Chapter 12
Non financial measures
Water explanatory factors

Covering:
Source types and pumping
Treatment types

Non financial measures
Chapter 12
Water explanatory factors

Guidance

Three tables have been provided. One for NI Water data only, a second for PPP data only and a third for combined company data including PPP.

These tables have three blocks and a total of 13 lines. They are used in water service operating efficiency studies. They cover:

- **Source types and pumping**
- **Treatment type**
- **Potable mains**

The information collected in this table is used in NIAUR's operating efficiency studies. It provides explanatory factors for the amount of pumping required for treatment and distribution, and the relative complexity of a company's water treatment works. Changes in these factors can have a significant impact on a company's costs.

NIAUR has asked for the required tables split by PPP in order to assess the efficiency of water treatment across different providers and as a whole company.

Section A - Source types and pumping

This section includes the number of sources in each of the following categories, and the proportions of distribution input derived from sources in each category, and the proportion of distribution input obtained from bulk supplies for each category:

- impounding reservoirs;
- river abstractions, and
- boreholes.

It also includes the average pumping head.

We use the information provided in this table about the company's sources in two ways in our relative efficiency modelling. Firstly we use the total number of sources to calculate the company's average source size. Secondly we use the proportion of water from different sources as a measure of how difficult the company's water is to treat. Since the information about sources is used in two different ways we have split the guidance in this table into two sections clarifying how we expect the company to report both number of sources, and proportion of water from different source types.

Number of sources

We collect the total number of sources operated by the company for our econometric modelling. A source here is defined as an independent raw water supply to a treatment works. Standby or mothballed sources from which no water has been obtained in the year should not be included in the number of sources. We expect the company to consider when it is appropriate to report sources which have produced very small outputs during the report year.

To ensure consistency of reporting source numbers, the company should follow these guidelines:

- If a treatment works receives water from three boreholes on one site, this would be classed as one source.

Annual Information return reporting requirements and definitions manual 2013
Version 1.0 – March 2013

- If a treatment works receives water from a reservoir that has been filled by a river this would be classed as one reservoir source.
- If a treatment works receives water directly from two reservoirs this would be classed as two reservoir sources.
- If a treatment works receives water directly from two reservoirs, but water can be transferred between the two reservoirs, this would still be classed as two reservoir sources.
- If a treatment works receives water from a reservoir that has been filled by another reservoir then this would be classified as one reservoir source.
- If a source supplies more than one treatment works then it should only be reported once in the reported source numbers. The exception being Lough Neagh which can be counted as a source for each works it supplies.
- Reservoirs used only to regulate river flows should not be reported in the source numbers.
- Bank side storage, gravel pits and non-impounding reservoirs should not be included as sources in their own right. If a river supplies a treatment works via bank side storage then this should be reported as one river source.
- PPP schemes should be reported separately.

In the example below the arrows represent the flow of water. There is one reservoir, filled by a river, which feeds into one inlet at the treatment works. There is another reservoir that is fed by a different river, this reservoir feeds into a different inlet at the treatment works. It is possible to transfer water between each of the reservoirs.
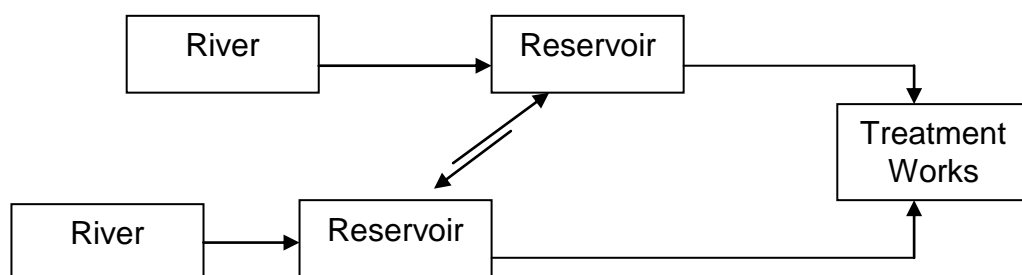
The company should report this as two reservoir sources.

We expect the company to use common sense and be honest when reporting source numbers. If the company is unsure how a certain source configuration should be reported, then details of the configuration should be included in the commentary, or advice can be taken from NIAUR.

Proportion of distribution input from each source category

The proportion of water in each source category is a measure of how difficult the company's water is to treat. When classifying the water into one of the categories, the following guidelines should be followed.

- Water abstracted from boreholes or springs and pumped directly to a treatment works should be classified as borehole water.
- Water abstracted from a river and transported directly to a treatment works (either by pumping or by gravity) should be classified as river water.
- Water that is transported directly to a treatment works from a reservoir which has been filled by a river should be classified as water from reservoirs (this is because, in general, while the water is stored in the reservoir, sediments will settle making the water easier to treat).
- Water that is transported from a reservoir, via a river, to a treatment works should be classified as water from a river.

If multiple sources feed a works (for example a river and a number of boreholes) and the flow from these sources is combined prior to treatment, then all of the flow entering the works can be categorised as the more difficult to treat water. (In this example, all of the water would be categorised as river water.)

In the table, the company must report the proportions of distribution input derived from the various sources as a number between zero and one (not as a percentage). The sum of the proportions of distribution input from the various different sources, including bulk supply imports, must add up to one. (That is, on line 4 the sum of columns 2 and 3 must be one).

The proportions attributed to each source type in the 'NI Water only' and PPP tables should be calculated on the basis of the DI associated only with that area of responsibility. Therefore for the 'NI Water only' table, calculations should be based on the total DI that is produced by the 'NI Water only' works (i.e. the DI excluding that produced by PPP works). For PPP the proportions should be based on the total DI that is produced by the PPP works only (i.e. the DI excluding that produced by 'NI Water only' works). For the 'Total' table the total DI should be used. It is recognised that this will mean that the 'proportion of DI' figures in individual tables will not add to those in the 'Total' table.

The company should identify in its commentary the proportion of water taken from Lough Neagh that is included within Block A of each table and identify which source type this proportion has been allocated to.

Bulk supplies

Bulk supply imports should be included in section A of the table. The proportion of distribution input from bulk supplies should be included in column 3 and the number of bulk supply import sources should be included in column 1. Bulk supply exports should be excluded from this table. The distribution input obtained from them should not be included in the proportion of DI in either column 2 or 3. If a source is used by the company only to provide a bulk export it should not be included in the source numbers in column 1. PPP data should be reported on the PPP table and not as a bulk supply on the NIW table.

Non-potable supplies

Non-potable supplies for water should not be included in this table. The water supplied should not be included in the distribution input figures in column 2, and if a source only provides non-potable water it should not be included in column 1. This includes sources that are used only to provide stream support.

Line 5: Average pumping head

The key reason we collect this data is as an explanatory factor for power costs. Therefore the variable needs to reflect the amount of pumping that a company needs to do. In order to do this we need to know, in effect, how much of each Ml of water is pumped through the process, from abstraction to supply. Obviously this cannot be measured in practice so a calculation is used instead.

$$\text{Average pumping head} \quad = \quad \frac{\Sigma_i(l_i * WP_i)}{V_p + V_g}$$

where:

l_i = annual mean lift at site i

WP_i = volume of water pumped at site i

$V_p + V_g$ = total volume of water that enters supply (pumped and gravity fed)

Included below is an example of how average pumping head should be calculated (the numbers are not representative of a real life situation, just for illustrative purposes.)

A company has the following processes:

- 100 Ml of water is pumped 20m at site A
- 200Ml of water is pumped 10m at site B, then 50Ml of this water is pumped a further 5m at site C (a booster station). The remainder of the water is gravity fed to customers
- 75Ml of water is abstracted and reaches supply without ever being pumped.

The average pumping head for this company would be calculated as follows:
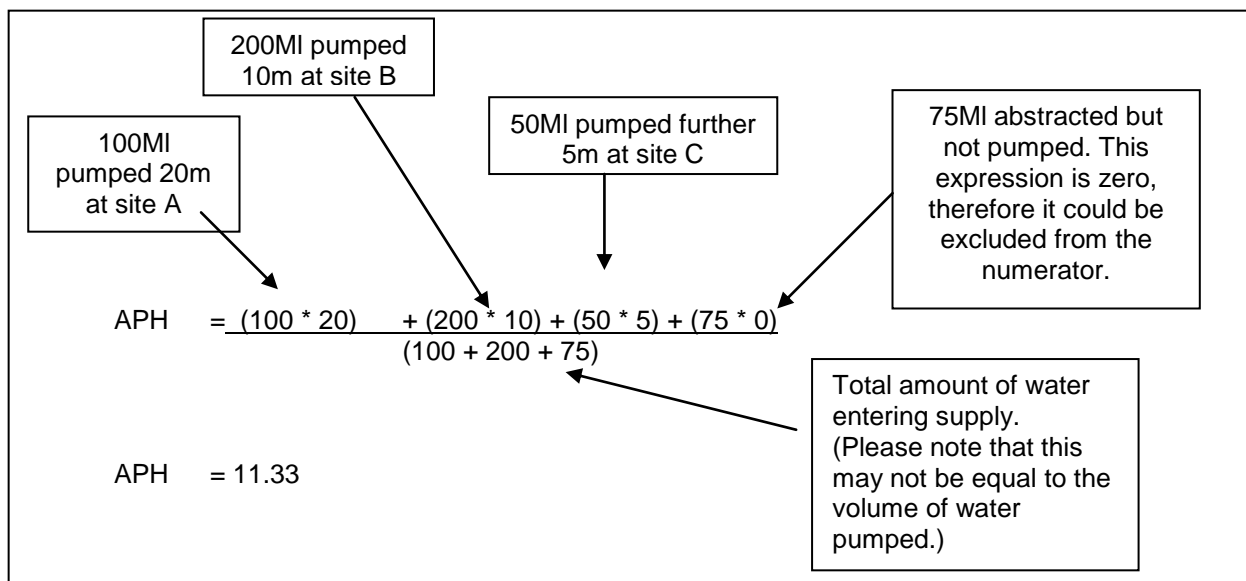
Average pumping head should be calculated for 'NI Water only', 'PPP only' and the 'total company'. Different denominators should be used to calculate the average pumping head for each table (i.e. 'NI Water only', 'PPP' and 'Total') reflecting the amount of water entering supply from NI Water treatment works, PPP treatment works and in total, respectively. **There is no requirement for the sum of the NI Water and PPP pumping head figures to equal the total company APH**. The numerator for the 'NI Water only' calculation should reflect pumping from NI Water treatment works and all NI Water distribution system pumping. The numerator for the 'PPP' calculation should reflect only pumping associated with the PPP concession.

The average pumping head should be calculated using data from all sites if possible. The company should state in its commentary if sites have not been used in calculating the average pumping head, and why they could not be used.

Pumping of **non-potable water** into supply (for example for stream support) should not be included in the average pumping head calculation.

Pumping of water that is exported to another company (**bulk supply exports**) should not be included in the average pumping head calculation.

We would expect all other pumping used in the abstraction, treatment and supply of water to be included in the pumping head calculation. This includes pumping as part of the treatment process and the pumping of process water.

Section B - Treatment type

This section covers the proportion of distribution input derived from works falling into each category of water treatment and the numbers of works in each category as detailed in the table.

The proportions attributed to each treatment type in the 'NI Water only' and PPP tables should be calculated on the basis of the DI associated only with that area of responsibility. Therefore for the 'NI Water only' table, calculations should be based on the total DI that is produced by the 'NI Water only' works (i.e. the DI excluding that produced by PPP works). For PPP the proportions should be based on the total DI that is produced by the PPP works only (i.e. the DI excluding that produced by 'NI Water only' works). For the 'Total' table the total DI should be used. It is recognised that this reporting requirement will mean that the 'proportion of DI' figures in individual tables will not add to that in the 'Total' table.

The company should identify in its commentary the proportion of water taken from Lough Neagh that is included within Block B of each table and identify which treatment type this proportion has been allocated to.

For both groundwater and surface water, a **works** is here defined as an individual location which receives raw or partially treated water for treatment (excluding secondary disinfection) and ultimate delivery to customers. Where the total treatment process is split between a number of sites, banding should be carried out on the basis of the size and treatment category of the sites at which the greatest proportion of costs are incurred.

The company should state in its commentary if it has included treatment works that have not been used in the report year.

Lines 6 – 12: Treatment type

The categories of treatment types are: Examples

SD: Works providing simple disinfection only;   •   Marginal chlorination

W1:   Simple disinfection plus simple physical treatment only;   •   Rapid gravity filtration
                                                                    •   Slow sand filtration
                                                                    •   Pressure filtration

W2:   Single stage complex physical or chemical treatment;   •   Super chlorination
                                                                •   Coagulation
                                                                •   Flocculation
                                                                •   Biofiltration
W3:   More than one stage of complex treatment;   •   pH correction
                                                                •   Orthophosphate dosing
                                                                •   Softening
                                                                •   Membrane filtration
               but excluding processes in W4.

W4:   This category is intended to capture processes with very   •   Ozone addition
        high operating costs;   •   Activated carbon / pesticide
                                                                         removal
                                                                    •   UV treatment
                                                                    •   Arsenic removal
                                                                    •   Nitrate removal

Section C - potable mains

This section includes the breakdown of all potable mains into size bands. When added together, the total length of main on the 'NI Water only' table should equal the total length of mains reported in table 11 line 12. The total length of main on the PPP table should equal the length entered in Table 42, line 22. The company should ensure that 6'' mains are included in Band 1 and 12'' mains are included in band 2.

The company should detail assumptions made in order to provide its data, and comment on areas where it considers that more information is required for the proper interpretation of the results.

Company commentary

The company must:

• comment on the changes which have occurred since previous years and provide clear explanations for them;
• state whether changes are one-off revisions because of exceptional circumstance (e.g. drought) or whether they are due to permanent changes in the company's assets or operations;

- include inset appointments as they are part of the regulated business. Provide details in your commentary of the amounts included for any inset appointments in the relevant lines; and
- where treatment types are not covered by this guidance, state in its commentary what assumptions it has made in categorising these processes;
- identify in its commentary the proportion of water taken from Lough Neagh that is included within Block A and B of each table and identify which source and treatment type this proportion has been allocated to; and
- provide a table documenting water sources and treatment types during the report year (as provided in AIR10 commentary). This should include location, source type, treatment type, in service during year, in service at year end and distribution input.

Guidance for Reporters

Reporters must:

- bring to NIAUR's attention any areas where the company has failed to explain changes to the reported information and comment on their significance;
- confirm correct reporting of PPP data;
- comment on the reasonableness of any changes;
- comment on the average pumping head methodology, including the sites that have not been included in the calculation; and
- comment on whether the company's approach to counting and categorising sources is appropriate and in line with the guidance.

Proposal for additional reporting requirements notified in AIR09

In AIR09 the Utility Regulator advised that it was considering the inclusion of an additional table based on the following information requirements.

1. *Water Treatment Works table.*
   This table will be similar in format to Table 17b – Large Sewage Treatment Works, except that it will deal with Water Treatment Works including both NI Water and PPP schemes.
   It will seek similar information and lines will include the following (or variations thereon):
   - *Population served*
   - *Distribution Input*
   - *Quality / performance measures*
   - *Breakdown of operating costs.*

   The reason for the inclusion of this table is to obtain information on individual works in order to produce comparative benchmarks on water treatment works.

The Utility Regulator is still considering the inclusion of such a table in future AIR reporting requirements but does not require the company to submit this information in AIR13.

Table 12 line definitions

A   SOURCE TYPES AND PUMPING

| 1 | Impounding reservoirs | nr | 0dp |
| | | prop'n from 0 to 1 | 3dp |
		prop'n from 0 to 1	3dp
Definition	Column 1 - number of sources. Column 2 - proportion of distribution input derived from impounding reservoirs Column 3 - proportion of distribution input derived from bulk supplies. Operational sources from which no water has been obtained in the report year should not be included in the number of sources.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

| 2 | River abstractions | nr | 0dp |
| | | prop'n from 0 to 1 | 3dp |
		prop'n from 0 to 1	3dp
Definition	Column 1 - number of sources. Column 2 - proportion of distribution input derived from river abstractions. Column 3 - proportion of distribution input derived from bulk supplies. Operational sources from which no water has been obtained in the report year should not be included in the number of sources.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

| 3 | Boreholes | nr | 0dp |
| | | prop'n from 0 to 1 | 3dp |
		prop'n from 0 to 1	3dp
Definition	Column 1 - number of sources. Column 2 - proportion of distribution input derived from boreholes. Column 3 - proportion of distribution input derived from bulk supplies. Operational sources from which no water has been obtained in the report year should not be included in the number of sources.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

4	Source types and pumping; total.	nr	0dp
		prop'n from 0 to 1	3dp
		prop'n from 0 to 1	3dp
Definition	(Column 1) total number of sources, (Column 2) total proportion of distribution input, and (Column 3) total proportion of distribution input obtained from bulk supplies.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Calculated: Column 1 is the sum of lines 1, 2, 3		
	Column 2 is the sum of lines 1, 2, 3		
	Column 3 is the sum of lines 1, 2, 3		
	Input: Confidence Grade.		
	The sum of columns 2 and 3 must equal 1.		
Responsibility	Comparative Efficiency & Performance Team		

5	Average pumping head – total	m.hd	1dp
Definition	Total average pumping head. For information on how this should be calculated see the guidance for this chapter.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

B   TREATMENT TYPE

6	Proportion of distribution input – simple disinfection	prop'n from 0 to 1	3dp
		nr	0dp
Definition	The total proportion of distribution input derived from works and total number of works providing simple disinfection only (columns 1 and 2 respectively).		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

7	Proportion of distribution input - W1	prop'n from 0 to 1	3dp
		nr	0dp
Definition	The total proportion of distribution input derived from works and total number of works providing simple physical treatment only (columns 1 and 2 respectively).		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

8	Proportion of distribution input - W2	prop'n from 0 to 1 nr	3dp 0dp
Definition	The total proportion of distribution input derived from works and total number of works providing single stage complex physical or chemical treatment but excluding processes in W4 (columns 1 and 2 respectively).		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

9	Proportion of distribution input - W3	prop'n from 0 to 1 nr	3dp 0dp
Definition	The total proportion of distribution input derived from works and total number of works providing more than one stage of complex treatment but excluding processes in W4 (columns 1 and 2 respectively).		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

10	Proportion of distribution input – W4	prop'n from 0 to 1 nr	3dp 0dp
Definition	The total proportion of distribution input derived from works and total number of works providing processes with very high operating costs. (Columns 1 and 2 respectively).		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

11	Proportion of distribution input – total	prop'n from 0 to 1 nr	3dp
Definition	Total proportion of distribution input for all treatment categories.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Calculated: sum of column 1, lines 6, 7, 8, 9 and 10. It must equal 1.		
Responsibility	Comparative Efficiency & Performance Team		

12	Total numbers of works	nr	0dp
Definition	Total numbers of treatment works.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Calculated: sum of column 2, lines 6, 7, 8, 9 and 10.		
Responsibility	Comparative Efficiency & Performance Team		

C   POTABLE MAINS

13	Potable mains (nominal bore)	km	2dp
Definition	The length of all potable water mains broken down by size band. The total length of main on the 'NI Water only' table should equal table 11 line 12. The total length of main on the PPP table should equal table 42 line 22.		
Primary Purpose	Informing relative performance and efficiency assessments.		
Processing rule	Input		
Responsibility	Comparative Efficiency & Performance Team		

CHANGE CONTROL SHEET
CHAPTER 12

2008/1.0	First issue of chapter for the SBP period.
2009/1.0	Second issue of chapter for the SBP period. - notification of proposed changes to reporting requirements for AIR10 - Amending of tables to provide PPP and NIW+PPP reporting
2010/1.0	Third issue of chapter for the SBP period. – Clarification on reporting of proportions and average pumping head added. – Additional information on allocation of water supplied by Lough Neagh requested.
2011/1.0	First issue of the chapter for the PC10 period. – Additional table required in commentary to reflect useful data provided for in the AIR10 commentary.
2012/1.0	Second issue of chapter for the PC10 period. – Revised guidance for the calculation of 'NIW only' and 'PPP' average pumping head figures.
2013/1.0	Third issue of chapter for the PC10 period - No changes.