea										
Within the economy	**2. Use of water received from other economic units**										
3. Total use of water (=1 + 2)											

Physical supply table

Physical units

		Industries (by ISIC categories)									
		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**										
	of which:										
	4.a. Reused water										
	4.b. Wastewater to sewerage										
To the environment	**5. Total returns** (=5.a+5.b)										
	5.a. To water resources										
	5.a.1. Surface water										
	5.a.2. Groundwater										
	5.a.3. Soil water										
	5.b. To other sources (e.g. sea water)										
6. Total supply of water (=4+5)											
7. Consumption (=3-6)											

Note: Grey cells indicate zero entries by definition.

They comprise two distinct tables: the supply and use proper, making explicit, at the space and time chosen resolution, the source of environmental resource used to provide water to and economic sector, sorted by ISIC category. The information presented in table 3.1, (physical use from the environment in Figure 1.4) is indeed part of the resource assets accounts, under EEA understanding because water use by economic sectors and the return flows have direct impact on the resource. The appropriate computation of data from tables 6.1, 6.2 and 3.1is the way to make the WEI indicators, scarcity and drought indicators, etc.

Both tables are presented in the results, with slight modifications since the computation volumes make sit necessary to read databases with Excel Pivot functions.

1.4 Data components of the SEEAW implementation

The full system of water assets and physical uses and supply (excluding table 3.2 of flows within the economy) is based on 5 groups of data sets:

1. Reference systems that defines the statistical units and the territories of references;
2. Climatic data sets providing rain fall, actual and potential evaporation and soil water plus (as control) effective rainfall (= likely run-off to surface and ground water); snow and ice cover are possibly taken into account despite source data is missing,
3. River discharge that express the final balance (in principle after abstractions and returns and considering lake and reservoir storage). River discharge is the most objective data sets, being in principle fully documented by observations;
4. Water abstractions, uses and returns, apportioned into 4 sub-groups and clustered under the NACE:
    a. Urban and domestic uses
    b. Industrial (good production) uses
    c. Energy (cooling, and where possible turbining)
    d. Agricultural uses, taking stock of rain fed agriculture (this is direct use of natural resource) and irrigation (that is abstraction from natural/artificial) sources
5. Synthetic tables of consolidation

2 Datasets contents and elements submitted to analysis

2.1 Contents of the chapter

2.1.1 Purposes of summary data provision

This chapter describes the different data sources collected, processed, completed or just modelled to carry out water accounts computation. This computation is the first full scale water balance under the SEAAW carried out at the EU level. Some data sources have a high level of coverage and reliability, other ones are highly modelled.

The purpose of this description is to raise awareness of member States experts on the rationales used for this task and provide them with element of data sources so that they can analyse the quality of the outcomes with full information about the sources of information provided. When possible, the member states are encouraged to complete the data sets or to provide the references of these data if they consider this provision useful to correct and improve the findings.

If changes are substantial and likely to actually modify these findings, then complementary computations could be envisaged by the DG Env (if resource available). Otherwise, data shall be kept and prepared so that the repetition of the exercise could be carried out in better conditions.

2.1.2 Scoring scope and methods

The simplest method to simply inform about data source is scoring each category of data per country. The scoring applies d to data source and indicates a semi-quantified assessment of the quality of data. By decreasing order of data quality are found:

1. Original data (e.g. river discharge from monitoring, abstraction for that city, etc.) provided by original source is considered best quality and scored 1;
2. Targeted data (e.g. abstraction for that city) found on a non-original source (e.g. Wikipedia) is considered second choice and scored 0.75;
3. Non-targeted data (e.g. computed with generic technical coefficients, space reconstructed river discharge) is considered last quality and score 0.25.

Application of scoring is applied to the quantities mobilised and rationalised to range [1-0] systematically. The elementary scores 1, 0.75 and 0.25 are applied with respect to the way the dta was expected to be computed. For example, all river discharge should come from monitoring; by contrast domestic volumes in the scattered populations layer is not expected to be collected by abstraction: national coefficients are hence scored 1 and EU level coefficients would be scored 0.75 instead.

Scoring does not preclude any judgement or classification of member states albeit reported per member state since this gives information of the relative share of data from original sources that had been mobilised from each country. This scoring has been applied as well to non EU countries, that are documented in this report only if relevant for the full understanding of the issue.

2.2 Reference system

2.2.1 Definition and source

In 2008, the EEA developed a European wide system, nicknamed ECRINS (for European Catchments and RIver Network System) from the CCM version 2produced by the DG JRC and complementary sources of information. The current version (V1.0), modified after trial implementation of the water accounts methodology in 2008-2009has been used for the production and processing of the results submitted to evaluation.

The source CCM comprised raw elementary catchments and drainage segments as outcome of the processing of the ERTS 1989 mission. This data set, because obvious qualities of area covered, topological relationships and absence of licensing has been taken by the EEA for its processing.

The EEA development consisted in fully reprocessing the source data sets, add complements, check and correct errors and make it usable for modelling, reporting and hosting purposes. The features of Ecrins are:

- A set of catchments. CCM comprises 1,409,644 CCM elementary catchments apportioned by “basins”, sets of catchments having same outlet and having Strahler hierarchy.

  Ecrins is made of layer of 181,071 “functional elementary catchments” (FECs) created by clustering the CCM elementary catchments within a narrowed size range.

  The FECs are organised by:

  - marine shore (based on Marine Strategy), the islands being fully revised and reallocated;
  - clustered into RBDs, functional districts,
  - sub-basins Strahler, sub-basins hydrological,
  - country and region

- A set of river elements. CCM has a layer of 1,348,163 “river segments” and nodes, connected to elementary catchments.

  Ecrins making lend to remove ~160,000 spurious segments and correct several topological errors (not all corrected). The supplementary information inserted is:

  - Main drains, that connect FECs together (other are drains inside a FEC), hence allowing to analyse “main rivers”;
  - Routes, that define “dummy rivers”, from spring to outlet or confluence (with distance to sea);
  - Rivers, that are sets of drains with the same name (~22,000 rivers created).

- A newly created set of lakes based on Corine *Land cover* (validated against ERM and Art 13 deliveries), locally completed by the water layer computed with CCM. This data set counts 70,847 lakes, connected to river segments (inlets and outlets if relevant), connected to dams known by the EEA (about 3,000, figure constantly evolving) and, for the largest, completed by hydrographical information taken from external sources: Art13 and mostly Wikipedia (depth, volume of natural lakes), completing volume information provided by the dams database Eldred2.
- The simplified groundwater systems, made from BGR transboundary aquifers in Europe could not be yet completed but shall be added to Ecrins V1.5 under preparation (it is not part of the submission).

2.2.2 Place of the data sets and expectations

Ecrins data sets are on the EEA data service, along with the EEA technical report # 9/2012 (number to be confirmed).

A list of found topological errors as detected during the process will be provided separately.

This data sets are provided for information and if relevant, complements to topological errors so that the corrections in v1.5 could be as comprehensive as possible.

2.2.3 Scoring

Having no reference to score the reference system, it has not been scored.

2.2.4 Envisaged corrections

Correcting topological errors (that may lead to uncertainties in water balances) impose recomputing the whole system, thus requiring ~1 full week (Once errors corrected in source data sets) and imposes creating a new version, to be implemented in the different applications because leading to changes in IDs of the modified / changed objects. Hence the recomputation is carried out sparingly.

2.3 Climatic data sets

2.3.1 Role in the process

Climatic data is used to populate different cells in the WA tables. All climatic data is apportioned at the relevant level for these tables:

- At the FEC level, possibly disaggregated between land and water masses (e.g. lakes) since this break-down is demanded;
- At the land cover relevant level to address separately the agricultural and other land types (to compute rain fed agriculture water volumes);
- Taking into account soil type and apportionment between GW and SW.

2.3.2 Data source and provision to the accounts procedure

Two source data have been examined by the EEA expert; MARS and E-OBS. The second[2] was selected because:

- Unrestricted availability (MARS, despite JRC managed became access restricted);
- Resolution is 25 km instead of 50 km
- gridded daily observation dataset is more homogeneous (MARS being agriculture targeted has less accurate results in mountainous areas)
- despite less addressing some important variables (e.g. snow coverage, however poorly populated).
- Despite having some gaps in coverage of the coastal catchments.

Meteorological parameters are: Precipitation, temperature (mean, min and max) and air pressure.

Source data has been processed with model developed by Blaz Kurnik (EEA) that computes rain fall, potential and actual evaporation, soil water and run-off from the aforesaid meteorological data and soil characteristics (field capacity and wilting point), as compiled by ETC/SIA from the soil data centre (JRC). Processing is carried out on a daily basis and balances soil water at this range. Monthly aggregates and then computed.

Modelled data is provided as raster files, with kilometric resolution (adjusted to the LEAC grid) for each data and each parameter. EEA in-house process i) transfers raster data as clustered series of parameters for one date as SQL Server data sets (accessible to public on request) and ii) aggregates kilometric data into FECs, substantially squeezing data size. The aggregated data, for the 10 years of simulation, can be handled as a single MS Access® database.

2.3.3 Snow and ice

Snow and ice are important features of the accounts. When MARS data was in use (preliminary calculations, 2009-2010) filed “snow” was in use. It soon appeared that this field was oddly populated and that corrections had to be systematically inserted.

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[2] Data source : http://eca.knmi.nl/download/ensembles/ensembles.php

Systematic data provision from alternate source has been started, but no usable data could be organised for this accounting exercise.

Part of Precipitation that is Snow is assessed from monthly FECs precipitation values trough a parameterized limit compared with monthly average temperature of the FEC. It means that if monthly average temperature over the FEC is below the limit (taken equal to zero degree for current calculation), precipitation is considered to be snow and is stored (as water volume) in the category “EA.1314 Glaciers, snow and ice” of the SEEAW asset classification.

Snow melt can be calculated from approximation of monthly transfer from category “EA 1314 Glacier, Snow and Ice” to “EA 133 Soil Water” and other surface water categories. Snow melt is calculated using a Swiss based formula with both parameterized thawing coefficient (set to 2 mm/°C/day) & thawing threshold (set to 0 degree C). For the first month of the calculation period, snow stocks have been set to be null.

Table A.1.1: averaged snow volume (hm3) computed from this approach are, per country

CTY	Total Snow	1	2	3	4	5	6	7	8	9	10	11	12
AD	162	39	30	19								42	33
AL	2,577	733	860	65								83	836
AT	23,364	4,855	4,223	4,350	1,199	46				71	566	3,015	5,040
BA	6,909	2,171	2,953	61									1,724
BE	1,015	312	649										54
BG	12,940	3,256	4,372	70	24							79	5,139
BY	168	41	42	35								15	35
CH	16,163	3,320	2,726	2,547	1,809	97					525	2,288	2,852
CZ	10,617	3,019	2,678	2,272								57	2,590
DE	35,230	12,874	9,827	2,741								217	9,572
DK	2,710	1,309	464	905									32
EE	6,841	1,535	984	953								2,219	1,150
ES	2,991	608	1,517	182								228	456
FI	63,249	13,058	9,251	6,962	3,807	27					5,043	13,343	11,758
FR	17,233	5,442	3,895	1,613	787						179	1,338	3,979
GR	5,759	1,068	1,411	-									3,280
HR	6,328	2,122	2,277	129									1,800
HU	7,110	2,247	2,830										2,034
IT	13,082	3,242	2,095	1,833	1,346	45				2	403	1,817	2,299
LI	90	16	14	24								21	15
LT	8,042	2,157	1,890	2,056								56	1,884
LU	201	92	109										
LV	7,765	1,799	1,741	1,416								951	1,858
MD	94	35	36										23
MK	2,993	930	946	36								15	1,066
NO	120,128	26,423	20,436	14,386	7,762	412					8,854	20,875	20,980
PL	31,592	8,574	8,115	6,827								268	7,809
RO	22,750	6,073	6,569	2,060								1,557	6,491
RS	10,221	3,395	3,798	192								319	2,517
RU	1,658	295	239	221	102						174	327	300

CTY	Total Snow	1	2	3	4	5	6	7	8	9	10	11	12
SE	87,406	17,660	13,228	11,377	6,090	377					7,928	15,305	15,441
SI	3,933	1,095	1,183	374									1,282
SK	7,424	1,942	2,021	912								767	1,782
TR	56,050	18,582	19,459	2,569								35	15,406
UA	299	76	89	51								23	60
UK	1,143	534	298	269									43

2.3.4 Validation and corrections

Since data is modelled, validation is carried out in two steps. First is model checking and relevance of equations, that has been carried out against external datasets (publication on going by B Kurniz).

The second step of validation is the inserting of these data (with all adjustments required, e.g. evaporation from water masses is computed from potential ETP, whereas from crops it is adjusted to crop and from actual >ETP by the WA module developed by the consultant).

The dataset used in the final tables has been recomputed early May 2012, after the first computation has not passed balance checking carried out by the consultant. The final data set has been delivered 31/05 2012 on the EEA FTP.

Table 2.1: Summary of main climatic water sources (rain, actual ETP and surface run-off) in hm3/year

CTY	Avg_rain	Min_Rain	max_rain	Avg_ER	Min_ER	max_ER	Avg_RO	Min_RO	Max_RO
AT	82952	62610	97022	63761	43668	76650	16919	11983	24474
BE	23267	17340	28662	18638	14340	22114	3351	1307	6829
BG	58457	46149	80722	56965	47736	76657	1841	201	4001
CH	48193	35743	65173	30082	22067	37539	14798	11286	21029
CY	2181	1305	2989	2103	979	2738	199	0	860
CZ	47084	32143	57441	43145	35701	56126	3809	1527	9695
DE	235422	167756	301275	198016	159959	237417	28185	10502	60768
DK	20817	17293	23648	14920	11008	17851	4961	2789	6513
EE	20863	11747	30478	15906	10592	19559	3895	852	6722
ES	250126	175823	317977	218637	162957	270756	28795	6842	55686
FI	164406	131103	213962	118811	79366	143434	40706	21701	72705
FR	368025	285457	450173	314657	256908	368748	44482	14149	86152
GR	54882	40372	66554	48157	39534	59457	5635	1250	11592
HU	45906	27178	72164	45269	30978	71794	909	77	3117
IE	58612	40576	78360	41456	28412	55286	15167	6833	26037
IT	196131	144975	258478	155079	109650	190659	38487	21820	57844
LI	253	184	329	183	127	223	55	36	98
LT	37020	31020	43480	30822	21980	38512	5597	920	7789
LU	2086	1450	2600	1634	1170	1945	343	116	630
LV	31030	19646	44525	25357	19763	29358	5023	1392	8340
MT	no data								
NL	25247	19902	29807	19199	14499	22467	4303	2166	6905
NO	267707	216733	300804	115110	77598	128192	131311	77724	170457
PL	166627	120831	215559	153140	118214	205567	13692	4962	25177
PT	59516	37672	78805	43293	30159	53062	13146	1767	24845
RO	126914	91959	171053	123121	95440	162919	3704	1028	8835
SE	235757	209110	269264	176235	129347	203900	49276	28832	66450
SI	24724	17398	30468	18561	12531	22636	5654	3096	9269
SK	33399	20019	48705	30850	24742	47211	2574	893	5327
TR	223306	146726	364063	195747	138426	355131	26600	1565	50597
UK	182187	129322	218900	123193	88816	151177	48518	15715	68117

Values reported are average (over the 10 years computed), minimum and maximum annual sum.

2.3.5 Scoring quality of data per country

The scoring is based on a very simplistic method: documented FECS are scored 1 and non-documented 0. The overall scoring is computed as (total area per country –total areas non-documented) / total area per country. Some places are poorer documented since either the grid design does not cover well some FECs (coastal FECs mainly) or because the data provision stops at some north or East distance of the first cells.

The results are reported in the next two tables

Table 2.2 Scoring of meteorological data per country (all FECS processed)

CTY	Nb of FECS	T: Total area of FECS	R: Area with rain data	E: Area with ETP Real data	Score as ratio of the smaller of E or R /T
AL	923	29609.15	29179.83	29543.19	0.99
AT	2173	83428.27	83428.27	83428.27	1.00
BE	392	30849.32	30849.32	30849.32	1.00
BG	2002	111542.1	111059.2	111470.7	1.00
BY	5473	406827.9	6032.07	6032.07	0.01
CH	1052	41692.52	41692.52	41692.52	1.00
CY	134	9275.13	8266.56	9229.77	0.89
CZ	1333	79046.94	79046.94	79046.94	1.00
DE	5532	356175.2	354869.4	355784.2	1.00
DK	409	43660.78	40186.49	42518.96	0.92
EE	610	44285.67	42869.27	43842.95	0.97
ES	9478	512450.8	494402.2	496996.1	0.96
FI	5144	337407.4	334930.8	336005.2	0.99
FR	9880	549117.4	543140.1	547044.8	0.99
GR	3810	132742.9	115003.7	126776.8	0.87
HR	1259	56941.15	52941.13	54360.47	0.93
HU	940	92076.45	92076.45	92076.45	1.00
IE	1278	69899.71	68362.42	69504.09	0.98
IS	1532	202260.6	0	0	0.00
IT	6944	300445	293467.9	298188.7	0.98
LI	6	213.78	213.78	213.78	1.00
LT	869	66203.19	65411.7	65713.79	0.99
LU	57	2661.9	2661.9	2661.9	1.00
LV	932	64585.85	64175.32	64451.67	0.99
MD	1072	62970.21	4017.67	4017.67	0.06
MK	625	25850.61	25850.61	25850.61	1.00
NL	206	35701.21	35064.69	35564.05	0.98
NO	6158	323873.8	313289.4	317986.5	0.97
PL	4384	311899.9	310506.7	310868.1	1.00
PT	1520	89884.3	87438.11	88158.1	0.97
RO	3776	238457.4	237477.6	237789.2	1.00
RS	1111	80679.8	80679.8	80679.8	1.00
RU	110955	6963761	34508.98	34971.29	0.00
SE	7709	448563.5	443526.2	445642.5	0.99
SI	463	20200.37	20200.37	20200.37	1.00
SK	805	49157.86	49120.56	49120.56	1.00
TR	15230	1072546	471797.1	475173.5	0.44
UA	15169	1187882	11050.3	11320.92	0.01
UK	4054	243334.5	234872.5	241139.5	0.97

Coastal FECS are much lesser documented than continental ones because the incomplete extend of the source data grid.

Table 2.3 Scoring of meteorological data per country (costal FECS processed)

CTY	Nb of FECS	T: Total area of FECS	R: Area with rain data	E: Area with ETP Real data	Score as ratio of the smaller of E or R /T
AL	23	1358.09	1175.43	1331.62	0.866
BE	6	1576.06	1576.06	1576.06	1.000
BG	23	1461.11	1045.36	1452.89	0.715
CY	40	4246.53	3288.49	4223.85	0.774
DE	93	10377	9402.56	10210.2	0.906
DK	209	23571.67	20746.4	23008.56	0.880
EE	97	7127.58	6110.02	6945.18	0.857
ES	333	21944.06	14060.72	15739.63	0.641
FI	440	18380.55	16800.1	17833.46	0.914
FR	278	21872.46	18779.76	21320.94	0.859
GR	511	28896.93	17208.6	26300.56	0.596
HR	138	6097.42	3943.08	5086.08	0.647
IE	174	15215.15	14137.56	15077.86	0.929
IS	316	34408.57	0	0	0.000
IT	470	28039.88	24567.14	27274.32	0.876
LT	5	568.86	266.77	568.86	0.469
LV	32	2679.32	2545.57	2679.3	0.950
MK	9	165.06	165.06	165.06	1.000
NL	92	17984.39	17416.45	17915.81	0.968
NO	886	70633.18	64497.53	68231.59	0.913
PL	45	3473.21	3277.95	3466.39	0.944
PT	70	5445.06	4546.14	4834.72	0.835
RO	16	1649.12	1571.85	1611.52	0.953
RU	570	62877.81	1371.71	1401.53	0.022
SE	556	28642.48	25738.28	27612.44	0.899
SI	2	95.42	95.42	95.42	1.000
TR	402	42516.7	28917.54	31713.76	0.680
UA	137	18675.2	215.98	215.98	0.012
UK	580	49089.41	42621.69	48273.34	0.868

2.4 *River discharge*

2.4.1 Role in the process

As indicated above, river discharge is key to all water accounts (except in those areas having no river that deserve a specific methodology) and plays a fourfold role in the production:

1. River fluxes are part of the assets tables; (monthly resolution)
2. River discharge is the element of estimating groundwater outflow (by depletion curve assessment); (daily resolution)
3. River discharge upstream-downstream lakes and reservoirs tell the change of stock in these compartments (in most case this data is not accessible); (preferable better than monthly resolution)
4. River discharge at the outlet of each “territory of reference” is the touchstone of the water balance and allows checking change in stock. (monthly resolution).

The processing consists in transferring monthly discharge at as many as possible Gauging stations on the main drains to downstream segments. The quality of populating each and every river segment of the computed domain depends first and foremost on the density and time duration of data sets fuelling the computations.

2.4.2 Data source and provision to the accounts procedure

Data source consists in two distinct data sets:

1. Gauging stations, that must be placed ("snapped") to the relevant river segment before any data from this station can be used;
2. Daily averages of discharge at station, on the longest possible period (at least 10 years). Even though only the 10 last years are computed, longer periods are necessary to reconstruct time gaps by correlation.

Data sets have been collected by several means, with the help of ETC/IMW, many direct contacts and requested support from Eionet (meeting :18 May 2011).

Current source of data are the following:

Monitored data:

- Data collected by the EEA / Pöyry during the prototype implementation;
- Data collected through the EIONET process (provision by MS) pre-processed by ETC/IMW;
- Data collected by consultant (Pöyry) during the execution of this contract
- Data collected by the EEA out of the EIONET process.

Reconstruction data

- Data collected (only Gauging stations placement) next to GRDC;
- Modelled monthly areal data provided by JRC (M Ad de Roo).

2.4.3 Validation and corrections

Primary data uploading has been carried out by the EEA (NSV3) to i) populate Gauging stations table, create Ecrins-compatible stations ID and relate if possible to Waterbase stations (before snapping to Ecrins) and ii) populate SQLserver table V_quan with daily data.

Consistency control have been limited to units (some provider provide m3/s for big discharges and l/s for smaller ones)

Pöyry snapped all possible stations to Ecrins and made a systematic checking by analysing discharge productivity (as l/s/km2). This allowed detecting very numerous errors in Gauging stations placement and errors in the area controlled (many stations on a river having the river total catchment as attribute).

Data complements were carried out by SCM as:

- Station to station(s) correlation to reconstruct time gaps in monitored data;
- Modelled data (by JRC) to stations by probabilistic approach for those areas having no stations delivered.

2.4.4 Submitted for review: Gauging stations

The Gauging stations availability is prerequisite for all further assessments. The number of provided Gauging stations per country is extremely variable. To address this issue comparatively, the following calculations were carried out:

1. Compute the length of main drains (as Ecrins) per country, main drains are the dummy rivers on which computations are carried out;
2. Analyse the number of station known per country and sorted out per category of drain on which the station is snapped (disregarding their accurate positioning and possible errors,

hence some stations may be assigned to the wrong drains category) and analyse as density per 1000 km of main drain. This analysis is in line with the first recommendations

3. Propose a range of target stations. To this end, the number of stations between percentiles 75% and 50% across all countries has been computed. These values (as density) are used to estimate a reasonable range of number of stations per country. Percentiles have been computed over the whole Ecrins area and comprises non EEA countries, lowering the target number of stations.
4. :if the number of stations known is larger, no further station is required, otherwise a supplementary number of stations should be collected.
5. Only those countries which number of stations provide is less than the lower threshold are considered as insufficiently documented under criterion "number of Gauging stations"

Over the 27 EU countries computed, 10 miss stations at threshold 50% (3.5stations /1000 km2) and 17 miss stations at threshold 75% (9 stations /1000 km2). The current number of stations is 6949 (main drains) and 748 (secondary drains). The number of stations that should be added is between 749 and 3472.

Many countries do match the minimum target, by contrast, several EU countries have huge gaps, compared to the target: this gap is not necessarily abnormal (it may depend on the hydrological structure of rivers in the country). Nevertheless, strong attention should be given in such cases, by comparing the current country's equipment and delivery.

Detail per country is reported in Appendix 1 Appendix 1

The number of data delivered is not the unique issue: many stations are poorly documented or erroneously populated. The controlled area is wrong (e.g. ~28,000 km2 instead of 43), position is precise but inaccurate without controlled area (hence making Ecrins snapping provide a control area of 100,000 instead of 130,000 for an error of a couple of km (not related to Ecrins, placement checked on BING maps), etc. Several dozens of such errors were recorded and as much as possible corrected.

Scoring applies to both knowledge of gauging stations vs. standard objective and quantity of data eventually taken into account.

2.4.5 Submitted for review: monthly data

Monthly data is the aggregate that is required for the accounts; this aggregate is preferably computed from daily averages. Three categories of data have been prepared and then computed:

1. Source data (daily data flows computed as monthly averages) (best scoring: 1)
2. Time reconstructed monthly averages, when local gaps were identified, this reconstruction is carried out with recorded values at other stations correlated with the stations data to reconstruct; (intermediate scoring : 0.75)
3. Space reconstructed data. This data has been reconstructed with a probabilistic approach, to avoid any discharge modelling, using existing stations and modelled data provided by the JRC. This later method was applied where no data had been provided, and only targeted to documented gauging stations. No virtual station was created (low scoring: 0.25).

Scoring has been carried out considering how many data were expected (target nb of stations * nb of expected data per station) vs. currently obtained nb of data, sorted per quality of data.

- The target number of data is 10 years *12 months * target number of stations (low / high).
- This target is compared to the current number of data; the number of data is scored according to its quality. The scores per category are ceiled to 1 (if more data that the general target is present, it does not count for more). This method hence tends to lower the demand, since the target number of stations is lowered by the countries having provided minimum information on their gauging network.

- The final score is reweighted by the number of data in each category / total number, to range the final value between 1 and 0.

The normal expectations are monthly data, not reconstructed, for 10 years, at the minimum number of Gauging stations as computed in the previous section. The analysis of data availability is hence made comparing the number of data of the three categories vs. optimum number. If a country has provided more than the minimum target, the assessment of gap is based on the minimum number and not on the actually provided data. Details of calculations are in the next table.

Table 2.4 : Summary of delivered, reconstructed and targeted month-station river discharges

Country	Score (50%)	Score (75%)	Total month-station	Source nb of months	Time computed months	Space computed months	Target low in M-S	target high in M-S	Missing low in M-S	Missing high in M-S
AL	0.17	0.07	2096	0	0	2096	3120	8040	1024	5944
AT	0.96	0.96	247929	210927	36740	262	8280	21480	0	0
BE	0.80	0.79	15228	6696	6960	1572	2160	5400	0	0
BG	0.31	0.12	6308	4212	0	2096	9600	24720	3292	18412
BY	0.08	0.03	4978	0	0	4978	14760	38280	9782	33302
CH	0.74	0.74	71662	756	70644	262	3840	9840	0	0
CY	1.00	0.84	1512	1512	0	0	720	1800	0	288
CZ	0.16	0.06	1392	0	1392	0	6600	17040	5208	15648
DE	0.72	0.65	125556	19224	101616	4716	27000	70080	0	0
DK	0.88	0.88	51433	30084	19777	1572	1920	5040	0	0
EE	0.79	0.67	16486	3348	12876	262	3000	7920	0	0
ES	0.98	0.98	510402	497841	509	12052	42360	109920	0	0
FI	0.59	0.27	37816	6480	27144	4192	23040	59640	0	21824
FR	0.98	0.95	845331	787259	49426	8646	44520	115320	0	0
GR	0.08	0.03	3084	1512	0	1572	12000	31080	8916	27996
HR	0.88	0.46	13308	6696	6612	0	4920	12600	0	0
HU	0.57	0.22	9284	3888	4872	524	6240	16200	0	6916
IE	0.98	0.97	222332	215352	1740	5240	4920	12840	0	0
IS	0.18	0.07	4008	864	0	3144	4560	11760	552	7752
IT	0.06	0.02	7244	432	0	6812	27480	71280	20236	64036
LI	0.75	0.75	348	0	348	0	120	120	0	0
LT	0.54	0.21	8964	3564	3828	1572	5040	12960	0	3996
LU	1.00	0.60	432	432	0	0	240	720	0	288
LV	0.58	0.22	5758	972	4524	262	4920	12840	0	7082
MD	0.02	0.01	262	0	0	262	3000	7800	2738	7538
MK	0.69	0.30	3108	324	2784	0	2400	6360	0	3252
NL	0.66	0.60	11230	1335	7275	2620	1080	2760	0	0
NO	0.49	0.25	70208	7452	32364	30392	23520	60840	0	0
PL	0.09	0.04	8384	0	0	8384	22080	57360	13696	48976
PT	0.95	0.94	113112	105952	348	6812	7200	18600	0	0
RO	0.11	0.04	8384	0	0	8384	19440	50400	11056	42016
RS	0.83	0.60	16996	11772	4176	1048	5760	14880	0	0
RU	0.05	0.02	45850	0	0	45850	253920	657840	208070	611990
SE	0.65	0.25	55894	26568	27492	1834	35160	91200	0	35306
SI	0.72	0.69	13522	1080	12180	262	1920	5040	0	0
SK	0.55	0.21	4560	1080	3480	0	4080	10680	0	6120
TR	0.01	0.00	2932	1188	696	1048	55440	143760	52508	140828
UA	0.02	0.01	3406	0	0	3406	40800	105600	37394	102194
UK	0.95	0.95	119577	112726	5279	1572	17280	44880	0	0

The table above marks the country as EU (bleu) / non-EU (yellow). Both categories are kept since some catchments are spread over non-EU countries and calculations require some data from these countries.

Scoring in columns 2 and 3 indicate the gap between expected number of data and current situation. Score ranges from 1 (no gap) to 0 (full gap). The computation method is the following:

Comparing the score with the number of missing data provides insight on the quality of data: a low scoring with few supplementary months to get just indicate that data is of poor quality, but enough is present for computing. Of course, high need and low score just tells that this area is suspected of very poor informative content.

2.4.6 Envisaged corrections

First and foremost, the actual gauging stations data sets should be completed. Several countries have not provided a full coverage of their monitoring networks and in many cases have not provided accurate data related to the gauging stations.

Once obtained and integrated (with comparison to Ecrins in cases the controlled area mismatches too much) supplementary data is expected.

River run-off should be obtained from all monitored stations that are on main drains or that document the upstream rivers, even not formally main drains, plus for secondary drains if the station is on a river of any upstream FEC.

The number of missing data (EU countries only) ranges from 62404 month-stations to 298904. These gaps are respectively 17% and 32% of total data (targeted data) currently in use for the lowest and highest estimate.

In case of further complements, the objective is to set the number of “missing low” to zero (and hopefully the number of “missing high” to as low as possible) and improve the scoring at least to the medium (orange) category, with possible re-computation of balances.

2.5 Water uses (generic)

2.5.1 Role in the process

Water uses populate the supply and uses tables and contribute documenting the water assets tables.

The information sought for in all cases is disaggregated per stratum and per water source / time period.

2.5.2 Stratified approach

Stratification approach reflects that water abstraction sizes are extremely odd: a few hundreds of large cities group close to 80% of total population and likely more that 80% of urban abstractions. In the accounts, the placement of the abstraction and return flow is of paramount importance, especially if the source or the outlet is not in the same “territory of reference”.

Three levels of stratification have been defined for practical and relevance purposes. Under ideal situation, the data collection should be organised so that:

- Largest: to be individually surveyed (e.g. metropolis, nuclear power plant, major chemical site, etc.). Monthly data (volumes in / out) to be collected and sources (type, location, source of water at the time step) documented;
- Median (is a flexible category if individual sources are accessible): to be individually modelled, meaning that for small city X (coordinates known), the above data can be modelled from regional or national technical coefficients and activity volume (e.g. population number or tonnage of good produced, etc.);
- Small (for example, cities below reporting threshold of UWWD) are processed as lumped modelling, from technical coefficients applied to spatially distributed volume of activity (e.g. rural population density).

In practice, this ideal scheme could not be applied to data collection flows, since they do not exist. The way these principles have been implemented and data sources used is reported in the next sections.

2.6 *Urban and domestic uses*

2.6.1 Rationales

Population data is the key driver to domestic and urban abstractions (ISIC 3600) . There is no database of domestic water abstraction and uses in Europe that could meet minimum requirements of the WA methodology. Under this methodology, the individual abstraction and uses are the appropriate "statistical units" that must be documented.

The different tasks hence aim at delineating and populating city data per stratum, attach to sewerage and WWTP / outlet. The process and summary data are reported below.

2.6.2 Data source and provision to the accounts procedure

The data sources mobilised are:

- Delineation of largest cities from the urban Atlas, the "Urban Morphological Zones", modified procedure to explode those aggregates with multiple centres as functional cities;
- Use of appropriate population data source, of which LandScan® population density, aggregated by catchment (LandScan ® is the unique source that covers for the same date the whole area);
- UWWTP reporting information, matching "agglomerations" to the most likely functional city;
- Seeking for large cities information on their web sites, in some rare cases from the WFD reporting and systematic seeking in Wikipedia (used as well to re-focus to urban web sites);
- Any suitable report;
- Intensive use of the detailed information provided by French water agencies Adour-Garonne, Artois-Picardie, Loire-Bretagne, Rhône-Méditerranée-Corse (Rhin-Meuse and Seine Normandie denied access to data).
- French statistics (from Insee assessments).
- Wise (Waterbase v7) datasets collected that went available at the end of the process and which assessment was carried out in June 2012

Data has been consolidated and pre-processed by EEA (Annabelle Berger and Cathy Maguirre, IEA1) before being fully recomposed by Pöyry.

UWWTP directive reporting has been matched to Ecrins segments (or FECs if no segment present next to discharge point) and stations connected to agglomerations / functional cities by EEA (NSV3, with support from ETC/SIA).

2.6.3 Validation and corrections

The processing was carried out to assess and code into the data base tables the following information:

- Sources and volumes abstracted;
- Recipients and volumes returned;
- Sources of information related to values above.

The process is based on former developments related to integrated uses of water and split the information to be processed in different subsets:

1. Characterisation of urban entities, as host of population,
2. Volumes related to the activity, split into “domestic” and “urban” (services); where time-depending volumes are stored,
3. Sewerage systems that collect water (and possibly industrial entities);
4. UWWTP that, in this case, are there to identify the place and volume (with sewerage) out water return. This assessment poses the question of estimating as well water losses during uses.

2.6.4 Considering the WISE datasets

Water abstraction and uses collected by the ETC/ICM could be mobilised late in the process. First version of WaterBase abstraction (v6) was analysed by the Consultant and considering the very limited amount of data present it was commonly decided (meeting 21February 2012) to put this source aside.

The update of WaterBase (v7) was the opportunity to consider if new data could be processed and introduced in a revision of the balances. The purpose of this revision is to give opportunity for data proposed by countries that made a reporting effort to be considered and processed as alternate water balance scenario.

By contrast with industrial data the presence of urban and domestic abstractions and uses is widely spread water use. As consequence, neglecting small industries is not a water balance accuracy issue, hence finding out all the largest may suffice to process.

By contrast, domestic abstractions require a comprehensive approach. In this case the benefit of incorporating limited information may be disproportionate vs. the efforts to process data since the reported data are aggregates at spatial levels that are not congruent with the requirements of the accounting process.

To meet these requirements, the attempts for using the WISE data sets was carried out with the following rules:

1. The ‘L’ stratum is not modified; no WISE data provide specific data for the largest cities;
2. The WISE data processing is oriented to extract water abstraction technical coefficients over a smaller spatial area than the processing using Eurostat source did.

WISE data processing to extract these information is rather technically complex and presented in Appendix 3

2.6.5 Considering collected data per WFD reporting

Abstraction data Member States have reported for RBDs via the RBMP reporting and presented as tables (not as figures in text that have not been yet extracted) have been processed. Reported volumes are those abstracted from surface and groundwater sources. Compiling data from the reported sources (that are not all as data sets, but sometimes as values inside the text) has been carried out for 54 of the ~170 RBDs with a significant area.

All calculations are reported in Appendix 4 These data, albeit not formally reported under ReportNet are the most likely disaggregated values from countries under the WFD.

Another source of information, compiled by ETC/ICM has been considered; however this source contains only total abstractions per country or RBD and cannot be used for assessing abstractions in relation with domestic and urban uses. This dataset is the source of population by RBD, considered from member State origin, used in both Wise and this processing.

2.6.6 Final disaggregated population number taken into account

The two aforementioned sources could not provide data at the needed degree of resolution, that is the different strata mentioned in § 2.5.2 2.5.1 In the absence of clear individual reporting of major sources (the Eionet data flow has no data for stratum 'L': for large cities), administrative sources do not provide exploitable data: UMZs don't match "communes", scattered population has to be identified by difference; census are not all at the same date and have gaps in EU, the UWWTP reporting reports "equivalent inhabitants" related to undefined "agglomerations".

Population into the largest cities (L) was taken from the "urban Audit" data. Stratum « L » hence contains the most important European cities (**544 cities in the 27 European countries members**). This number comes from the urban audit data file available [3] that contains only **371** cities. It has been completed with the delimitation of the core of the urban audit cities of **679** cities and only records the population for the year 2001. Best match between both data sets and applying bottom threshold yielded the aforesaid number.

The population of the UMZ was calculated with the LandScan data from 2010, with the zonal statistic tool on ArcGIS[4] to associate the population LandScan to each UMZ. Because the relatively large size of the LandScan grid, a part of the population can be ignored in the calculation. However, this is not an important issue because the population that has not been taken into account inside the UMZ will be taken into account inside the rural population of the FEC (inside stratum S).

The population data was used to further select the elements of stratum M (all are UMZs). Since data relative to the urban waste water treatment plants concerns agglomerations with a capacity bigger than 2 000 eh, this value was used as threshold between stratum M and S. Thus, 12 104 UMZ for the stratum M were selected.

Table 2.5: Total population per country, from different sources

Country name	Total population used in WA application	Total urban audit population (Eurostat)	Reference period of Eurostat data	Percentage of difference with Eurostat data	Total Landscan 2010 population	Percentage of difference with Landscan data	Percentage of difference between Eurostat and Landscan data
Austria	8,436,500	8,318,592	2007_2009	1%	8,276,561	2%	1%
Belgium	10,729,035	10,666,866	2007_2009	1%	11,110,341	-3%	-4%
Bulgaria	7,437,792	7,606,551	2007_2009	-2%	7,042,407	6%	7%
Cyprus	1,091,051	789,300	2007_2009	38%	1,060,600	3%	-34%
Czech Republic	10,440,720	10,532,770	2010_2012	-1%	10,475,955	0%	1%
Germany	84,841,880	82,002,356	2007_2009	3%	84,454,551	0%	-3%
Denmark	5,902,076	5,397,640	2003_2006	9%	5,898,434	0%	-9%
Estonia	1,410,403	1,363,310	2007_2009	3%	1,407,027	0%	-3%
Spain	47,329,765	46,157,822	2007_2009	3%	45,035,479	5%	2%
Finland	6,125,281	5,300,484	2007_2009	16%	5,973,364	3%	-13%
France	63,841,229	63,235,742	2003_2006	1%	62,770,705	2%	1%
Greece	10,514,354	11,144,866	2003_2006	-6%	10,308,310	2%	8%
Hungary	10,259,701	10,014,324	2010_2012	2%	10,065,196	2%	-1%
Ireland	4,830,436	3,905,907	2003_2006	24%	4,904,159	-2%	-26%
Italy	57,756,472	59,619,290	2007_2009	-3%	56,922,965	1%	5%
Lithuania	3,904,714	3,366,357	2007_2009	16%	3,767,697	4%	-12%
Luxembourg	484,998	483,799	2007_2009	0%	472,430	3%	2%
Latvia	2,417,029	2,270,894	2007_2009	6%	2,320,418	4%	-2%
Malta	376,678	413,609	2007_2009	-9%	376,600	0%	9%
Netherlands	17,463,230	16,405,399	2007_2009	6%	17,361,479	1%	-6%
Poland	39,809,727	38,135,876	2007_2009	4%	39,431,641	1%	-3%
Portugal	10,290,937	10,627,250	2007_2009	-3%	10,212,183	1%	4%
Romania	22,131,375	21,498,616	2007_2009	3%	21,792,492	2%	-1%
Sweden	10,170,949	9,256,347	2007_2009	10%	9,834,556	3%	-6%
Slovenia	1,937,222	2,025,866	2007_2009	-4%	1,997,030	-3%	1%
Slovakia	5,510,754	5,412,254	2007_2009	2%	5,558,970	-1%	-3%

[3] Eurostat_Table_tgs00079FlagDesc.xls, URAU_CITY_RG_01M_2007.shp

[4] More accurate methodology developed by SCM for the EEA was not implemented here, because higher precision was not required.

Country name	Total population used in WA application	Total urban audit population (Eurostat)	Reference period of Eurostat data	Percentage of difference with Eurostat data	Total Landscan 2010 population	Percentage of difference with Landscan data	Percentage of difference between Eurostat and Landscan data
United-Kingdom	65,563,391	59,862,820	1999_2002	10%	64,595,804	1%	-8%

Source: Pöyry report

Stratum M allows “individual modelling”, albeit data can be taken from appropriate source. The number of available sources (only 4 water agencies in France) and the difficulties to apportion L/M and S data for a limited area, the data collected was used to calibrate coefficients.

The data per country that was used in the accounts is summarized in country tables, in the view of scoring the quality of assessment. Following table could be compiled and provided

Table 2.6: Apportionment of population per stratum, with number of statistical units

Country	Total cities	Nb:L	Pop: L	Nb: M	Pop: M	Nb: S	Pop: S	Total Hb
AT	2405	5	2378559	258	2230687	2142	3827254	8436500
BE	546	7	2552029	152	2015289	387	6161717	10729035
BG	2103	7	2428725	130	2072702	1966	2936365	7437792
CY	150	2	385951	18	226004	130	479096	1091051
CZ	1586	12	2824115	251	2499829	1323	5116776	10440720
DE	7663	84	25745427	2122	20461125	5457	38635328	84841880
DK	508	4	1143611	134	1445675	370	3312790	5902076
EE	598	2	500095	37	340081	559	570227	1410403
ES	10183	60	17761141	1006	8371427	9117	21197197	47329765
FI	4858	4	1073783	200	1760033	4654	3291465	6125281
FR	10944	30	14307664	1261	12550966	9653	36982599	63841229
GR	3639	10	2130017	148	1594254	3481	6790083	10514354
HU	1305	9	2887961	364	2842539	932	4529201	10259701
IE	1312	4	698289	89	768138	1219	3364009	4830436
IT	8084	48	13962770	1372	12213777	6664	31579925	57756472
LT	908	5	1351809	52	583931	851	1968974	3904714
LU	75	1	86981	17	134060	57	263957	484998
LV	944	3	917686	31	322443	910	1176900	2417029
MT	12	1	203960	8	36283	3	136435	376678
NL	565	34	5823383	343	4531122	188	7108725	17463230
PL	5075	45	11530190	708	7938976	4322	20340561	39809727
PT	1651	14	2805808	176	1462794	1461	6022335	10290937
RO	4354	27	6673848	605	4645498	3722	10812029	22131375
SE	7524	11	2654073	274	2282814	7239	5234062	10170949
SI	513	2	379100	53	411738	458	1146384	1937222
SK	963	8	1127778	162	1295852	793	3087124	5510754
UK	4707	105	30916736	761	10772614	3841	23874041	65563391
Together	**83175**	**544**	**155251489**	**10732**	**105810651**	**71899**	**249945559**	**511007699**
As %		**1%**	**30%**	**13%**	**21%**	**86%**	**49%**	

The 1% in number of cities group 30% of population, and likely same share of volume. The 86% in number in stratum “S” are lumped at the FEC level and assigned to the FECs and not to individual cities, thus explaining the low number of items.

The “M” stratum is floored by the lower threshold of the UWWTP Directive, ~2000 persons (UWWTP Directive considers “equivalent population and not real persons).

2.6.7 Computing volumes for domestic water uses

Volumes for strata ‘M’ and ‘S’ are computed from country wide abstracted volumes, corrected by consultant to take into account water need for tap water production, losses and non-domestic uses defined from best locally available statistics. Eionet and WFD analysed data were not used because i) too erratic and ii) not sufficiently spatially relevant to justify large use of resources to include such data. Eurostat source has been used since understood more homogeneous and easier to process. For example using RBD level aggregated data posed the question of taking out large cities to avoid double counting.

2.6.8 Scoring volumes for domestic uses

The scoring of data deals only with assessment of the method used to quantify volumes with the method used by the consultant; no scoring has been applied to the other data collection sources since this would lead to scoring countries and not data. The assessment of volumes per stratum has been analysed in the following way:

- Stratum “L” is expected to be filled with individual data. Volumes obtained this way (column L1) were scored 1, volumes obtained individually by specific research (column L2) (not direct provision by country) were scored .75 and volumes obtained from the application of technical coefficients (column L3, litres per capita) were scored .25
- Stratum “M”, is expected to be filled with individual modelling (column M3, no otherwise data produced e.g. local or regional technical coefficients°. In this case they are scored 1, otherwise (nationwide coefficients) they are scored .75 and .25 if from application of EU wide technical coefficients.
- Stratum “S” is expected to be filled by nationwide coefficients and are hence scored 1 in this case (column S3) and .75 otherwise.
- The final score is rationalised to [1,0] with the total volume estimated. Calculation is presented for both all stratae and “L” stratum, which is the most impacting on the accuracy of the accounts.
- Columns WPL, WPM and WPS respectively indicate the estimated volumes used for producing distribution water.

Table 2.7: Scoring of water volumes abstracted per country, per stratum, for domestic and urban uses

Country	L1	L2	L3	WPL	M3	WPM	S3	WPS	Score	L score
AT		400000	140902	8114	446683	6700	766387	11496	0.81	0.62
BE		266630	432643	10489	378377	5676	1156883	17353	0.77	0.44
BG		1836042	445895	34229	730121	10952	1034352	15515	0.75	0.65
CY			155691	2335	91169	1368	2953735	44306	0.94	0.25
CZ		415605	273899	10343	436962	6554	193265	2899	0.67	0.55
DE		2782022	1872748	69822	3505567	52584	894397	13416	0.66	0.55
DK			246222	3693	311257	4669	6619321	99290	0.95	0.25
EE			63315	950	43056	646	713252	10699	0.92	0.25
ES		3105955	3922152	105422	2864578	42969	72194	1083	0.55	0.47
FI		191781	107488	4489	367531	5513	7253366	108800	0.96	0.57
FR	1980363	987740		44522	3140318	47105	687325	10310	0.84	0.92
GR		246078	196938	6645	331558	4973	9253242	138799	0.96	0.53
HU		1781	201994	3057	492261	7384	1118671	16780	0.84	0.25

Country	L1	L2	L3	WPL	M3	WPM	S3	WPS	Score	L score
IE		540000	96732	9551	328127	4922	784352	11765	0.82	0.67
IT		3787145	3064351	102772	5104733	76571	41351	620	0.61	0.53
LT			143023	2145	61781	927	208320	3125	0.69	0.25
LU			21180	318	32644	490	64275	964	0.78	0.25
LV		150000	76839	3403	123686	1855	451447	6772	0.83	0.58
MT			40531	608	7210	108	27112	407	0.56	0.25
NL		209329	871386	16211	947394	14211	1486334	22295	0.72	0.35
PL		1036677	1095431	31982	1178904	17684	3020486	45307	0.77	0.49
PT		257534	541599	11987	342040	5131	1408181	21123	0.77	0.41
RO		259200	907082	17494	890975	13365	2073673	31105	0.75	0.36
SE		333699	486290	12300	602027	9030	1380334	20705	0.77	0.45
SI			84593	1269	91876	1378	255806	3837	0.79	0.25
SK			238736	3581	274315	4115	653504	9803	0.78	0.25
UK		5645522	5804041	171743	3657770	54867	8106274	121594	0.70	0.50
Together EU	1980363	15414525	12410955	447090	19684611	295270	28042776	420642	0.76	0.56
All together	1980363	22052740	21390799	681360	26336237	395047	51911452	778672	0.76	0.53

The overall scoring is 0.76 for EU countries and 0.56 for the same area and large cities. The rather large number of countries which "L" stratum score is below or equal 0.25 is quite a concern; in fact, apart France where some source data has been found, most country large cities data were populated from specific research carried out on the Web by the EEA or the Consultant.

2.6.9 Summary water origin

In the frequent absence of any information about the water source and the depending volumes abstracted, some simple rules were applied:

- Apportionment between surface / groundwater and sea water was carried out using Eurostat statistics;
- Apportionment between lake and reservoir was done considering the likely presence of lake in the vicinity (if not documented specifically);

Table 2.8: Statistics of water origins per country and in percentage (primary settings bty consultant)

Country	Groundwater	Lakes	Reservoirs	Rivers	Sea Water	Groundwater	Lakes	Reservoirs	Rivers	Sea Water
AT	1372022		858	407403		77%	0%	0%	23%	0%
BE	1475164	22129	261704	509054		65%	1%	12%	22%	0%
BG	1057530	291946	2209662	547968		26%	7%	54%	13%	0%
CY	72265		25088	27468	321907	16%	0%	6%	6%	72%
CZ	839683	1362	713379	496753		41%	0%	35%	24%	0%
DE	10487345	185120	1760262	2568625		70%	1%	12%	17%	0%
DK	1289793	0	0	0		100%	0%	0%	0%	0%
EE	97814		29397	54033		54%	0%	16%	30%	0%
ES	3848800	58835	3871010	9624596		22%	0%	22%	55%	0%
FI	697938	77329	443955	155215		51%	6%	32%	11%	0%
FR	9488423	903207	1497031	3703428		61%	6%	10%	24%	0%
GR	461004	28081	296078	1434352		21%	1%	13%	65%	0%
HU	876673	80697	351580	193643		58%	5%	23%	13%	0%
IE	372374	236711	971472	857339		15%	10%	40%	35%	0%
IT	20330783	318212	792391	4090960		80%	1%	3%	16%	0%
LT	419320		0	0		100%	0%	0%	0%	0%
LU	64117		6801	48953		53%	0%	6%	41%	0%

LV	433471		211669	168862		53%	0%	26%	21%	0%
MT	32923				43053	43%	0%	0%	0%	57%
NL	2041752		910835	614571		57%	0%	26%	17%	0%
PL	3943673	5503	981326	1495968		61%	0%	15%	23%	0%
PT	813015	62523	374201	1337855		31%	2%	14%	52%	0%
RO	1235082	96808	1270774	1590230		29%	2%	30%	38%	0%
SE	568067	386887	1322951	566479		20%	14%	47%	20%	0%
SI	428122	720	2392	7525		98%	0%	1%	2%	0%
SK	994158	15664	76028	98204		84%	1%	6%	8%	0%
UK	5616047	1731335	8270225	7944204		24%	7%	35%	34%	0%
Together	69357358	4503069	26651069	38543688	364960					
Tog. %	49.7%	3.2%	19.1%	27.6%	0.3%					

Volumes in Table 2.8 cannot be scored since reference is unknown or since volumes were computed from reference.

In some case, the ratio SW / GW, as computed by the consultant is quite different to the ratios reported by country. In these cases, an update is on-going, with data from Table A.3.8, page 54.

2.6.10 Envisaged corrections

Two categories of corrections can be envisaged:

1. Corrections on the list of large cities: in some countries having not enough data (e.g. no urban Atlas, no Corine *Land cover*, etc. may have prevented from including cities in the list of stratum "L".
2. If hard data is provided for some countries, specifically with regards to large cities (currently present or added) and reason to re-compute accounts, new data could be taken on board.
3. Origin of water is quite coarse: some data more detailed were collected oddly, but their relevance and representativeness is not enough for such computations.

2.7 Industrial uses of water

2.7.1 Common Warning to manufacturing and energy production

Industrial data proved being the most difficult and controversial data sets in the accounting procedure. Industrial abstractions and uses comprise both cooling for energy production and water uses in relation with manufacturing processes.

In principle, the three stratification categories should heve been followed; this revealed impossible for many reasons. The main one is that building the categories backs on two prerequisites:

- Having a reference population (in the case of domestic, this is the list of cities, even simplified)
- Having a reference proxy for activity, which in the case of municipalities is the number of inhabitants hosted.

In the case of industrial activities, only some biased lists exist: EPRTR (threshold applied and selection made by countries), some lists per branches (that are exploited in the next sections). Moreover, no proxies of the activity or water volume used exist in the EU wide data sets. In some cases (attempt to exploit data from some French water agencies that grant publicly access to data sets), there are so many obstacles in matching the EU and the national sources that this attempt had to ba set aside; albeit it provided some clues on the way ideal data addressing could be organised.

The data presented here as statistics have been processed by by VITO, from different sources as told in the draft final report produced by Pöyry and achieved the following goals:

Provide geographically located .abstraction values for individual users, broken down into main ISIC categories;

- Document the allocation of volumes per resource (that had to be restricted to sea (brackish /coastal) / fresh (e.g. continental) source, with educated estimate of abstraction, uses (consumption) and return.
- Data presented do not pretend being an accurate estimate of the real situation; it is the best available estimate of volumes and place of abstraction using the addressable data sources. The values are linked to actual reporting schemes and hence are disaggregated at the facility, thus allowing easy upgrading of the values used.

The basic method used was to best estimate, from all verifiable information, the total volume per country for a branch, where no individual estimate was possible, and breakdown this volume per facility using educated guess of the volumes related to each site based on other activity proxies (e.g. relative pollution load), with the only constraint that the sum of sites within a country would meet the estimated total.

2.7.2 Data source and provision to the accounts procedure

Industrial uses are very local and very specific. In many cases the volumes extracted can be huge for certain sectors – for example water extracted for cooling purposes. On the other hand the large volumes used for cooling are almost immediately returned back to the water source and in many cases the water used in brackish rather than fresh. The main issue is that sources are all incomplete and are not dedicated to obtaining water volumes.

Water volumes abstracted and used for industry (cooling and process) and energy (cooling and turbining) are not reported in any EU databases and not sought for in any EU regulation.

Some data can be found in a limited number of countries: highly disaggregated, but not under the NACE codification (as found in public data sets) in some parts of France, or aggregated at some level in other countries.

Information sources mobilised were:

- E-PRTR , this database is mainly providing reported industrial emissions for major industrial facilities. But for only one sector, Large Combustion Plants, are the reporting of emissions compulsory – the remaining sectors can report information on a voluntary basis – therefore the data is complete. There is very little information on water volumes extracted or discharged. One of the principle assets of the E-PRTR dataset is that the geographical location of the industrial facility is provided; although in some cases the position is not the facility but some related building (e.g. headquarters).
- Platts data bases to locate and assess cooling for Nuclear Power Plants (NPPs), with limited information on open / atmospheric cooling way;
- Best Available Techniques (BAT) Reference documents (BREFs), provide valuable information on water use coefficients from different industrial facilities that are representative for the particular sector and in some cases data on data on industrial production levels and water use is provided. Both data sets are hosted by the European IPPC Bureau;
- Statistical data on industrial production levels and water is hard to come by because of confidentiality issues. EUROSTAT provides mainly production information in terms of the value and not the quantity. Therefore, the internet has been used extensively to look for data from industry representatives, and other sources such as FAO and UNECE. This means that

the data collection is not harmonised, there is little or no independent quality control and there are large data gaps.

- CEPI (pulp), CONCAWE (oil), EUROFER (steel) and Wikipedia for many categories, of which the cement industry…
- Some French water agencies data were collected and are discussed in a specific section.

Processing has consisted principally of using water use coefficients from BREF resources (good quality data), with industry production levels (low quality data). In addition spatial analysis (using the coordinates of the E-PRTR facilities) has been used to determine whether the source of water is brackish or fresh.

The next section address per branch and not per source. A final section reports the data including into a single data sets ad last section reports data scoring.

2.7.1 Manufacturing activities

Table 2.9 : Sum of volumes per country for the manufacturaing activities as estimated .

Country Code	Number of different ISIC categories	Number of Facilities	Brackish water intake (hm3/d)	Brackish water return (hm3/d)	Fresh water intake (hm3/d)	Fresh water return (hm3/d)
AT	3	24	0	0	0.298	0.26
BE	4	38	0	0	0.011	0.01
CY	1	2	0.001	0.001	0	0
CZ	4	22	0	0	0.007	0.006
DE	4	153	0.017	0.014	0.413	0.359
DK	2	4	0.003	0.003	0.001	0.001
EE	1	1	0	0	0	0
EL	3	13	0.004	0.003	0.004	0.003
ES	4	100	0.094	0.081	0.181	0.158
FI	4	50	0.38	0.331	0.611	0.532
FR	4	157	0.006	0.005	0.326	0.282
HU	4	10	0	0	0.004	0.004
IE	2	7	0.001	0.001	0.002	0.002
IT	4	111	0.013	0.011	0.109	0.095
LT	1	1	0	0	0	0
LU	2	5	0	0	0.001	0.001
LV	2	2	0	0	0	0
NL	3	10	0.001	0.001	0.007	0.007
PL	4	47	0	0	0.021	0.019
PT	4	19	0.58	0.504	0.869	0.756
SE	3	64	0.778	0.677	0.454	0.395
SI	3	6	0	0	0.001	0.001
SK	4	13	0	0	0.003	0.003
UK	4	59	0.028	0.024	0.035	0.031

It is important to note that the volumes are rather limited compared to cooling volumes. The question of the effectiveness of devoting more efforts should be analysed in detail.

2.7.2 Comparative input with French data sets

As mentioned in previous sections, detailed data collection has been done from 4 web sites of the French water agencies Adour-Garonne, Artois-Picardie, Loire-Bretagne and Rhône-Méditerranée-

Corse. Data sets are for public usage, provided mention of the source is done. No attempt to obtain non-public data sets was made since this would have raise the issue of creating a completely new data-flow within Eionet.

The question of using the information from these data sets as surrogate of the EPRTR and cooling values was analysed and the data (exported as Excel files) was integrated in a single data base. However, the informative content of data is very different from one agency to another. The data structures are the following:

- Adour-Garonne focuses on abstraction point and on supply work. Data source is apportioned between Surface / Groundwater. The user of water is attached to the supply work and identified, with a name but the usage proper is only told as Irrigation / public supply / industrial supply. Supplementary information should be sought next to the agency to identify the ISIC and the uses (only abstractions were publicly available).
- Artois-Picardie has more or less the same structure (albeit point and work are not separated) and presents the abstraction in different datasets depending on origin: groundwater and Surface water (river /canal); after consolidation, different sources for same user can be collected. However, the detailed type of usage cannot be identified.
- Loire-Bretagne, by contrast, organises the data from user's perspective (and not from resource's perspective). Source of water is very detailed (deep / superficial GW, spring, dam, lake, etc). The NAF code of main production is provided and relates to abstraction point ID.
- Rhône-Mediterranée-Corse provides some intermediate information, where the category of uses can be extremely detailed (under proprietary typology) albeit the coding of the activity is not.

Once complied and reformatted into common categories and structure, a databases (covering a few years) provided 25683 abstraction volumes attached to (figure is uncertain

Table 2.10: Summary results of volumes (hm3/d) used for manufacturing by source of supply as from WA data

WAgency	Canal	GW-D	GW-S	HillDam	Reservoir	River	Spring
AG		0.139	0.193			5.695	
AP	0.433		0.318			0.01	
LB	0.016	0.522	0.14	0.059	0.026	0.467	0.042
RMC		0.003	0.821			0.823	

Data in Table 2.10 are surprisingly elevated, especially for AG. In the case of RMC, the "refroidissement industriel" use (that is part of group 20 "production") has been removed and makes volumes much closer to likely values.

AG data (that does not allow excluding cooling and turbining) is unlikely since this area is not highly industrialised (even if several pulpmills are present) but do not justify a 65 m3/s abstraction rate. Assuming river abstraction close to LB rate, this would give a total for the 4 water agencies of ~4.5 hm3/d, making it likely a total manufacturing abstraction of 5 to , to compare to the 0.326 obtained from EPRTR processing. This suggests an underestimate in a range of one order of magnitude, just because the source population of industries is far from representative.

2.7.3 Validation and corrections

It is almost impossible to carry out a validation of the industrial water use estimations at the facility level unless these have been collected and made public by the respective water agencies. In France, some agencies have made information on industrial water use available – so here is a possibility to do some cross-checks. Another approach would be to sum the water uses per sector and ask Member States to verify that the estimates match their own reported values. CONCAWE (CONServation of Clean Air and Water in Europe) representing European oil companies is party to a dataset of water use from their own sector, and they are willing to provide a cross check on the estimates carried out by the project.

The issue of validation related to French data assessment strongly suggests three conclusions:

1. Considering the huge difference between the homogeneous assessment carried out with EPRTR data sets, inserting French data instead of modelled data for the 4 French water agencies would create an enormous bias in the computations, and would pinpoint France as excessive industrial water consumer, which is not the case;
2. Manufacturing volumes are considerably underestimated and hence the balances and exploitation indexes are likely to be underestimated.
3. Since volumes are likely to be underestimated in a range of one order of magnitude, scoring is meaningless.

2.7.4 Envisaged corrections

If hard data is provided for some countries and reason to recompute accounts, new data taken on board. This data should be used to compute systematic correction factors.

In all circumstances, the full revision of industrial data collection schemes should be undertaken.

2.8 Energy production

2.8.1 Data source and provision to the accounts procedure

Energy production uses water mainly for cooling purposes. In this category of uses, a critical issue for the accounts is to estimate if the cooling is performed using fresh water or brackish water . A second critical issue is the cooling technology used – once through cooling system (using large amounts of water almost instantly returned to the water source) or a recirculating, wet tower cooling system (with significantly lower amounts of water extracted). Significant energy production uses are very local and can be huge for certain sectors. Sources are all incomplete and not dedicated to obtaining volumes.

As for industrial water uses the main sources are:

- E-PRTR , this database is mainly providing reported industrial emissions for major industrial facilities. All major energy producing facilities are Large Combustion Plants, and so the reporting of emissions is complete, due to reporting obligations. However, there is very little information on water volumes extracted or discharged, because this section of reporting is voluntary.

- The Best Available Techniques (BAT) Reference documents (BREFs) for cooling provides valuable information on water use coefficients that are representative for the energy production sector. Production levels are not provided in the E-PRTR database nor the BREF so use is made of the CO_2 emissions information to estimate power production, and then relate this to water uses

- The Platts database, from which many locations have been made, from the more or less precise indications (e.g. commune, then detailed assessment, mainly carried out by ETC/SIA), is used to assess water use by the nuclear energy production sector;

Processing has consisted principally of using water use coefficients from BREF resources (good quality data), with industry production levels (from the Platts database or CO_2 emissions (good quality data). In addition spatial analysis (using the coordinates of the energy producing facilities) has been used to determine whether the source of water is brackish or fresh.

2.8.2 Nuclear power plants

Nuclear power plants are not part of EPRTR lists and were selected from the Platts data base. The facilities have been entered into the final data sets as EccNnnnnnn where cc is country ID and nnnnnn is the ranking of facility; with reference to the list provided by VITO. There is no reference to EPRTR and hence no national ID related.

Table 2.11 : Sum of volumes per country for the Nuclear power plants as found and estimated .

Country Code	Nb plants	Brackish Intake Hm3/day	Brackish consumption Hm3/day	Brackish return Hm3/day	Fresh W intake Hm3/day	Fresh W Consumption Hm3/day	Fresh W Return Hm3/day
BE	2	9.46	0.18	9.28	0.55	0.38	0.16
BG	1	0	0	0	0.35	0.25	0.11
CZ	2	0	0	0	0.68	0.47	0.2
DE	14	11.97	0.23	11.74	3.66	2.56	1.1
ES	6	3.52	0.07	3.45	1.16	0.81	0.35
FI	2	8.94	0.17	8.77	0	0	0
FR	18	66.58	1.26	65.32	7.62	5.33	2.29
HU	1	0	0	0	0.35	0.25	0.11
LT	1	0	0	0	0.26	0.18	0.08
NL	1	1.55	0.03	1.52	0	0	0
RO	1	0	0	0	0.25	0.18	0.08
SE	3	30.36	0.58	29.78	0	0	0
SI	1	0	0	0	0.12	0.09	0.04
SK	2	0	0	0	0.32	0.22	0.1
UK	10	40.83	0.77	40.05	0	0	0

Prepared by VITO, compiled by EEA. Data are for year around 2004

Comparison with external data is very difficult; however, the cooling volumes for energy production as reported by Water agency Rhône-Méditrerranée –Corse seem in average interannual range of ~30 hm2/d, which is largely more than estimated for the whole France, based on current standards (without clear information on the pass-through vs. cooling towers, that change radically the abstracted volume.

2.8.3 Other cooling facilities

Table 2.12 : Sum of volumes per country for the cooling (non nuclear) plants as found and estimated .

Country Code	Nb plants	Brackish Intake Hm3/day	Brackish consumption Hm3/day	Brackish return Hm3/day	Fresh W intake Hm3/day	Fresh W Consumption Hm3/day	Fresh W Return Hm3/day
AT	23	0	0	0	0.47	0.33	0.14
BE	45	1.01	0	1.01	0.75	0.53	0.23
CY	2	0.48	0	0.48	0	0	0
CZ	25	0	0	0	0.7	0.49	0.21
DE	219	1.24	0	1.24	3.18	2.23	0.96
DK	6	0.19	0	0.19	0.08	0.06	0.02
EE	2	0.25	0	0.25	0	0	0
EL	16	3.06	0	3.06	0.11	0.08	0.03
ES	100	5.46	0	5.46	1.12	0.78	0.34
FI	26	2.88	0	2.88	0.08	0.05	0.02
FR	182	9.32	0	9.32	1.81	1.27	0.54
HU	9	0	0	0	0.2	0.14	0.06
IE	8	1.19	0	1.19	0.05	0.03	0.01
IT	113	7.86	0	7.86	0.93	0.65	0.28

Country Code	Nb plants	Brackish Intake Hm3/day	Brackish consumption Hm3/day	Brackish return Hm3/day	Fresh W intake Hm3/day	Fresh W Consumption Hm3/day	Fresh W Return Hm3/day
LT	1	0	0	0	0.04	0.03	0.01
LU	5	0	0	0	0.03	0.02	0.01
LV	2	0.12	0	0.12	0.01	0.01	0
NL	48	5.21	0	5.21	0.49	0.34	0.15
NO	31	3.12	0	3.12	0.02	0.02	0.01
PL	46	0.49	0	0.49	0.76	0.53	0.23
PT	14	1.53	0	1.53	0.12	0.09	0.04
SE	23	3	0	3	0.07	0.05	0.02
SI	4	0	0	0	0.05	0.04	0.02
SK	5	0	0	0	0.05	0.04	0.02
UK	138	13.64	0	13.64	0.65	0.46	0.2

Estimation of volumes has been carried out as indicated in heading section. Again, despite reconstruction efforts, it is likely that large underestimation resulted from the insufficient reference population (as from EPRTR). However, this underestimation is beyond analysis (see previous section on NPP).

2.8.4 Validation and corrections

It is almost impossible to carry out a validation of the water use estimations for energy production at the facility level unless these have been collected and made public by the respective water agencies. In France, some agencies have made information on industrial water use available – so here is a possibility to do some cross-checks. Another approach would be to sum the water uses per sector and ask Member States to verify that the estimates match their own reported values. A cross check of water use by energy producing facilities in Flanders has been carried out and indicates that the approach provides water using estimates of the right order of magnitude. The Association of Electricity Producers is party to a dataset of water use from their own sector and they may be willing to provide a cross check on the estimates carried out by the project.

2.8.5 Suggestions

It revealed impossible to correctly address the sorting out industries and their abstractions / water uses at disaggregated levels and even assess quite accurately the volumes per catchment. This is key difficulty that has to be readdressed in the next steps of water balances assessments.

2.9 *Agriculture*

2.9.1 Data source and provision to the accounts procedure

Abstraction from soil water includes two radical different categories:

1. water use in rainfed agriculture. This is computed as the amount of precipitation that falls onto agricultural fields (meteorological inputs at month level, apportion according to share of Corine *Land cover* crop land per FEC). The excess of water, e.g. the part that is not used by the crop, estimated as from the difference with actual evaporation, is recorded as a return flow to the environment from rainfed agriculture. It is important to record this flow for several reasons: the first and foremost is that is tis demanded by the SEEAW, the other reasons are that it shows, for example, the relative contribution of rainfed and irrigated agriculture for food production. In addition, considering the importance of rainfed agriculture worldwide (more the 60% of all food production in the world is produced under rainfed conditions), this information can be used to assess the efficiency of rainfed agriculture (e.g. crop production per volume of water used) and to formulate water policies.);
2. Irrigation volumes;

The first category is not presented here: values are the results of calculation at FEC and then aggregated at territory of reference levels. The second category is the one which volumes are generally considered as “agricultural abstractions” in statistical documents.

EU wide, the source selected is the one assessed by JRC. JRC provides a database of monthly values covering all the years from 1984 until 2008. The spatial resolution is a LEAC grid 10 by 10 km. The database can be processed with MS Access.

This data set has been exploded into the FECs and volumes compared to reference volumes from local statistics, showing large differences. Assuming a quality value of 0.25 for source (since significantly modified where checked) and 0.75 where corrected, the assumptions on agricultural irrigation are in the

Table 2.13: summary of yearly (average) of volumes (hm3) abstracted for irrigation per country and scoring.

CTY	Nb of years	Yearly avg (JRDC)	Yearly avg (corrected)	score
AL	25	0	0.92	0.75
AT	25	9.88	9.88	0.25
BE	25	1.64	1.64	0.25
BG	25	5.52	7.96	0.75
BY	25	0	0	0.25
CH	25	4.56	7.76	0.75
CY	No source data; data surrogated to 184hm3/y			
CZ	25	0	0	0.25
DE	25	6.52	6.52	0.25
DK	25	24.32	24.32	0.25
EE	25	0	0	0.25
ES	25	3598	3598	0.25
FI	25	0	0	0.25
FR	25	1893.68	5740.24	0.75
GR	25	1851.32	5019.36	0.75
HR	25	0	0	0.25
HU	25	94.4	94.4	0.25
IE	25	0	0	0.25
IT	25	4231.04	4776.56	0.75
LI	25	0	0	0.25
LT	25	0	0	0.25
LU	25	0	0	0.25
LV	25	0	0	0.25
MD	25	6.8	6.8	0.25
MK	25	0.6	0.96	0.75
MT	0	ND	ND	NA
NL	25	30.8	30.8	0.25
NO	25	0	0	0.25
PL	25	0	0	0.25
PT	25	259.08	259.08	0.25
RO	25	788.68	788.68	0.25
RS	25	0	0	0.25

CTY	Nb of years	Yearly avg (JRDC)	Yearly avg (corrected)	score
RU	25	0	0	0.25
SE	25	0	0	0.25
SI	25	2.8	2.8	0.25
SK	25	107.12	107.12	0.25
TR	25	21.88	58.88	0.75
UA	25	0	0	0.25
UK	25	1.8	1.8	0.25

Overall volume shifts from 3235 (all countries) to 12942 (score from 0.25 to 0.63 and from 3227 (EU only) to 12889 and scores shifts from 0.25 to 0.63 as well. Scores are rather spurious, just indicate that a major change has occurred, since they are volume depending.

Comparison with known values per basin were made and some data seems to be largely underestimated or underestimated so that a correction factor that applies globally to the basin concerned as shown in the following table was introduce

2.9.2 Validation and corrections

Regionalised data, correcting modelled data could be taken into account when provided.

3 Summary of data collection and preparing

3.1 Consolidation and calibration

Synthetic tables are the outcome of previous databases processing under some scenario specification (for example, how to transfer later in time precipitation as snow?).

The aggregated data are then transferred into ad hoc designed Excel workbooks, with pivot tables programmed so that month for a sub-basin or all years for RBD can be displayed.

Water accounts being both a process to output results and analytical instrument, there is some feed-back process to consolidate (calibrate) the accounts table to identify the major issues causing errors. For example, before correcting actual ETP, the final stocks were depleting along time and reached impossible deficits.

Sources of errors are many, the major identified errors are:

- Erroneous climatic data values, making non-adjustable differences between river discharge and effective rainfall;
- Incomplete setting for a catchment; for example is several years of deficit are computed and no large groundwater / surface reservoir is mobilised because unknown, the deficit will diverge;
- Incorrect documentation of rivers and Gauging stations: since the calculation invokes the specific discharge to expand data, erroneous catchment / topological errors in Ecrins may generate errors;

As a consequence, incorrect data sets in one area may have jeopardising effects on the rest of the process.

4 Summary of data scoring

4.1 Purpose of the summary

The document is quite heavy but presents summary data for each country. Each country can therefore compare with its best estimates and decide if:

1. They feel happy with values and / or scoring and consider that supplementary deliveries is not likely to improve the final results (to be presented separately)
2. They feel their situation is likely to be inaccurately and unacceptably depicted with the existing data sets and they wish to provide supplementary data / propose correcting coefficients of sub-basin aggregates.

4.2 Overall conclusions regarding data sets quality

4.2.1 Reference systems for reporting

- River systems and catchments are OK,
- Lakes and reservoirs almost fine, except still missing many volumes
- Groundwater not ready, since too many delays in ETC production.

4.2.2 Meteorological data

The coverage of meteorological data is:

- Albeit a bit coarse for meto data and likely somehow imprecise when considering actual evaporation,
- Insufficient regarding catchments close to sea-shore, because absence of coverage on the source grid, this has been mitigated by expanding data (at the expense of accuracy, this cannot be checked);
- Missing snow data had to be reconstructed from rain and temperature, nevertheless ensuring seasonal transfer of snow-borne resource

4.2.3 River run-off

This key information, since the only certain in its quality when coming from records (run-off captures both transfer of resource and result of consumption / diversion) is widely insufficient in many countries because:

- Not provided map of gauging stations, hence preventing from spatial reconstruction
- And / or not providing sufficient data (or with many time gaps)
- Perfect in several countries, and leading to sufficient comparison rainfall / run-off as primary balance.

4.2.4 Domestic uses

- Reconstruction could be done with sufficient correctness because the reference population (of cities, towns, people number) is homogeneous,
- Reporting of the UWWTP allowed in many cases estimating restitution point,
- Insufficient where directive does not apply, making gaps in the system (hence to be surrogated by specific data collection)

Stratified analysis, jointly with the development under the ‘urban atlas’ will simply improve the situation.

4.2.5 Cooling water

- Estimates from EPRTR provide a seriously biased data set(underestimate by ½ to 1 order of magnitude)
- Source country data sets not “matcheable” with EPRTR and too heterogeneous to be used simply or accurately
- Underestimates cannot be corrected because lack of reference population (except NPP, that should be individually surveyed), since both resource and cooling file are not systematically documented and accessible.

4.2.6 Process water

- Estimates from EPRTR provide a seriously biased data set(underestimate by 1 to more than 1 order of magnitude)
- Source country data sets not “matcheable” with EPRTR and too heterogeneous to be used simply or accurately
- Underestimates cannot be corrected because lack of reference population

As generic conclusion regarding all industrial uses, we have an homogeneous data set that is a “sub-sub-sample” (both as targeted groups and size of facilities inside the selected groups, plus oddness is reporting) of all activities and that does not provide what is needed but allows reconstructing it and the country data sets obtained have a large detail of information that do not match the purposes and that is eventually less usable than the EU level one…

4.2.7 Irrigation water

- Spatial coverage almost complete BUT
- Values in wide data sets strongly underestimated if compared with national data (1/2 to 1 order of magnitude)
- Values COULD be corrected with better reference / national data since reference population exists and hence MUST be corrected because the large share of consumptive uses in this category.

4.3 Summary of data scoring presented by country

Again, the target of scoring per country is to provide to each country (level of consultation) a flavour of the bigger or smaller degree of quality of the data that could be mobilised for this country so that the results could be analysed vs. the likelihood of data in this country. It is not a country scoring.

Scoring consists in putting in parallel columns the different scores computed. Because editing reasons, this is placed in Appendix 1 .

Appendix 1 : Summary of scores

Table A.1.1: main table of FECS detailed data structure infeature class C_Zhyd

CTY	meteo		Run-off		Dom		Cooling (non power making)	Cooling (energy)	Manufacturing		agri
	All	Coastal	Minimum	Optimum	All	large Only			Fresh	brack	
AL	0.99	0.87	0.17	0.07	0.89	NA					0.75
AT	1.00	NA	0.96	0.96	0.81	0.62	0.50	0.50	0.72	NA	0.25
BE	1.00	1.00	0.80	0.79	0.77	0.44	0.50	0.50	0.52	0.50	0.25
BG	1.00	0.72	0.31	0.12	0.75	0.65			NA	0.50	0.75
BY	0.01	NA	0.08	0.03	NA	NA					0.25
CH	1.00	NA	0.74	0.74	0.93	0.25		0.50			0.75
CY	0.89	NA	1.00	0.84	0.94	0.25	0.00	0.50	NA	0.75	NA
CZ	1.00	NA	0.16	0.06	0.67	0.55	0.50	0.50	0.53	NA	0.25
DE	1.00	0.91	0.72	0.65	0.66	0.55	0.50	0.50	0.61	0.54	0.25
DK	0.92	NA	0.88	0.88	0.95	0.25	0.00	0.50	0.75	0.51	0.25
EE	0.97	0.86	0.79	0.67	0.92	0.25	0.00	0.50	NA	NA	0.25
ES	0.96	0.64	0.98	0.98	0.55	0.47	0.50	0.50	0.66	0.56	0.25
FI	0.99	0.91	0.59	0.27	0.96	0.57	0.50	0.50	0.75	0.70	0.25
FR	0.99	0.86	0.98	0.95	0.84	0.92	0.50	0.50	0.65	0.50	0.75
GR	0.87	0.60	0.08	0.03	0.96	0.53					0.75
HR	0.93	0.65	0.88	0.46	0.84	0.36					0.25
HU	1.00	NA	0.57	0.22	0.84	0.25	0.50	0.50	0.52	NA	0.25
IE	0.98	0.93	0.98	0.97	0.82	0.67	0.00	0.50	0.75	0.51	0.25
IS	0.00	0.00	0.18	0.07	0.96	NA					
IT	0.98	0.88	0.06	0.02	0.61	0.53	0.50	0.50	0.61	0.51	0.75
LI	1.00	NA	0.75	0.75	0.84	NA					0.25
LT	0.99	0.47	0.54	0.21	0.69	0.25	0.50	0.50	0.50	NA	0.25
LU	1.00	NA	1.00	0.60	0.78	0.25	0.00	0.50	0.75	NA	0.25
LV	0.99	0.95	0.58	0.22	0.83	0.58	0.00	0.50	NA	0.75	0.25
MD	0.06	NA	0.02	0.01	0.98	NA					0.25
MK	1.00	NA	0.69	0.30	0.86	NA		0.50			0.75

CTY	meteo		Run-off		Dom		Cooling (non power making)	Cooling (energy)	Manufacturing		agri
	All	Coastal	Minimum	Optimum	All	large Only			Fresh	brack	
NL	0.98	0.97	0.66	0.60	0.72	0.35	0.50	0.50	0.51	0.50	0.25
NO	0.97	0.91	0.49	0.25	0.88	NA	0.00				0.25
PL	1.00	0.94	0.09	0.04	0.77	0.49	0.50	0.50	0.56	0.50	0.25
PT	0.97	0.83	0.95	0.94	0.77	0.41	0.50	0.50	0.75	0.71	0.25
RO	1.00	0.95	0.11	0.04	0.75	0.36			0.50	0.50	0.25
RS	1.00	NA	0.83	0.60	0.87	NA					0.25
RU	0.00	0.02	0.05	0.02	0.99	NA		0.50			0.25
SE	0.99	0.90	0.65	0.25	0.77	0.45	0.50	0.50	0.75	0.73	0.25
SI	1.00	1.00	0.72	0.69	0.79	0.25	0.00	0.50	0.52	NA	0.25
SK	1.00	NA	0.55	0.21	0.78	0.25	0.50	0.50	0.75	NA	0.25
TR	0.44	0.68	0.01	0.00	0.86	NA					0.75
UA	0.01	0.01	0.02	0.01	0.99	NA					0.25
UK	0.97	0.87	0.95	0.95	0.70	0.50	0.50	0.50	0.75	0.51	0.25

Comments :

Cells in yellow / blue indicate respectively non EU / EU countries

Scoring on meteorological data was done separately for all FECS and only coastal FECs; NA indicates that such FECs don’t occur for the country.

Run-off reports the minimum (50% percentile) and optimum (75% percentile)

Domestic reports scoring for all persons and stratum “L”.

Non power making was scored 50% if volume obtained, 0 otherwise for those countries where information was normally expected. Empty cells indicated full lack of data.

Energy cooling is assumed having captures information for all relevant countries. Only freshwater abstractions are mentioned here, brackish abastractions are documented in data sets.

Manufacturing presents both freshwater and saline water since some large plants (oil processing) refresh more on brackish, this is provided for information.

Agri column presents scoring for revised values.

No overall average has been done, since non-significant. As a rule of thumb, data scoring below .75 is questionable and below .5 is highly likely to raise final errors in balances.

Appendix 2 Gauging stations density and number of missing stations.

Table A.2.1: Gauging stations assessments density and possible gaps

nb ctry EU	nb ctry EEA	target	50%	3.49
27	35		75%	9.04

Country Code	Tot StNbM	Tot StNbS	WB Nb Sta	GrDC supp	Length Main	length Sec.	TSt per 1000kmM	Tst per 1000kmS	Target 0.5	Missing 0.5	Target 0.75	Missing 0.75	Totals	missing 0.5	missing 0.75
IE	1323	327	131	0	11883	7616	111.34	27.52	41	0	107	0	country #	10	18
PT	646	51	0	0	17134	14309	37.7	2.98	60	0	155	0	stations #	749	3531
AT	515	37	21	0	19826	21603	25.98	1.87	69	0	179	0			
DK	117	19	30	0	4623	2101	25.31	4.11	16	0	42	0			
FR	2257	180	0	0	106222	77087	21.25	1.69	371	0	961	0	station M (EU)	7963	
CH	187	19	205	0	9083	12094	20.59	2.09	32	0	82	0	station S (EU)	790	
LI	1	0	1	0	65	34	15.38	0	1	0	1	0			
BE	69	6	26	0	5025	2993	13.73	1.19	18	0	45	0			
ES	1153	61	42	1	101273	86550	11.39	0.6	353	0	916	0			
NL	24	0	0	0	2521	599	9.52	0	9	0	23	0			
SI	43	2	18	0	4683	5206	9.18	0.43	16	0	42	0			
EE	63	3	30	0	7304	2680	8.63	0.41	25	0	66	3			
RS	117	6	120	1	13674	11696	8.56	0.44	48	0	124	7			
CY	13	1	0	0	1682	1126	7.73	0.59	6	0	15	2			
DE	465	10	147	2	64597	39487	7.2	0.15	225	0	584	119			
UK	290	18	57	0	41358	27359	7.01	0.44	144	0	374	84			
HR	71	3	72	0	11627	10357	6.11	0.26	41	0	105	34			
NO	261	29	100	0	56123	50939	4.65	0.52	196	0	507	246			
LT	49	0	42	0	11931	5288	4.11	0	42	0	108	59			
HU	52	0	32	1	14887	6582	3.49	0	52	0	135	83			
SE	280	22	21	0	83997	44415	3.33	0.26	293	13	760	480			
LU	2	2	4	0	610	350	3.28	3.28	2	0	6	4			
FI	142	7	76	1	54944	32849	2.58	0.13	192	50	497	355			
IS	23	0	0	0	10809	5506	2.13	0	38	15	98	75			
BG	44	3	39	1	22809	19242	1.93	0.13	80	36	206	162			
SK	19	0	19	0	9825	10542	1.93	0	34	15	89	70			
LV	21	2	9	0	11778	4811	1.78	0.17	41	20	107	86			

MK	10	1	6	0	5860	7016	1.71	0.17	20	10	53	43
AL	7	1	0	0	7454	9804	0.94	0.13	26	19	67	60
RO	31	4	0	0	46415	32330	0.67	0.09	162	131	420	389
GR	19	2	0	0	28593	33407	0.66	0.07	100	81	259	240
PL	31	3	0	0	52822	27574	0.59	0.06	184	153	478	447
BY	19	0	0	0	35283	24069	0.54	0	123	104	319	300
IT	30	1	0	0	65682	69006	0.46	0.02	229	199	594	564
RU	170	7	0	0	606219	441545	0.28	0.01	2116	1946	5482	5312
CZ	4	0	0	0	15651	11138	0.26	0	55	51	142	138
MD	1	0	0	0	7166	3479	0.14	0	25	24	65	64
UA	13	0	0	0	97365	52426	0.13	0	340	327	880	867
TR	16	2	0	0	132471	73630	0.12	0.02	462	446	1198	1182

Columns **Tot STBnM**: total number of stations snapped to main drains, **Tot STBnS**: total number of stations snapped to secondary drains,; **WB nb**: number of stations as reported in EEA /Wise water base; **GRDC suppl**: stations found in GRDC data sets and not previously recorded.

Stations on main drains are those taken into consideration in the computation of targets since only main drains are considered in river discharge computations. In fact, some secondary drains might be of importance to assess the productivity of the uppermost catchments (in those catchments, no drain can be considered as purely main, any river in such catchment can be used to seed the computations);

Table A.2.2: Monthly discharge data available and possible gaps

							1	0.75	0.25		1	0.75	0.25		10	12
							E	S	J	Sum	E	S	J	Sum		
Country Code	Total Of Number monthly Values	C	E	J	S	X	Score E	Score S	Score J		Score E	Score S	Score J		nBm50	nBm75
AL	2096			2096			0.00	0.00	0.17	0.17	0.00	0.00	0.07	0.07	3120	8040
AT	247929		7311	262	36740	203616	0.85	0.11	0.00	0.96	0.85	0.11	0.00	0.96	8280	21480
BE	15228		6696	1572	6960		0.44	0.34	0.02	0.80	0.44	0.34	0.01	0.79	2160	5400
BG	6308		4212	2096			0.29	0.00	0.02	0.31	0.11	0.00	0.01	0.12	9600	24720
BY	4978			4978			0.00	0.00	0.08	0.08	0.00	0.00	0.03	0.03	14760	38280
CH	71662		756	262	70644		0.00	0.74	0.00	0.74	0.00	0.74	0.00	0.74	3840	9840
CY	1512		1512				1.00	0.00	0.00	1.00	0.84	0.00	0.00	0.84	720	1800
CZ	1392				1392		0.00	0.16	0.00	0.16	0.00	0.06	0.00	0.06	6600	17040
DE	125556		19224	4716	101616		0.11	0.61	0.00	0.72	0.04	0.61	0.00	0.65	27000	70080
DK	51433		1404	1572	19777	28680	0.58	0.29	0.01	0.88	0.58	0.29	0.00	0.88	1920	5040
EE	16486		3348	262	12876		0.20	0.59	0.00	0.79	0.09	0.59	0.00	0.67	3000	7920

ES	510402		83214	12052	509	414627	0.98	0.00	0.00	0.98	0.98	0.00	0.00	0.98	42360	109920
FI	37816		6480	4192	27144		0.05	0.54	0.01	0.59	0.02	0.25	0.00	0.27	23040	59640
FR	845331	70682	115867	8646	49426	600710	0.93	0.04	0.00	0.98	0.93	0.02	0.00	0.95	44520	115320
GR	3084		1512	1572			0.06	0.00	0.02	0.08	0.02	0.00	0.01	0.03	12000	31080
HR	13308		6696		6612		0.50	0.37	0.00	0.88	0.27	0.20	0.00	0.46	4920	12600
HU	9284		3888	524	4872		0.26	0.31	0.00	0.57	0.10	0.12	0.00	0.22	6240	16200
IE	222332		215352	5240	1740		0.97	0.00	0.01	0.98	0.97	0.00	0.00	0.97	4920	12840
IS	4008		864	3144			0.04	0.00	0.14	0.18	0.02	0.00	0.05	0.07	4560	11760
IT	7244		432	6812			0.00	0.00	0.06	0.06	0.00	0.00	0.02	0.02	27480	71280
LI	348				348		0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	120	120
LT	8964		3564	1572	3828		0.28	0.24	0.01	0.54	0.11	0.09	0.01	0.21	5040	12960
LU	432		432				1.00	0.00	0.00	1.00	0.60	0.00	0.00	0.60	240	720
LV	5758		972	262	4524		0.03	0.54	0.00	0.58	0.01	0.21	0.00	0.22	4920	12840
MD	262			262			0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	3000	7800
MK	3108		324		2784		0.01	0.67	0.00	0.69	0.01	0.29	0.00	0.30	2400	6360
NL	11230		1293	2620	7275	42	0.12	0.49	0.06	0.66	0.06	0.49	0.06	0.60	1080	2760
NO	70208		7452	30392	32364		0.03	0.35	0.11	0.49	0.01	0.18	0.05	0.25	23520	60840
PL	8384			8384			0.00	0.00	0.09	0.09	0.00	0.00	0.04	0.04	22080	57360
PT	113112		65318	6812	348	40634	0.94	0.00	0.01	0.95	0.94	0.00	0.01	0.94	7200	18600
RO	8384			8384			0.00	0.00	0.11	0.11	0.00	0.00	0.04	0.04	19440	50400
RS	16996		11772	1048	4176		0.69	0.13	0.00	0.83	0.55	0.05	0.00	0.60	5760	14880
RU	45850			45850			0.00	0.00	0.05	0.05	0.00	0.00	0.02	0.02	253920	657840
SE	55894		26568	1834	27492		0.36	0.29	0.00	0.65	0.14	0.11	0.00	0.25	35160	91200
SI	13522		1080	262	12180		0.04	0.68	0.00	0.72	0.02	0.68	0.00	0.69	1920	5040
SK	4560		1080		3480		0.06	0.49	0.00	0.55	0.02	0.19	0.00	0.21	4080	10680
TR	2932		1188	1048	696		0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	55440	143760
UA	3406			3406			0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	40800	105600
UK	119577		6528	1572	5279	106198	0.94	0.01	0.00	0.95	0.94	0.00	0.00	0.95	17280	44880

Column contents are the following: total number of monthly values: all month-stations, C data collected out of Eionet, as monthly data, E Eionet data collection and reported as month, J space reconstructed data sets, S time reconstructed data sets, X daily data collected out of Eionet and recomputed as monthly data sets.

The target number of stations month is 10 years * 12 months * target number of gauging stations (low: 50% , and high: 75%).

Scoring is based on a double weighting, ceiled to 1. See main text for details and rationales.

Appendix 3 WISE data processing for domestic abstractions

1 *Rationales*

1.1 Nomenclatures

WISE water abstractions and uses are collected under a very detailed nomenclature (albeit somehow obscure) that makes exploitation of data rather complex. The entries of water volumes are under the categories recalled in the Table A.3.1

Table A.3.1: Nomenclature of water abstraction and uses categories in the WISE data sets

	Parameter	Definition	Sector
1.	wa_for_public_wss	Freshwater abstraction which was withdrawn through PWSS	PWSS_all sectors
2.	wa_for_public_wss_sw	Freshwater abstraction which was withdrawn through PWSS from Surfacewater	PWSS_all sectors
3.	wa_for_public_wss_gw	Freshwater abstraction which was withdrawn through PWSS from Groundwater	PWSS_all sectors
4.	wu_public_water_supply-total	Total Water Use from PWSS	PWSS_all sectors
5.	wa_abstraction_for_self_suply_total	Freshwater abstraction which was withdrawn through self-supply	Self-supply_all sectors
6.	wa_abstraction_for_self_suply_total_sw-total	Freshwater abstraction which was withdrawn through self-supply from Surfacewater	Self-supply_all sectors
7.	wa_abstraction_for_self_suply_total_gw-total	Freshwater abstraction which was withdrawn through self-supply from Groundwater	Self-supply_all sectors
8.	wu_self_supply-total	Total Water Use from Self-supply	Self-supply_all sectors
9.	wa_abstraction_for_self_suply_total_sw-domestic	water abstration for Self-supply Domestic purposes, from Surfawater	Domestic
10.	wa_abstraction_for_self_suply_total_gw-domestic	water abstration for Self-supply Domestic purposes, from Groundwater	Domestic
11.	wu_total_freshwater_used-domestic	Total Water use for Domestic purposes	Domestic
12.	wu_public_water_supply-domestic	Water Use for Domestic pursposes from PWSS	Domestic
13.	wu_self_supply-domestic	Water Use for domestic pursposes from self-supply	Domestic
14.	wa_abstraction_for_self_suply_total_sw-nace_a	water abstration for Self-supply Agricultural purposes, from Surfawater	Agriculture and Irrigation
15.	wa_abstraction_for_self_suply_total_sw-nace_a_irrgation	water abstration for Self-supply Irrigation purposes, from Surfawater	Agriculture and Irrigation
16.	wa_abstraction_for_self_suply_total_gw-nace_a	water abstration for Self-supply Agricultural purposes, from Groundwater	Agriculture and Irrigation
17.	wa_abstraction_for_self_suply_total_gw-nace_a_irrgation	water abstration for Self-supply Irrigation purposes, from Groundwater	Agriculture and Irrigation
18.	wu_total_freshwater_used-nace_a	Total Water use for Agriculture	Agriculture and Irrigation
19.	wu_total_freshwater_used-nace_a_irrgation	Total Water use for Irrigation	Agriculture and Irrigation
20.	wu_public_water_supply-nace_a	Water use for Agriculture from PWSS	Agriculture and Irrigation
21.	wu_public_water_supply-nace_a_irrgation	Water use for Irrigation from PWSS	Agriculture and Irrigation
22.	wu_self_supply-nace_a	Water use for Agriculture from self-supply	Agriculture and Irrigation
23.	wu_self_supply-nace_a_irrgation	Water use for Irrigation from self-supply	Agriculture and Irrigation
24.	wa_abstraction_for_self_suply_total_sw-nace_c	water abstration for Self-supply Manufacturing Industry purposes, from Surfawater	Manufacturing Industry, and Cooling for Industry
25.	wa_abstraction_for_self_suply_total_sw-nace_c_cooling	water abstration for Self-supply Manufacturing Industry cooling purposes, from Surfawater	Manufacturing Industry, and Cooling for Industry
26.	wa_abstraction_for_self_suply_total_gw-nace_c	water abstration for Self-supply Manufacturing Industry purposes, from Groundwater	Manufacturing Industry, and Cooling for Industry
27.	wa_abstraction_for_self_suply_total_gw-nace_c_cooling	water abstration for Self-supply Manufacturing Industry cooling purposes, from Groundwater	Manufacturing Industry, and Cooling for Industry

	Parameter	Definition	Sector
28.	wu_total_freshwater_used-nace_c	Total Water Use for Manufacturing Industry	Manufacturing Industry, and Cooling for Industry
29.	wu_total_freshwater_used-nace_c_cooling	Total Water Use for Cooling purposes in Manufacturing Industry	Manufacturing Industry, and Cooling for Industry
30.	wu_public_water_supply-nace_c	Water Use for Manufacturing Industry from PWSS	Manufacturing Industry, and Cooling for Industry
31.	wu_public_water_supply-nace_c_cooling	Total Water Usefor for Cooling purposes in Manufacturing Industry, from PWSS	Manufacturing Industry, and Cooling for Industry
32.	wu_self_supply-nace_c	Water Use for Manufacturing Industry from self-supply	Manufacturing Industry, and Cooling for Industry
33.	wu_self_supply-nace_c_cooling	Total Water Usefor for Cooling purposes in Manufacturing Industry, from self-supply	Manufacturing Industry, and Cooling for Industry
34.	wa_abstraction_for_self_suply_total_sw-nace_d	water abstration for Self-supply Production of Electricity purposes, from Surfawater	Electricity production, and Cooling for Electricity
35.	wa_abstraction_for_self_suply_total_sw-nace_d_cooling	water abstration for Self-supply Production of Electricity cooling purposes, from Surfawater	Electricity production, and Cooling for Electricity
36.	wa_abstraction_for_self_suply_total_sw-nace_d_hydropower	water abstration for Self-supply Hydropower generation purposes, from Surfawater	Electricity production, and Cooling for Electricity
37.	wa_abstraction_for_self_suply_total_gw-nace_d	water abstration for Self-supply Production of Electricity purposes, from Groundwater	Electricity production, and Cooling for Electricity
38.	wa_abstraction_for_self_suply_total_gw-nace_d_cooling	water abstration for Self-supply Production of Electricity cooling purposes, from Groundwater	Electricity production, and Cooling for Electricity
39.	wa_abstraction_for_self_suply_total_gw-nace_d_hydropower	water abstration for Self-supply Hydropower generation purposes, from Groundwater	Electricity production, and Cooling for Electricity
40.	wu_total_freshwater_used-nace_d	Total Water Use for Energy production	Electricity production, and Cooling for Electricity
41.	wu_total_freshwater_used-nace_d_cooling	Total Water Use for Cooling purposes in Energy production	Electricity production, and Cooling for Electricity
42.	wu_total_freshwater_used-nace_d_hydropower	Total Water use for Hydropower	Electricity production, and Cooling for Electricity
43.	wu_public_water_supply-nace_d	Water Use for Energy production from PWSSS	Electricity production, and Cooling for Electricity
44.	wu_public_water_supply-nace_d_cooling	Water Use for Cooling purposes in Energy production from PWSSS	Electricity production, and Cooling for Electricity
45.	wu_public_water_supply-nace_d_hydropower	Water use for Hydropower from PWSS	Electricity production, and Cooling for Electricity
46.	wu_self_supply-nace_d	Water Use for Energy production from self-supply	Electricity production, and Cooling for Electricity
47.	wu_self_supply-nace_d_cooling	Water Use for Cooling purposes in Energy production from self-supply	Electricity production, and Cooling for Electricity
48.	wu_self_supply-nace_d_hydropower	Water use for Hydropower from self-supply	Electricity production, and Cooling for Electricity
49.	wa_abstraction_for_self_suply_total_sw-nace_i	water abstration for Self-supply Sevices purposes (e.g. tourism), from Surfawater	Services (e.g. tourism)
50.	wa_abstraction_for_self_suply_total_gw-nace_i	water abstration for Self-supply Sevices purposes (e.g. tourism), from Groundwater	Services (e.g. tourism)
51.	wu_total_freshwater_used-nace_i	Total Water Use for Services (e.g. tourism)	Services (e.g. tourism)
52.	wu_public_water_supply-nace_i	Water Use for Services (e.g. tourism) from PWSS	Services (e.g. tourism)
53.	wu_self_supply-nace_i	Water Use for Services (e.g. tourism) from self-supply	Services (e.g. tourism)

Source: NTUA, text exactly similar to delivery and database for consistency purposes; column "parameter" is the value inside the database and cannot be changed. Only text in cell "sectors", line 13 has been reset to "Domstic"

Column "Sector has been added to the dataset at EEA request.

Despite definitions, it is not straightforward to find out what is in direct relation with domestic abstractions. Sectors "PWSS_all sectors" (PWSS is for "public water supply systems") and "Domestic" are candidates, but may lead to double accounting. some supplementary information is provided by NTUA, reported in the next Figure A 3.1.

Figure A 3.1: hierarchy of volumes according to categories

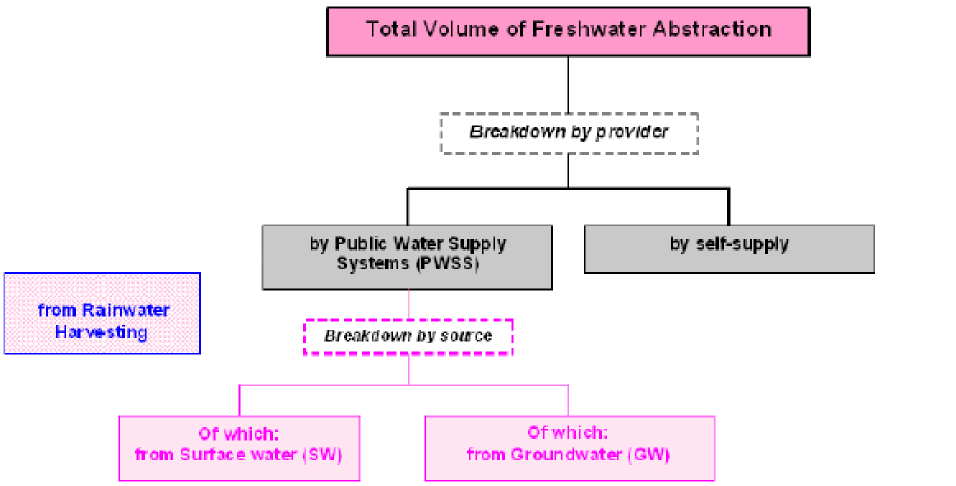

Figure 33: Freshwater abstraction breakdown by provider, and further breakdown for the PWSS abstraction by source

1.2 Selection of categories and preparing calculation data sets

According to this Figure A 3.1 (and similar figure, not reported, related to self-supply volumes), domestic abstraction and domestic uses are separated and not fully clear. The categories to mobilise are:

1. Regarding abstraction, the volumes are the sum of abstractions for public supply services {1}, possibly broken down into surface and ground water ({1}= {2}+{3}). To this public services abstraction adds the self-supply for domestic uses,
2. Self-supply for domestic uses address the water used for domestic and not counted in PWSS; it adds to. It is composed of total abstraction ({9}+ {10}, from breaking down into surface and ground water {10} and {11}). The entries {12} and {13} should respectively tell a volume (less than ({1}or {2}+{3}) less than ({9}+ {10} related to the uses of the water from the sources.
3. Total water use from public services {4} is unclear, since “use” is not defined. It should be less than {1}, but this is not systematically the case.
4. As consequence, all values {1} to {4} and {9} to {13}are extracted compared and processed.

These sums should be computed, of course at the same spatial and time aggregation level.

To make these data usable for the water accounts, the following steps must be carried out:

- Create a complete matrix table of volumes (in rows, the source and time, in columns the categories listed above.
- Analyse and aggregate data as needed; check if the breakdown by water source is relevant, at the reported disaggregation level
- Extract relevant data, compute technical coefficients and if relevant, suggest scenario building. Find the appropriate relationship between WISE disaggregation and Water accounts targets: set of FECs, to compute sub-basin levels technical coefficients.

At this stage there is a potential difficulty: many reporting are done at the Sub-Unit or at NUTS3 levels that cannot match directly the Water accounts working catchments; best guess will be done in such cases.

The previous step aimed at finding the number of population related to the reported volume; this will be done if no population number is found in reporting for the reported entity.

2 *Making working datasets*

The source data is pile-type file, which is perfect to minimize storage but inadequate to carry out analysis is data populating is odd. First step is making a matrix type dataset, populated stepwise.

Database WaterDom_Wise has been created and links to the relevant Wise and Ecrins datasets. Target reconstructed table is WaterDom_main. Table is populated stepwise, adding first all recods for {1}, then updating for {2} and adding missing {2} records, updating for {3} and so on. A total of 461 lines with at least one volume is then obtained for all countries, years and time steps of aggregation, which is incredibly small number.

Calculation of data was oriented to maximise data use: total abstraction through PWWS is ceiled to either total ({1} or sum of surface and groundwater; total self-supply is ceiled to sum of surface and groundwater or uses from self-supply. Source of sum is kept in all cases.

3 *Checking breakdown by water source.*

3.1 Summing totals

A table is created (PWSS_SS_totals) in two steps.

Analysis of results show very patchy information.

- Seasonal abstraction volumes are provide for year 2010 and 3 Bulgarian sub-entities (RBD) and 2008 for three Czech sub-entities (RBD). A total of 12 records is obtained. No use volumes are provided.
- Monthly volumes are provided for year 2010 for 2 over the three Bulgarian RBD mentioned above, for year 2008 for the 3 Czech RBDs mentioned above and for year 2007 for one Irish RBD and 7 Slovakian entities (country and 6 sub-units, in this case for two different years). A total of 240 records is obtained
- Yearly data is apparently best populated, reaching a total of 169 records. These data are however rather patchy, as shown in the next table.

Table A.3.2: Number of year-data (abstractions) per country (all disaggregation together)

Ctry	Number of abstraction values	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AT	2		1									1		
BE	8										2	2	2	2
BG	5								1					4
CH	4										1	1	1	1
CY	13	1	1	1	1	1	1	1	1	1	1	1	1	1
CZ	3											3		
DK	11			1	1	1	1	1	1	1	1	1	1	1
EE	7									6		1		
FI	1									1				
FR	58										58			
GB	14				14									
HU	1									1				
IE	10										4	6		
LT	16										4	4	4	4
LV	20									4	4	4	4	4

Ctry	Number of abstraction values	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MK	1											1		
NL	3								1	1	1			
PT	10									10				
RO	3										1	1		1
SI	3											1	1	1
SK	18									6	6	6		

Where annual value for one country is larger than 1, this means disaggregation per sub-entities, as displayed in next table where the sorting is per geographical entity en then per country. A total of 20 countries reported at country level. Data available at country level are summarized in the next table

Important information is that no year is complete across countries: some countries provide regular time series (Cyprus, Denmark, Latvia), some other have very old data (Great Britain). Hence only averages across years could be considered.

Water uses data are very poor, by contrast.

Table A.3.3: Number of year-data (uses) per country (all disaggregation together)

Ctry	Number of uses values	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AT	1	1										
CH	4								1	1	1	1
DK	9		1	1	1	1	1	1	1	1	1	
EE	1									1		
NL	3							1	1	1		
SI	3									1	1	1

Uses data does not give any clue on the seasonal uses since a single value is present in the best cases.

Moreover, making the ratio uses / abstraction (where both data are >0) gives strange results.

Table A.3.4: ratios volumes used /volumes abstracted for calculable pairs, per country and per year

Ctry	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AT	0.59										
CH								0.49	0.614	0.593	0.595
DK		0.355	0.368	0.375	0.367	0.003	0.004	0.003	0.004	0.003	
EE									0.708		
NL							0.57	0.576			
SI									0.533	0.514	0.512
SK											0.956

Ratios are all in a rather small range (below 70% seems however unusual at country level). Recent data for DK compared to previous suggest radical change in understanding or in data delivery scope

Since only yearly abstraction volumes are most present, and generally at country level, the next analysis will focus on the possibility to improve abstraction coefficients per capita and share GW /SW, where relevant (possibly at sub country level). The ratios usage / abstraction are so away of expected standards that they cannot be used for any purpose.

3.2 Usability of yearly data to derive per capita coefficients

Population data is provided for different levels of aggregation in space and time. to compute the maximum number of coefficients, the processing was carried out in the following way:

A supplementary table “population” provided by ETC/ICM (as support to a preparation to map of abstractions) gives reported population for some entities, that has been updated into the main computation table WiseDom_main.

Abstraction technical coefficients are all expressed in litres/capita/day. Usual values range from less than 100 litres to over 700 in places where no water counting was applied. In EU countries, the most frequent values range between 130 and 280 l/c/day. Since three periods are possible, the number of days per period has been taken 365 for 'annual' 365/2 for 'seasonal' and 365/12 (disregarding the actual month / year) for 'monthly.

v/c/d= (nb periods/365) × ($10^6 \times 10^3$ × total volume / nb of inhabitants). This is equivalent to rationalise volume to the year.

The two factors are just to recall that i) starting volumes are hm^3 and ii) target is litres and not m^3. Calculations are made with a detail query, rounded to the next litre and summarized in the next Table A.3.5

The results are much dispersed and are summarized in the next table. This table show blank lines where the calculation could not be done because population data were not reported. For obvious reason of homogeneity, only reported populations were considered to calculate a ratio.

Table A.3.5: Summary of computed statistics on daily abstractions per capita from WISE data sets

Ctry	GEntityType	TimeStep	max	Min	Mean	Nb values	Population
AT	C	annual	218	198	208	2	8404252
BE	RBD	annual	596	18	297	8	695581
BG	C	annual	358	358	358	1	7504868
BG	RBD	annual	384	163	318	4	2958756
BG	RBD	monthly	448	325	363	24	1032733
BG	RBD	seasonal	536	231	370	6	2958756
CH	C	annual	348	328	338	4	7866500
CY	RBD	annual	202	64	157	13	804435
CZ	RBD	annual	189	159	177	3	2670690
CZ	RBD	monthly	200	151	177	36	2670690
CZ	RBD	seasonal	191	156	178	6	2670690
DK	C	annual	358	190	263	11	5560628
EE	C	annual	137	137	137	1	1340194
EE	RBD	annual	151	6	95	3	575319
EE	SU	annual	151	6	95	3	575319
FI	C	annual	209	209	209	1	5375276
FR	C	annual	243	243	243	1	65075373
FR	RBD	annual	526	118	259	9	8067876
GB	RBD	annual	1500	150	425	11	6337369
GB	SU	annual	1500	182	653	3	444249
HU	RBD	annual	195	195	195	1	9977170
IE	RBD	annual	448	1	88	10	82957
IE	RBD	monthly	456	119	288	24	542000
LT	RBD	annual	140	9	71	16	91275
LV	RBD	annual	785	36	181	20	917056
MK	C	annual	307	307	307	1	2057284
NL	C	annual	210	205	207	3	16655799
PT	RBD	annual	459	65	199	10	308256
RO	C	annual	144	132	138	2	21413815
SI	C	annual	223	221	222	3	2050189

SK	C	monthly	27	24	26	12	5435273

Legend: where value is less than 130/2 or larger than 280*2, it is set in red (aberrant), when value in between these threshold it is set in green (in the average range) and orange otherwise (doubtful).
All volumes have been rationalised to the year before computing l/c/d.

When at least one column is questionable or aberrant, data should be considered with care. Interesting example is GB data: both maximum and minimum are aberrant, albeit the mean seems good because it average too high and too low value at two different dates.

Lessons are that single dates in data sets are poorly informative since so many data are questionable and less that 3 years of time series cannot help identifying possible errors.

Some values are indeed totally aberrant, either because population if reference is wrong or volume not referring correctly to the population, or any other reason. In such case, the average is doubtful applies as well if identical values pop-up for different periods or if possibly doubtful minimum is recorded.

Further assessment is carried out considering if abstraction coefficients are excellent (all green) or acceptable (maximum all orange). If one or more is aberrant, the line is rejected. Computing the number of people falling into one category per type of documented aggregation category yields the following results.

Table A.3.6: Populations concerned by the excellent or acceptable documented values of per capita coefficients

Reference	Country level		RBD level		Sub-Unit level	
	Excellent	Acceptable	Excellent	Acceptable	Excellent	Acceptable
Population selected in category	120314898	143304178	17989240	33857617	0	0
Total population documented in category	148739451	148739451	43361609	43361609	1019568	1019568
Percentage selected / documented	80.89%	96.35%	41.49%	78.08%	0.00%	0.00%
Total population in catchments under WA computation	548909159	548909159	548909159	548909159	548909159	548909159
Percentage documented / total population in WA	27.10%	27.10%	7.90%	7.90%	0.19%	0.19%
Percentage selected / total population in WA	21.92%	26.11%	3.28%	6.17%	0.00%	0.00%

Table A.3.6 above provides the final summary of assessments. Based on a total population in the WA computation are (population within the identified RBDs, from LandScan 2009), it comes that the documented data sets at country level concerns a bit more than a quarter of the targeted population, which is very low after several years of data collection next to Eionet. This percentage strongly suggests that less information than collected from Eurostat resulted from such process (as carried out by consultant with the support of IEA1 (EEA). At country level, the likelihood of ratios is excellent in both situations.

However, the important input expected from the Eionet process was regionalised information. Apart from France that provided data disaggregated at the NUTS 3 level, not relevant information could be extracted from the datasets. The French case is special since volumes at the user's level can be downloaded from the Web, making detailed computation at NUTS3 level both time-consuming and lesser relevant than direct individual data collection.

The percentages of documented vs. total population falls below 10% and 1% when considering respectively RBDs and Sub-Units, falling between 1 to 6% for the RBDs only. Even though the likelihood of ratios at RBD level seems relatively acceptable (less that 50% excellent however!), the coverage of the whole area is too low and does not deserve the efforts to make any concurrent scenario to the one built from national data and individual data collection in the stratum 'L'. the percentages of population are very close to the percentage in volumes: adjusting abstraction ratios of 5% of population would not change the volumes by more than a couple of percent for these populations and would be negligible at the EU area level.

Because the low percentage of coverage, the share of 'M' and 'S' stratae have not been computed in this report.

3.3 Share surface water vs. groundwater

Having collated the different sources of information, which are not fully documented, and disregarding the fact that within a single entity at a certain time (GW+SW) ~ total, although not exactly, the respective shares of GW and SW in the total present very wide ranges, that make it necessary to consider the relevance of regionalising source of abstractions.

Different situations can be found: total abstraction is provided, volume from surface water is provided, volume of ground water in provided or both of the later.

Table A.3.7: Counting the number of elements for computing S/G volumes ratios

Considered type	Number of types counted	nb of SW volumes in PWSS	Nb of GW volumes in PWSS	Nb of pairs (S and G present)	Nb of SW volumes as Self-supply	Nb of GW volumes as Self-supply	Nb of pairs (S and G present)
C	43	39	29	27	13	2	1
NUTS	2	0	0	0	0	0	0
RBD	76	20	1	0	0	0	0
SU	31	118	0	0	12	0	0

Apart country level, where 27 pairs document respectively 31 surface water and 29 ground water volumes, all the disaggregated level do not provide both surface and groundwater volumes: computation of ratio surface to groundwater in abstractions is jeopardised by the fact that one of the terms has to be estimated by difference with a total volume which accuracy is unknown.

In principle, on should expect that {1} = {2} + {3} and that S/W is computed as {2} / {3} (if {3}>0).

In all cases (except 1) at RBD level, ratio will be computed as {2} / ({1} – {3}) or as {3} / ({1} – {2}).

Results are somehow strange; many results had to be estimated since one of the elements was missing.

Table A.3.8: Averages of ratios Surface volumes / groundwater volumes per entity

Ctry	Entity Type	Entity Code	TimeStep	S/G	Nb of data in average	Comments
AT	C	AT	annual	0.005	2	In line with majority of extraction from GW in Austria, possibly exaggerated
BE	RBD	BEMaas_VL	annual	1	3	All from SW?
BE	RBD	BEShelde_VL	annual	1	3	All from SW?
BG	C	BG	annual	1.94	1	Reads: 2/3 SW; 1/3 GW
CH	C	CH	annual	0.2375	4	23% SW, 75% GW
DK	C	DK	annual	0.1355	11	14% SW, seems in line with usual knowledge on DK
EE	C	EE	annual	0.86	1	Most SW
FR	C	FR	annual	0.61	1	61% SW is likely to be in line with usual knowledge in FR
HU	RBD	HU1000	annual	1	1	100% SW seems exxagerated
IE	RBD	IEGBNISH	annual	1	1	100% SW seems exaggerated, albeit possible in Ireland
IE	RBD	IEGBNISH	monthly	1	12	
IE	RBD	IEWE	annual	0	1	No SW seems unlikely in this context
MK	C	MK	annual	0.17	1	
NL	C	NL	annual	0.64	3	
RO	C	RO	annual	1.745	2	
SI	C	SI	annual	0.0267	3	
SK	C	SK	monthly	0.0492	12	Country level contradicts totally the sub-units
SK	SU	SK2	annual	1	2	
SK	SU	SK2	monthly	1	24	
SK	SU	SK3	annual	1	2	

Ctry	Entity Type	Entity Code	TimeStep	S/G	Nb of data in average	Comments
SK	SU	SK3	monthly	1	24	
SK	SU	SK4	annual	1	2	
SK	SU	SK4	monthly	1	24	
SK	SU	SK5	annual	1	2	
SK	SU	SK5	monthly	1	24	
SK	SU	SK6	annual	1	2	
SK	SU	SK6	monthly	1	12	

As suggested in comments in the table, data seem highly erratic and in many cases not believable (especially SK where country level and SU levels 100% contradict).

This data cannot be used until better informed.

3.4 Conclusion about usability

As suggested by the above tables, the input values are of rather poor value:

- No annual coverage for all countries of EEA and even EU area;
- No common years at disaggregation levels and limited number of disaggregation levels (there are xxx RBDs and zzz sub-units reported under the WFD).
- Share GW / SW useful in many areas below country.

The data that can be extracted does not really deserve making costly calculation of water balances, they will nevertheless be assessed to estimate the possible differences with the overall method taken for the WA computations.

3.5 Computing abstraction coefficients

4 *Comparing scope and differences with data processed for the accounts*

4.1 Scope, analysed from documented population numbers

Documented population analyses primarily from the country's levels to compare with data processed in the WA.

Appendix 4 WFD reporting data processing for water abstractions

1 *Data sources and rationales*

There are in total 185 RBDs, from country designation. Countries have already reported 161 RBDs (not all information processed) and there are missing 9 from Spain (mainly Canarias) 6 from Belgium and 9 from Norway.

However this figure include some very small ones (upstream parts) that do not really compare with large RBDs such as the “Loire and Brittany “for example. In further assessments, when comparison is made against numbers, a rounded total of 170 national RBDs is taken. When possible, comparison is made against the number of persons living in the RBS, to make comparison weighted vs. more significant criterion than number of RBDs. This reference is however not the best in all cases: area could be good candidate as well.

Countries reported water volumes respectively for surface water (SW) and groundwater (GW). Reported information is country, RBD and Sub-units volumes for SW and only country and RBD volumes for GW. Data have been received and compiled for only 54 RBDS (54/170= 32% in number).

Reported categories are as well slightly differently named. Field equivalence in placed in the next table

Table A.4.1: Source fields in respectively SW and GW data sets

Field name (Surface water data sets)	Field name (groundwater data sets)	likelihood
ID	ID	
Country	Country	
RBD	RBD	
Water Abstraction		
Agriculture	Abstraction Agriculture	Full
Public Water Supply	Abstraction Public Water Supply	Full
Manufacturing	Abstraction Industry aggregated	Possible, no other other filed likely to be added
Electricity cooling		
Fish farms		
Hydro energy not cooling		
Quarries		
Navigation		
Water transfer		
Other	Abstraction Other	Full

Data sets provided were preprocessed from the Excel sheets before computing:

- suppressing top lines, replacing empty cells by -1 in Excel,
- importing as separate Access tables;
- the removing the intercalary ‘Total’ lines in each Access table;
- placing all data in a single Access table WFDR_GSW_All, with field ‘GW’ or ‘SW’ and filling fields RBD / Su with appropriate values.

The values in hm3/year are related to the “significant abstraction pressures in RBD”, not further defined (anyway, each country should have used some type of own thresholding). Anyway, the total should be <= total abstractions from other comprehensive sources (e.g. in WaterBase, as processed in the WISE_Dom_main table .

In this case, as well as in the analysis carried out with WaterBase data, there are very unlikely ratios per capita, making the value for that entity not usable, especially if much below any known constant (larger could be in the event large other uses are fed by public supply).

2 *Results and comparisons with Eionet data*

All data has been computed applying the same rules as thoe used for processing Eionet sourced data. Since only WFD reported data at the RBD level matters, these results are presented. All RBD reported under the WFD are presented and only those from Eionet data sets that match.

Where the RBD based coefficient falls within range 130 – 280, it is marked 'High" as its likelihood, where it falls within 130/2 – 280*2, it is marked "Plausible" and where out of this later range "Out of range".

Similarly, where the volume per capita and per day in WFD reported data falls into the range minimum – maximum of Eionet data, convergence is 'Possible', otherwise 'To reject'. Caption 'NA' indicates impossible comparison.

It is important to note that when the WFD reports 54 districts with volumes, only 33 can compare with Eionet reporting.

Table A.4.2: Comparative values of abstractions for domestic & urban in litre/year/cap. Eionet vs. RBD data sources

RBD	Population	Eionet data: Max coef.	Eionet data: Min coef.	Eionet data: mean coef.1	RBD data: coef.	RBD data: Likelihood	Convergence Eionet vs. RBD
AT1000	8017780				299	Plausible	NA
AT2000	331586				215	High	NA
AT5000	82307				333	Plausible	NA
BEMaas_VL	695581	596	528	559	336	Plausible	To reject
BESchelde_VL	5645751	87	18	36	100	Plausible	To reject
BG1000	2958756	536	231	384	300	Plausible	Possible
BG2000	1032733	448	325	365	937	Out of range	To reject
BG3000	2336944	362	362	362	495	Plausible	To reject
BG4000	1229100	163	163	163	239	High	To reject
CY001	804435	202	64	157	175	High	Possible
ES010	1355149				134	High	NA
ES014	1220154				568	Out of range	NA
ES040	1818491				271	High	NA
ES050	5005234				239	High	NA
ES091	6904880				165	High	NA
ES100	3749932				577	Out of range	NA
ES110	789000				695	Out of range	NA
FRA	4416730	205	205	205	198	High	To reject
FRB1	630858	208	208	208	66	Plausible	To reject
FRB2	343222	118	118	118	128	Plausible	To reject
FRC	3429230	257	257	257	158	High	To reject
FRD	14441486	319	319	319	224	High	To reject
FRE	233000	526	526	526	287	Plausible	To reject
FRF	8067876	249	249	249	249	High	Possible
FRG	13030392	208	208	208	208	High	Possible
FRH	18567444	237	237	237	237	High	Possible
FRI	460000				369	Plausible	NA
FRJ	394000				404	Plausible	NA
FRK	165000				267	High	NA
FRL	723000				546	Plausible	NA
GBNIIENB	82957	2	2	2	3	Out of range	To reject
GBNIIENW	281455	1	1	1	1	Out of range	Possible
HU1000	9977170	195	195	195	202	High	To reject
IEEA	498749				1212	Out of range	NA
IEGBNISH	1133722	131	1	120	1	Out of range	Possible
IESE	1026345	253	1	127	1	Out of range	Possible
IESW	542000	456	2	416	2	Out of range	Possible
IEWE	449188	45	2	24	2	Out of range	Possible
ITA	6866260				257	High	NA
ITD	235130				750	Out of range	NA
LU RB_000	495340				288	Plausible	NA

RBD	Population	Eionet data: Max coef.	Eionet data: Min coef.	Eionet data: mean coef.1	RBD data: coef.	RBD data: Likelihood	Convergence Eionet vs. RBD
RO1000	21365278				110	Plausible	NA
SK30000	199928				87	Plausible	NA
SK40000	5246445				165	High	NA
UK03	2447175	464	464	464	379	Plausible	To reject
UK04	10513353	301	301	301	396	Plausible	To reject
UK05	6337369	333	333	333	423	Plausible	To reject
UK06	13932427	347	347	347	451	Plausible	To reject
UK07	3844199	262	262	262	404	Plausible	To reject
UK08	3411777	282	282	282	488	Plausible	To reject
UK09	5185792	574	574	574	711	Out of range	To reject
UK10	1765876	278	278	278	446	Plausible	To reject
UK11	444249	1500	1500	1500	2128	Out of range	To reject
UK12	6728338	182	182	182	295	Plausible	To reject

Table A.4.3: Counts of RBS falling into different categories, according to source of reporting

Number of reported RBDs (RBD reporting)	Number of common RBD (Eionet reporting)	Number of reported RBDs (RBD reporting)			Number of RBD ‘H’ or ‘P’ having a pair in Eionet
		Likelihood= High	Likelihood=Plausible	Out of range	
54	33	17	23	14	5
With 211890573 people		With 101656908 people	With 93562259 people		Match for 43428903 people

As conclusion, only 40/54 = 74% of reported RBDs (40/170= 24% compared to reference number of RBDs), which provide usable values per capita; trying to compare with Eionet source is “mission impossible”, only 5 match, before estimating the relevance of Eionet data, less than 10% of the reported RBDs (but 20% as number of persons, most from France where again all sources are identical and converge). As a rule of thumb, the proportion in number of RBDs with common usable data in both reporting is 5/170 =3% in number.

This poor percentage of geographical coverage makes it difficult to assess a scoring that would be informative.