



**An Phríomh-Oifig Staidrimh**  
Central Statistics Office

# information notice

## CPI Technical Paper

### Introduction of Water Supply and Sewage Collection

#### Introduction

Water supply and sewage collection charges were introduced in Ireland on 1 January 2015. This paper outlines the rationale and methodology for introducing these new charges into the CPI and HICP.

#### **Determining if and when water supply and sewage charges should be introduced to the CPI/HICP**

The coverage of the HICP is defined as those goods and services which are included in household final monetary consumption expenditure. This definition was adopted as part of Council Regulation (EC) No. 1687/98 which legally obliges the CSO to include these new charges in the HICP. Although the CPI is not governed by European legislation, best international standards in terms of coverage would mean that water supply and sewage charges should be incorporated into the national index.

The timing of entering the new charges into the HICP is governed by Regulation (EC) No 2601/2000 which says that the prices of services shall be entered into the HICP in the month in which the consumption of the service at the observed prices can commence.

Consumption (at non-zero prices) commenced on 1 January 2015 for water supply and sewage collection, therefore, the new charges should be included in the January 2015 index numbers. A similar approach was adopted for the CPI.

#### **European Statistical System (ESS) and HICP Group of Experts**

At the five yearly CPI/HICP rebase, a full resampling of the items in the basket is carried out with some items falling out of the basket and other items being introduced. The methodological difficulty of introducing new items into the CPI/HICP basket outside a rebase was not new e.g. introduction of the household charge in 2012. However, the added complexity with water supply and sewage collection charges was that both items represent a class (4-digit level) in the COICOP consumption classification.

- 04 Housing, Water, Electricity, Gas & Other Fuels
  - 04.4 Water Supply & Miscellaneous Services Relating to the Dwelling
    - 04.4.1 Water Supply
    - 04.4.2 Refuse Collection
    - 04.4.3 Sewage Collection
    - 04.4.4 Other Services Relating to the Dwelling

For this reason, the methodological issues were examined both in the CSO and by the Group of HICP Experts within the European Statistical System (ESS)<sup>1</sup>. The solution that was implemented for the CPI/HICP was recommended by the HICP Group of Experts and agreed with Eurostat.

### Overview of the new charges

Unmetered households pay fixed charges on an annual basis as outlined in Table 1. Metered households pay no more than the fixed charges but could receive a rebate if water is conserved. Metered water is charged at a rate of €1.85 per M<sup>3</sup> or 1000 litres (applies to both water supply and sewage collection). There is an annual free allowance to cover each child's normal water and sewage needs, which is 21 M<sup>3</sup> (21,000 litres) per service, per child under 18 years old. There will also be a water conservation grant of €100 per year which will be administered by the Department of Social Protection. This grant is not relevant for CPI/HICP purposes.

Table 1: Water supply and sewage collection charges that apply from 1 January 2015

Household	Both Water Supply and Sewage Collection	Either Water Supply or Sewage Collection
1 Adult	€160 per year	€80 per year
2+ Adults	€260 per year	€130 per year

### Calculating the impact of water and sewage charges on the CPI/HICP

In principle, the short-term index<sup>2</sup> for the CPI/HICP can be expressed as the changing cost of the fixed basket of goods and services ( $Q_{t-1}^i$ ) as per formula (1).

$$I_{m,t} = \frac{\left[ \sum_i (P_{m,t}^i Q_{t-1}^i) \right]}{\left[ \sum_i (P_{Dec,t-1}^i Q_{t-1}^i) \right]} \quad (1)$$

<sup>1</sup> The ESS is the partnership between the Community statistical authority, which is the Commission (Eurostat), and the national statistical institutes (NSIs) and other national authorities responsible in each Member State for the development, production and dissemination of European statistics. This partnership also includes the EEA and EFTA countries

<sup>2</sup> The CPI/HICP is an annually chained Laspeyres-type price index with annual weight updating. They can be expressed as the product of a long-term annual index and a short-term monthly index.

where  $i = 1, 2, 3, \dots, I$  which represents items in the basket,  $Q_{t-1}^i$  is the quantity of items  $i$  that were consumed during the weighting reference period (t-1) and  $P_{Dec, t-1}^i$  are the prices of items  $i$  at the price reference period (December t-1).

In 2014, the number of items in the basket was 632. In order to incorporate water supply and sewage collection into the CPI/HICP in January 2015, two new items were required to be added to the basket.

Suppose that new items  $n$  are included in the basket in month  $m$  of year  $t$ . Formula (1) then takes the following form:

$$I_{m,t} = \frac{\left[ \sum_i (P_{m,t}^i Q_{t-1}^i) + \sum_n (P_{m,t}^n Q_{t-1}^n) \right]}{\left[ \sum_i (P_{Dec, t-1}^i Q_{t-1}^i) + \sum_n (P_{Dec, t-1}^n Q_{t-1}^n) \right]} \quad (2)$$

where  $n = 1, 2, 3, \dots, N$ . As  $P_{Dec, t-1}^n = 0$  (i.e. price water supply and sewage collection was zero in December 2014), the denominator in formula (2) becomes  $\sum_i (P_{Dec, t-1}^i Q_{t-1}^i)$  which is the total expenditure of the basket in the weight reference period. The cost of the basket is simply increased by the additional cost of paying  $\sum_n (P_{m,t}^n Q_{t-1}^n)$  in month  $m$  of year  $t$ .

In order to calculate  $\sum_n (P_{m,t}^n Q_{t-1}^n)$ , it was required to estimate the additional cost to the consumer of water supply and sewage collection charges. This was achieved by obtaining data from Irish Water<sup>3</sup> on projected revenues from households in 2015. This data was provided on an accruals basis and was net of consumption related rebates. The data also excluded the water conservation grant which was not relevant in the calculation of CPI/HICP.

By applying formula (2) and using the data from Irish Water, it was possible to calculate the impact of the new charges on the CPI/HICP at each aggregation level within the COICOP classification of consumption.

### Practical implementation

Formula (1) can also be expressed in terms of weights and price relatives as shown in formula (3). From a practical point of view, this is the formula that is used to calculate the short-term index for the CPI/HICP.

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<sup>3</sup> Incorporated in July 2013, as a semi-state company under the Water Services Act 2013, Irish Water brought the water and wastewater services of the 34 Local Authorities together under one national service provider.

$$I_{m,t} = \frac{\sum_i w_{m-1,t}^i \frac{P_{m,t}^i}{P_{m-1,t}^i}}{\sum_i w_{Dec,t-1}^i} \quad (3)$$

where  $w_{Dec,t-1}^i$  are the base weights for items  $i$  and  $\frac{P_{m,t}^i}{P_{m-1,t}^i}$  are the price relatives for updating the item weights on a monthly basis.

Suppose that new items  $n$  are included in the basket in month  $m$  of year  $t$ . Formula (3) then takes the following form:

$$I_{m,t} = \frac{\left[ \sum_i w_{m-1,t}^i \frac{P_{m,t}^i}{P_{m-1,t}^i} + \sum_n w_{m-1,t}^n \frac{P_{m,t}^n}{P_{m-1,t}^n} \right]}{\left[ \sum_i w_{Dec,t-1}^i + \sum_n w_{Dec,t-1}^n \right]} \quad (4)$$

where  $\left[ \sum_i w_{Dec,t-1}^i + \sum_n w_{Dec,t-1}^n \right] = 100$  i.e. base weights must sum to 100,  $i = 1,2,3... I$  and  $n = 1,2,3... N$ .

In the case of adding water supply and sewage collection to the CPI/HICP baskets,  $I + N = (632+2) = 634$ .

Therefore, in order to introduce water supply and sewage collection charges into the CPI/HICP, it is required to calculate appropriate base weights for December 2014 and price relatives in order to update the weights to January 2015. The combination of the weights and the price relatives must reflect the additional expenditure spent on water supply and sewage collection by households and ensure that the impact on the CPI/HICP is correct at all aggregation levels of the COICOP classification of consumption.

### Calculating the December 2014 weights for water supply and sewage collection

Water supply and sewage collection are components of Group 04.4 of the COICOP classification, codes 04.4.1 and 04.4.3 respectively. This group also includes refuse collection (04.4.2) and other services relating to the dwelling (04.4.4).

The calculation of base weights (December 2014) for water supply and sewage collection involved first limiting the total weight of COICOP group 04.4 to the expenditures in December 2014 (which did not include water supply and sewage collection) and then distributing that total weight across the four COICOP classes making up group 04.4. The resulting distribution of weights is shown in Table 2.

The proportions assigned to water supply and sewage collection were based on the expenditures in December, plus the projected household expenditure on water supply and sewage collection (i.e. Irish Water data).

The reason that the total weight of COICOP group 04.4 was required to be limited to December 2014 expenditures was to ensure that the resulting January 2015 index for the 04.4 aggregate correctly reflected the new charges.

The downside to limiting the total weight of COICOP group 04.4 is that COICOP classes 04.4.2 (refuse collection) and 04.4.4 (other services relating to the dwelling) were not set to a level representing their expenditures in 2014. This means that any further price change for these COICOP classes during 2015 will not have the full impact on COICOP 04.4 and the overall CPI/HICP.

Table 2: Weights (Dec 2014) for water supply and sewage collection in the CPI/HICP

COICOP	Description	CPI Weight Dec 2014 (%)	HICP Weight Dec 2014 (%)
04.4	Water Supply & Miscellaneous Services Relating to the Dwelling	0.5504	0.5960
<i>of which</i>			
04.4.1	Water Supply	0.1259	0.1364
04.4.2	Refuse Collection	0.2009	0.2175
04.4.3	Sewage Collection	0.1102	0.1193
04.4.4	Other Services Relating to the Dwelling	0.1134	0.1228

### Calculating the January 2015 price relatives for water supply and sewage collection

Water supply (04.4.1) and sewage collection (04.4.3) were given an index value of 100 for December 2014 in the short-term index<sup>4</sup>.

In order to calculate the January 2015 short-term index for water supply and sewage collection, an iterative process was followed to ensure the resulting indices reflected the additional expenditure spent on water supply and sewage collection by households and that the impact on the CPI/HICP was correct at all aggregation levels of the COICOP classification of consumption.

The result was an index value of 274.4 for both water supply and sewage collection in January 2015. An index value of 274.4 implies a price relative of 2.744. This price relative was applied in both the CPI and HICP.

The long-term index for January 2015 can be calculated by multiplying the short-term index development and the December 2014 long-term index. As water supply and sewage collection are new indices, the long-term and short-term indices are equal.

### Impact on the overall inflation rate

With weights and price relatives for water supply and sewage collection, all relevant information was available to calculate the overall CPI/HICP for January 2015 using formula (4).

The effect of the new charges on the HICP and CPI can be measured by calculating the contribution of the two new items on the index.

For the CPI, the contribution of water supply will add 0.22% to the annual change in the CPI while sewage collection will add 0.19%. This means that the overall CPI inflation rate will be 0.41% higher in 2015 as a result of the introduction of the new charges.

<sup>4</sup> Article 3(4) of Regulation 1708/2005 dictates that new sub-indices are required to take an initial value 100. This is the case for both 04.4.1 and 04.4.3.

For the HICP, the contribution of water supply will add 0.24% to the annual change in the HICP while sewage collection will add 0.21%. This means that the overall HICP inflation rate will be 0.45% higher in 2015 as a result of the introduction of the new charges.

## **Conclusion**

This technical paper has outlined the procedures required to introduce water supply and sewage collection into the CPI/HICP. The methodology was recommended by the HICP Group of Experts and agreed between CSO and Eurostat.

The key driver in choosing the methodology was to ensure that the impact on the CPI/HICP at each level of the COICOP consumption classification reflected the additional expenditure by households on water supply and sewage collection. In that regard, expenditure formula (2) was the starting point to calculate the impact on the CPI/HICP and the projected revenue data from Irish Water was an important input. Once the impact on the CPI/HICP was calculated, the methodology centred around choosing the most appropriate weights and price relatives for water supply and sewage collection to use in formula (4).

The methodology outlined here can be applied more generally as a way to introduce previously free products into the CPI/HICP.