



An Coimisiún  
um Rialáil Fóntas  
**Commission for  
Regulation of Utilities**

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**Commission for Regulation of Utilities**

# CRU Report to the Minister: Review of Demand for Water Services

## Report to the Minister

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## Executive Summary

The CRU is the economic regulator of Irish Water, Ireland's national water utility responsible for delivering and developing public water and wastewater services in Ireland. The CRU's legislative functions in water are set out in Sections 39-43 of the Water Services (No. 2) Act 2013.

Additional legislative requirements were placed on the CRU following the enactment of the recent Water Services Act 2017 on 17 November 2017. The Water Services Act 2017 amends the Water Services Act 2007 (the Act). Part of this amendment includes the insertion of new Sections 53A – 53F into the Act. Section 53A of the Act, requires the CRU to review and assess the rate of demand over a 12-month period for water services provided by Irish Water to dwellings. The CRU must then furnish the Minister with a report on its findings.

The CRU notes that, under the Act, the Minister will set a threshold amount for water demand and that Irish Water customers that use above the threshold may, in time, be charged for water demand above the threshold. Under Section 53B of the Act, the Minister will calculate the threshold amount by multiplying the average contained in the report by a multiplier of 1.7.

The CRU is required to:

- Report on the rate of demand over a 12-month period, for water services provided by Irish Water to dwellings.
- Consider the estimated rate of demand by an individual for provision of water services.
- Consider the estimated rate of demand for provision of water services to dwellings, and the impact on that demand where the number of individuals who ordinarily reside in the dwelling concerned exceeds four.

This report outlines the CRU's findings on the average rate of demand and the impact on demand where the number of individuals ordinarily residing at a dwelling exceeds four. The Act requires the CRU to provide this report to the Minister within one month of the Act's coming into operation.

The CRU's analysis has determined the following demand patterns:

- The average rate of demand to dwellings is 125,000 litres per year;
- The estimated annual rate of demand by an individual is 47,000 litres per year.
- The estimated average incremental demand is 25,000 litres per year for each additional occupant above four in a dwelling.

The findings are based on Irish Water meter data from 2016. In line with previous analyses (outlined in Appendix A), the CRU found that the first occupant in a dwelling will always use more water than subsequent occupants, i.e. average per person demand decreases in line with the greater number of individuals resident at a dwelling. This is due to the sharing of common water-demand drivers, e.g. use of a washing machine. For this reason, individual demand is estimated at 47,000 litres per year yet the impact on demand for dwellings with greater than four occupants is lower: estimated at 25,000 litres per person. Section 53A of the Act also required the CRU to consider trends or patterns identified by the CRU, information available on water demand trends or patterns, the impact on trends or patterns of the number of people who ordinarily reside at a dwelling, statistics published by the Central Statistics Office (CSO) and any other information considered relevant by the CRU.

The CRU has discharged its statutory responsibilities in this regard, by considering data published by the CSO along with trends and patterns evident from Irish Water’s studies and the CRU’s findings. The CRU sets out in this report the background, methodology and findings of existing studies into water demand along with the CRU’s findings arising from the available data. The below table sets out the CRU’s recommendations<sup>1</sup>:

Average annual rate of demand to a dwelling	125,000 litres per year
Average annual rate of demand by an individual	47,000 litres per year
Recommended allowance for additional occupants after four	25,000 litres per year

The CRU’s analysis reveals a disproportionate spread of demand across users, indicating that the highest users of water in Ireland use significant volumes of water. Should the Minister apply the multiplier of 1.7 to the CRU’s average rate of demand at a dwelling, a charge for water the volume of water used above the threshold would apply to about 7% of all customers of Irish Water, according to the CRU’s analysis. However, that 7% of customers use approximately 31% of all of the water provided by Irish Water.

The CRU, when analysing water demand in Ireland, included all metered water demand, including that of customers who have leaks and customers that may have exceptionally high demand. This approach differs to previous studies carried out by Irish Water and the CSO. As a consequence, the CRU’s average rate of demand per dwelling is different to previously-

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<sup>1</sup> Based on Irish Water 2016 metering data.

published results. The CRU has also based its report on the full year 2016. The findings of meter readings for almost 500,000 customers of Irish Water are represented in this report.

For clarity, the CRU is reporting on average demand as evidenced in metering data for 2016. There are a number of areas which, though outlined in the Act, the CRU is not in a position to provide information on at this point. These are as follows:

- The CRU is not setting the threshold amount in this report. The threshold amount will be set by the Minister.
- The CRU is not recommending a charge for customers that consume more water than the threshold amount. This will be subject to a public consultation during 2018.
- The CRU is not providing guidance on how any additional water demand allowance for dwellings with greater than four occupants, under Section 53E of the Act, would operate.
- The CRU is not providing guidance on how exemptions, where there is a certain medical need under Section 53F of the Act, would operate.

Customers of Irish Water that use greater amounts of water than the threshold amount will be charged for the volume of water used over the threshold. However, this does not take effect immediately, and is not considered in the report. For information purposes, under the Act, Irish Water shall inform a customer if the threshold amount has been exceeded in a 12-month period. It will not charge the customer during this period. If the customer continues to exceed the threshold amount over a six-month period, after having been given notice, then the customer will be charged for the volume of water used over the threshold.

In practical terms, a customer will face a charge (only for the volume of water used above the threshold) if:

- The customer uses water above the threshold for the full twelve months of 2018; and
- The customer then continues to use water above the threshold, following receipt of a notice, for the six months January-June 2019. The CRU notes that billing for that six-month period would commence after June 2019.

The process for charging customers who use water over the threshold amount, and the level of charge that a customer may face will be put in place by Irish Water and overseen by the CRU in due course.

The CRU notes that the threshold amount set by the Minister following consideration of the findings of this report will apply to all customers of Irish Water, i.e. those that have a meter and those that do not have a meter.

The CRU will continue to monitor the rate of demand throughout 2018, under Section 53A of the Act, which requires the CRU to review the matter from time to time and not less than 6 months before the expiration of the Water Charges Plan.

## Public/ Customer Impact Statement

In its role as economic regulator of Irish Water, the CRU is required to:

- Report on the rate of demand over a 12-month period, for water services provided by Irish Water to dwellings.
- Consider the estimated rate of demand by an individual for provision of water services.
- Consider the estimated rate of demand for provision of water services to dwellings, and the impact on that demand where the number of individuals who reside in the dwelling exceeds four.

As required by law, this paper reports to the Minister the average water demand of a dwelling and also the incremental per person demand for a dwelling with greater than four occupants. It also provides customers of Irish Water and other stakeholders with information on the analysis conducted, the methodology, the findings and the reasons why it is relevant to the customer.

The CRU analysed meter data from 2016 from approximately 475,000 metered Irish Water customers in arriving at its results. Also, as required by legislation, the CRU took account of trends or patterns identified by the CRU, information available on water demand trends or patterns, the impact on trends or patterns of the number of occupants, statistics published by the Central Statistics Office (CSO) and any other information considered relevant by the CRU. The CRU determined the average rate of demand to a dwelling to be 125,000 litres per year.

Under the Water Services Act 2007, amended in November 2017, customers of Irish Water that use water above a threshold amount will be charged for the volume of water used over that threshold from July 2019<sup>2</sup>. The Minister will determine the level of the threshold, by multiplying the average demand of a dwelling by 1.7.

This report is relevant to all Irish Water customers. The CRU has provided this report to the Minister, outlining average domestic water demand based on 2016 meter data and also an estimate of additional per person water demand for dwellings with greater than four persons.

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<sup>2</sup> In practical terms, a customer will face a charge (only for the volume of water used above the threshold) if the customer uses water above the threshold for the full twelve months of 2018; and the customer continues to use water above the threshold, following receipt of a notice, for the six months January-June 2019. The customer would face a bill after June 2019 for any demand that exceeded the threshold amount in the period January-June 2019 only.

Customers of Irish Water that have more than four people in their dwelling will be entitled to an additional allowance for each additional person. The CRU recommends this allowance to be 25,000 litres per additional occupant per year. Customers that have a medical need will be exempted from any charge for exceeding the threshold amount, once Irish Water are satisfied that the medical need requires water demand above the threshold. However, the CRU is not in a position to provide information in this paper on the detail of the higher occupancy allowance or medical need exemption.

The findings in this paper are based on metered data but apply to all customers of Irish Water, i.e. not just those customers that have a water meter.

Irish Water will monitor customer demand patterns throughout 2018 and, in time, notify those customers that appear to be using water excessively. Any excessive demand charge will not be levied on customers in 2018. Charging (only for the water used that exceeds the threshold amount) is expected to commence in 2019. The process for charging customers who use water over the threshold amount, and the level of charge that a customer may face will be put in place by Irish Water and overseen by the CRU in due course.

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## Glossary of Terms and Abbreviations

Abbreviation or Term	Definition or Meaning
<b>CER</b>	Commission for Energy Regulation (now CRU)
<b>CSO</b>	Central Statistics Office
<b>CRU</b>	Commission for Regulation of Utilities (formerly CER)
<b>Default</b>	This is a metered dwelling where the customer did not register with Irish Water.
<b>IW</b>	Irish Water
<b>IWCRP</b>	Irish Water Consumption Research Project
<b>IWQCR</b>	Irish Water Quarterly Consumption Reports
<b>Leaks</b>	Including customers with a leak or removing leaks from an analysis can lead to substantially different results. Each meter has a leak alarm, allowing Irish Water to detect if a customer may have a leak. If a customer's meter shows a continuous flow of water of six litres per hour over a 48-hour period then that customer is identified by Irish Water as possibly having a leak.
<b>JOC</b>	Joint Oireachtas Committee
<b>NPO</b>	This indicates that a premises was registered as Not Permanently Occupied with Irish Water, for example a vacant dwelling, a holiday home.
<b>Outlier</b>	Irish Water defined dwellings with exceptionally high usage as 'outliers'. Outliers were those metered dwellings where demand was over 800 litres of water per day for occupancies up to five persons and over 1,000 litres per day where occupancy was six or more.
<b>Standard</b>	Irish Water classifies standard customers as those that registered the dwelling with Irish Water as an occupied dwelling. The number of occupants in a Standard dwelling is the number that was registered by the customer at the time of registration.
<b>WCP</b>	Water Charges Plan

# 1 Introduction

## 1.1 The Commission for Regulation of Utilities

The Commission for Regulation of Utilities (CRU) is Ireland's independent energy and water services regulator. The CRU was established in 1999 and has a wide range of economic, customer protection and safety responsibilities in energy.

The CRU is the regulator of Irish Water as the national utility for the provision of public water and wastewater services. CRU's role is to protect the interests of water and wastewater customers, ensure water services are delivered in a safe, secure and sustainable manner and that Irish Water operates in an economic and efficient manner.

In October 2017, the CRU changed its name from the Commission for Energy Regulation (CER). This name change was brought about under the Energy Act 2016 and reflects the broadened remit of the organisation and its functions over the last two years, i.e. its role as regulator of public water services.

For the avoidance of doubt, the overall functions and duties of the CRU remain exactly as before. Further information on CRU's role and relevant legislation can be found on CRU's website at [www.cru.ie](http://www.cru.ie).

## 1.2 Background

In its first review of Irish Water's costs the CRU committed to monitoring water demand data as recorded by installed meters and reviewing these allowances periodically.

Legislative changes since 2014 have removed all domestic water allowances with the exception of the free allowance for children of 21,000 litres. The CRU commenced monitoring of demand data from January 2015 and has monitored it on a quarterly basis since then. This monitoring was done with specific regard to the 21,000 litre per child allowance. Since monitoring commenced, the findings have been that the allowance was appropriate and reflected children's demand broadly accurately.

The Water Services Act 2017, enacted on 17 November 2017, introduced measures to charge customers of Irish Water that use water excessively. The legislation requires a threshold amount to be set, based on a multiple of average demand for a dwelling as calculated by the CRU. Customers that use water above this threshold will be charged for their excess demand.

## 1.3 Purpose of this Paper

The purpose of this report is to outline the CRU's methodology, analysis and findings in discharging its legislative responsibility under Section 53A of the Act, i.e. reporting to the Minister on domestic water demand on an individual and per dwelling basis.

This paper details the methodology used by the CRU and also outlines the CRU process in considering trends or patterns identified by the CRU, information available on water demand trends or patterns, the impact on trends or patterns of the number of people who ordinarily reside at a dwelling, statistics published by the Central Statistics Office (CSO) and any other information considered relevant by the CRU.

## 1.4 Legislative Basis

As stated, additional legislative requirements were placed on the CRU following the enactment of the recent Water Services Act 2017, on 17 November 2017. The Water Services Act 2017 amends the Water Services Act 2007 (the Act). Part of this amendment includes the insertion of new sections 53A – 53F into the Act. The Act now includes measures to charge customers of Irish Water whose demand of water exceeds a threshold amount, as decided by the Minister. This legislation was enacted following the recommendations of the Joint Oireachtas Committee which delivered a report in April 2017 on the future funding of domestic water services in Ireland.

Section 53A of the Act requires the CRU to review and assess the rate of demand over a 12-month period for water services provided by Irish Water to dwellings. The CRU must then furnish the Minister with a report on its findings.

The CRU notes that, under the Act, the Minister will set a threshold amount for water demand and that Irish Water customers that use above the threshold may, in time, be charged for water demand above the threshold. Under Section 53B of the Act, the Minister will calculate the threshold amount by multiplying the average contained in the report by a multiplier of 1.7.

The CRU is specifically required to:

- Report on the rate of demand over a 12-month period, for water services provided by Irish Water to dwellings.
- Consider the estimated rate of demand by an individual for provision of water services.
- Consider the estimated rate of demand for provision of water services to dwellings, and the impact on that demand where the number of individuals who ordinarily reside in the dwelling concerned exceeds four.

In carrying out its review, the CRU was directed to consider:

- Trends or patterns in water demand evident in the provision of water services to dwellings given by Irish Water to the Commission;
- Any trends or patterns identified by the CRU;
- The impact on trends or patterns of the number of individuals who ordinarily reside in a dwelling;
- Statistics published by the CSO relating to trends or patterns; and
- Any other available information considered relevant by the CRU.

## 1.5 Structure of this Paper

The structure of this paper is outlined in this section.

- **Chapter 1** is an introduction to the paper, detailing the work of the CRU and the role it has played in monitoring of demand data thus far. It also outlines the purpose of the paper, the structure of the paper and the legislative basis for the CRU's report to the Minister on average demand patterns.
- **Chapter 2** outlines the findings of the various studies which the CRU has considered, as required under legislation.
- **Chapter 3** outlines the background, methodology and findings of the CRU's analysis and findings for the Minister.
- **Chapter 4** provides a comparison of the analyses presented in Chapters 2 and 3. It outlines the CRU's recommendations and the next steps.
- **Appendix A and B** outlines in detail the background, methodology and findings of the various studies which the CRU has considered as required under legislation.

## 1.6 Related Documents

The following documents may provide useful reference points when reading this paper:

- [CRU Water Charges Plan Decision \(CER/14/746\)](#)
- [Irish Water Quarterly Consumption Reports](#)
- [CRU submissions regarding Joint Committee on Future Funding of Domestic Water Services \(CER/17/094\)](#)
- [Central Statistics Office, 2017, Domestic Metered Public Water Consumption](#)

## 2 Analysis Published to Date

### 2.1 Introduction

The CRU has monitored water demand since the initial introduction of domestic water charges in January 2015. Water conservation is a key driver of Irish and European water policy and the CRU has a statutory obligation to ensure conservation of water resources.

This section provides information on the findings of various analyses that have been carried out on water demand since Irish Water commenced operations in 2014. The findings of these studies have been carefully considered by the CRU in preparing this report, as required under Section 53A of the Act.

The section outlines the findings of:

- Irish Water's Consumption Research Project
- Irish Water's Quarterly Consumption Reports
- Analysis completed by the CRU as part of its submissions to the Oireachtas Committee
- Analysis completed by the CSO in April 2017

The findings of these studies are outlined below. However, for a more detailed account of the background to these analyses, the precise method used in each study, and their findings, please see Appendix A of this paper.

### 2.2 Irish Water Consumption Research Project (IWCRP)

This early analysis made the following findings:

- Average demand when outliers are excluded was 109 litres per occupant per day (40,000 litres per year), when outliers were included in the analysis it was 120 litres per occupant per day (44,000 litres per year).
- When the survey was weighted against the 2011 CSO census data set, the outlier-excluded average demand increased slightly to 111 litres per occupant per day, or approximately 41,000 litres per occupant per year.

Other points of note from the IWCRP survey of 1,650 participating dwellings include the following:

- The top 1% of dwellings used 22% of all water;
- 79% of dwellings used less than 150 litres of water per occupant per day (55,000 litres per year);
- 3% of dwellings used less than 30,000 litres per year;

For a more detailed examination of this analysis, please see Appendix A.

## 2.3 Irish Water Quarterly Consumption Reports (IWQCR)

Irish Water furnished the CRU with demand reports for each quarter from Q1 2015 to Q3 2016.

The key metrics monitored in these quarterly reports include:

- Regulated Per Capita Consumption (Regulated PCC);
- Child Water Allowance analysis;
- Regulated PCC per region; and,
- Annualised dwelling demand per occupancy level.

### 2.3.1 Dwelling demand per occupancy level

On average during the period Q1 2015 to Q3 2016 on an annual basis:

- Single occupant dwellings used 54,000 litres of water;
- 2 occupant dwellings used 90,000 litres of water;
- 3 occupant dwellings used 111,000 litres of water;
- 4 occupant dwellings used 128,000 litres of water;
- 5 occupant dwellings used 147,000 litres of water;
- 6+ occupant dwellings used 177,000 litres of water.

### 2.3.2 Personal demand

Average demand for individuals in each quarter analysed ranged from 110 litres per person per day to 119 litres per person per day over the period.

### 2.3.3 Fair demand

The Irish Water reports show that about 3-4% of all dwellings consume more than 800 litres per day. This percentage includes leak and non-leak dwellings.

The reports show that about 1% of customers with no apparent leakage at their property consume more than 800 litres per dwelling per day (292,000 litres per year).

### 2.3.4 Child allowance

Throughout the quarterly reports, child water demand remained less than the free allowance of 21,000 litres per year. It was, however, consistently close to 21,000 litres as highlighted.

The analysis also suggested that child water demand is on average less than adult demand.

Further detail on the Irish Water studies can be found in Appendix A of this report.

## 2.4 CRU Analysis for Joint Oireachtas Committee

In 2016 an Expert Commission was established to examine the funding of domestic public water services in Ireland. The Expert Commission provided its report<sup>3</sup> for consideration to a newly formed Joint Committee on the Future Funding of Domestic Water Services. The CRU provided analysis of domestic water demand in Ireland to the Joint Committee in Q1 2017.

Some key points are outlined below regarding the analysis provided to the Joint Oireachtas Committee. These points were also outlined within the submissions:

- The analysis indicated an average dwelling demand of 127,000 litres per year. When dwellings with leaks were excluded from the analysis the result was 102,000 litres per year.
- The analysis found an average demand of 133 litres per day per occupant (48,500 litres per year). This was calculated by dividing the total volume of water used by the total number of occupants.
- The analysis indicated a number of ways of calculating average per person demand and provided results for each. These ranged from of 109 to 155 litres per day per person (40,000 – 57,000 litres per year). An extract which formed part of a CRU response to a query raised as part of the JOC process is provided in Appendix A.
- The CRU also noted that the first occupant in a dwelling normally uses more water than subsequent persons.

The CRU also noted that its analysis had not been subject to challenge via consultation or discussion with all relevant stakeholders. The CRU stated that other options and alternative methodology could emerge through any consultation process.

Further detail on this analysis can be found in Appendix A of this report.

## 2.5 CSO Publication

In April 2017 the CSO released its first analysis on demand of water by domestic customers of Irish Water.

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<sup>3</sup> The Expert Commission's report is available [here](#).

The CSO found that the average dwelling demand in 2015 varied from 274 litres per day to 383 litres per day depending on whether domestic water meters recording large demand are included or excluded.

The CSO did not analyse demand data on a per occupant basis.

Other findings from the CSO analysis are as follows:

- Around 69% of total water demand by domestic metered customers in 2015 was accounted for by 96.6% of customers.
- The median is a less-sensitive measure of daily meter demand and it varied from 245 litres per meter per day at the one cubic metre threshold to 252 litres per meter per day when all data for 2015 were included.

Further detail on the CSO's analysis and methodology can be found in Appendix A of this paper.

## 3 CRU Analysis

### 3.1 Introduction

As stated in Section 1.4 the CRU is required by law to report to the Minister on the rate of demand by an individual for provision of water services, the estimated rate of demand for provision of water services to dwellings and the impact on that demand where the number of individuals who ordinarily reside in the dwelling concerned exceeds four.

This chapter of the report details the CRU's analysis and the methodology followed to determine the findings.

### 3.2 Methodology

The following bullet points summarise the CRU's methodology in this report:

- Only the demand of metered customers was analysed.
- The CRU analysed metering data covering 12 months in 2016 of 475,000 customers of Irish Water.
- This total (475,000) was sourced from Irish Water's customer billing system and meter data system. This resulted in a lower sample size than the approximately 800,000 meter reads which were available on the meter data system only. The CRU only analysed meters that were in place at the start and at the end of 2016, i.e. actual 12-month demand. The larger meter data system file contained meter readings in their rawest form with many suspicious (high, or negative) reads. Sourcing the meter data from both systems was a useful integrity check and the CRU considers the data from the resulting 475,000 meters to be a robust representation of demand patterns of metered customers.
- All customers were included in the analysis, i.e. those that have leaks and those that do not have leaks.
- All occupancy types were included to assess average demand to a dwelling, i.e. those that registered with Irish Water, those that did not register and dwellings that were not permanently occupied.
- Only customers that registered with Irish Water were included to estimate the rate of demand at a dwelling where occupancy exceeds four people. This is because occupancy is unknown at those dwellings that did not register with Irish Water and occupancy at dwellings that were not permanently occupied is assumed to be zero.
- If the annual volume could not be calculated at a dwelling (i.e. reading not captured) or the result was invalid it was disregarded from the analysis.
- The CRU's results do not differentiate between adults and children, as the legislation required the analysis of occupants, without specifying between adults and children.

- The CRU had access to Irish Water metered data for 2015 and 2016. Under the Act, the CRU is required to prepare its report based on a 12-month period. The CRU focused its analysis for this report on the newer 2016 data while still giving regard to trends and patterns emerging from the 2015 data.

A more detailed synopsis of the methodology follows below:

The CRU analysed Irish Water metering data covering 12 months in 2016. This comprised meter reads of approximately 475,000 customers of Irish Water. The legislation requires the CRU to carry out its review over a 12-month period. The 2016 data is the most recent complete 12-month data set available and therefore the CRU has based its report on this year. However, 2015's data is also useful to analyse and allows the CRU to monitor trends and patterns over time, as directed by legislation.

There were approximately 884,000 domestic meters installed by Irish Water by the end of 2016. However, the CRU focused its analysis on 475,000 of these meters. This total was sourced from Irish Water's customer billing and meter data systems. Irish Water provided data where the WPRN (a unique identifier for each meter) appeared on both the customer billing and the meter data systems. The customer billing system contains the registration status (for example occupancy level) for each dwelling and the meter data system contains information on dwellings with leaks. Information on demand, registration status and leak information are key CRU requirements. Both systems contain meter read information and comparing the demand in the customer billing system to the demand in the meter data system for each WPRN is a useful integrity check. The meter data system contains meter read information in its rawest form and can contain suspicious (exceptionally high or negative) meter reads. Combining the systems allows for a more reliable dataset than relying on the data contained in Irish Water's meter data system alone.

The sample size was also reduced as the CRU only used customers that had a meter reading at the start and at the end of the year in its analysis. As many meters were installed during 2016, reads from these meters was excluded from the CRU's analysis. Both these factors (merging the systems and only including meters in place on 1 January 2016 in the analysis) results in a reduced sample size relative to the total number of domestic meters (approximately 884,000 at the end of 2016).

The CRU considers the data from the resulting 475,000 meters to be a robust representation of demand patterns of metered customers.

The datasets contain domestic water meter readings which indicate the volume of water used at each dwelling. These readings are automatically collected at midnight at the beginning of the year and the end of the year (i.e. the beginning of the following year). By calculating the

difference between the meter reading at the start and end of the year, the total volume of water used annually at that dwelling can be determined.

The raw data also contain information on whether a leak was present at the time the meter reading was captured. The CRU has examined the effect of leaks on the results by calculating the results both including and excluding dwellings at which leaks were detected. However the CRU is of the view that as there are currently a significant number of dwellings with leaks, an analysis of the current rate of water demand in Ireland should not disregard such a significant portion of customers. As such this report focuses on the analysis of data including leaks.

If the annual volume could not be calculated at a dwelling (e.g. reading not captured) or the result was invalid it was disregarded from the analysis. Dwellings with exceptionally high demand (i.e. outliers) were not removed from the analysis. The CRU is of the view that these dwellings are customers of Irish Water and as such they should be included in the analysis just as customers that use exceptionally small volumes of water are included in the analysis.

Finally, as 2016 was a leap year, the annual demand at each dwelling was converted to a 'normal' 365 day year to maintain consistency. Total demand was divided by 366 and multiplied by 365 in order to calculate the demand in 2016 on the same basis as a non-leap year.

### **3.2.1 Occupancy data**

In order to calculate the rate of demand where occupancy exceeds four people, the CRU needed to consider dwellings for which occupancy details was available and then analyse those dwellings' demand.

Some of the data included information on the number of people living at each dwelling. This data was used when examining occupancies of greater than four.

Irish Water's datasets categorise dwellings into three types:

- **Standard:** This indicates that the customer registered the dwelling with Irish Water as an occupied dwelling. The number of occupants in a Standard dwelling is the number that was registered by the customer at the time of registration.
- **Default:** This is a metered dwelling where the customer did not register with Irish Water. Irish Water assigns an occupancy of two (which is lower than average occupancy as per the CSO Census figures) to these dwellings.
- **NPO (Not Permanently Occupied):** This indicates that a premises was registered as Not Permanently Occupied with Irish Water. Irish Water assigns an occupancy of zero to these dwellings.

The Standard dwelling category was the only category included in the analyses relating to per person demand (i.e. Section 3.3.2 and 3.3.3). This is because standard dwellings are the only dwelling category for which occupancy data was disclosed. These dwellings comprise approximately 75% of the dwellings in the dataset examined by the CRU. Knowing the occupancy of a dwelling is essential to estimating the impact of the number of occupants on the rate of demand to a dwelling.

The occupancy data is based on information provided by customers as part of the original registration process. This information was reliant on the self-declaration of customers and, with the passage of time, it will have become increasingly out of date. However the CRU expects that any differences between actual occupancy and registered occupancy could be expected to be minimal on an overall basis, for example occupancy could decrease in one dwelling and increase in another.

The Irish Water occupancy data can be considered in parallel with the Census data for accuracy. According to the latest Census, taken in 2016, the average number of persons per dwelling is 2.75<sup>4</sup>. The average occupancy of the Standard dwellings used in this analysis varies from 2.59 to 2.65 depending on the year of analysis (2015 or 2016) and whether dwellings with leaks are included or excluded. This would indicate that the occupancy data is slightly below the Census average but close enough to be considered reliable.<sup>5</sup>

The CRU examined the number of dwellings in each occupancy bracket (i.e. one occupant, two occupants...nine occupants) in the CRU's dataset and compared it to the distribution of occupants per dwelling size according to the CSO 2016 Census data<sup>6</sup>. The percentage of occupants at each dwelling size was similar in both studies, indicating that the CRU's analysis was generally representative of the make-up of dwellings in Ireland.

However, the CRU has based its analysis on metered customers of Irish Water. The Census includes all private dwellings and not just those with a connection to the public water system. Therefore, the Census data provides a useful integrity check but may not necessarily be representative of Irish Water customers.

The data from Standard dwellings was then used as a basis for the analyses in Section 3.3.

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<sup>4</sup> <http://www.cso.ie/en/releasesandpublications/ep/p-cp1hii/cp1hii/od/>

<sup>5</sup> However it is possible that the Census average of 2.75 persons per dwelling may differ slightly from a Census average which only includes dwellings with public domestic water connections.

<sup>6</sup> [E4005: Private Households 2011 to 2016 by Composition of Private Household, Persons per Household and Census Year.](#)

## 3.3 Analysis

### 3.3.1 Estimated rate of demand to dwellings

The total volume of water used on an annual basis at each dwelling was calculated by taking each valid meter reading at midnight on 1 January 2015, midnight at 1 January 2016 and midnight on 1 January 2017. The reading on each meter was noted and the previous year's meter read was subtracted to arrive at an annual demand for each dwelling.

The CRU focuses its analysis on 2016, in line with the legislative requirement for review of a 12-month period and the fact that 2016 is the most recent period. The average dwelling demand was 125,000 litres in 2016. For information, the 2015 average dwelling demand was 130,000 litres.

Demand was identical in both 2015 and 2016 when customers with leaks were removed from the analysis. Average dwelling demand was 98,000 litres in both 2015 and 2016 when leaks were disregarded.

The CRU found that when all customers, with leaks and without leaks, are included in the analysis there is a substantial drop in demand from 2015 to 2016. However, removing all customers that have leaks sees demand remaining roughly the same in both years, i.e. 98,000 litres. This may indicate that the drop in demand from 2015 to 2016 could be, at least partly, attributed to customers fixing leaks over the period. In the 2015 dataset 8.9% of dwellings contained leaks at either the start or end of the year; in 2016, this reduced to 8.3%, again indicating that some customers may have addressed their leakages.

### 3.3.2 Estimated rate of demand by an individual

The CRU is also required to estimate the rate of demand by an individual. This can be calculated using different methodologies which provide different results. The CRU previously examined this in an extract which formed part of a CRU response to a query raised as part of the JOC process, this response is available on the CRU website. That analysis was based on metered data from Q2 2016, with its results detailed in Appendix A of this paper.

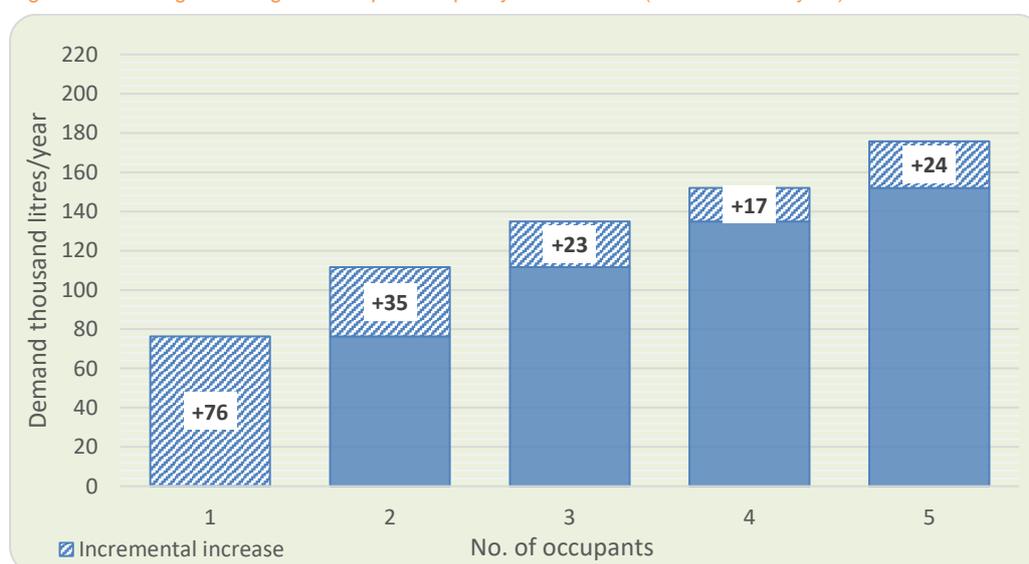
The CRU has decided that the most appropriate method to calculate individual demand is to divide the total volume of water used by dwellings in 2016 by the total number of occupants in those dwellings. The CRU in its analysis only included customers that registered with Irish Water, i.e. standard customers, as these are customers that provided occupancy details.

The estimated annual rate of demand by an occupant in 2016 was 47,000 litres. In 2015 the average rate of demand was 48,500 litres. For information, when dwellings with leaks are removed from the analysis the estimated annual rate of demand by an occupant was 37,000 litres and 38,000 litres in 2015 and 2016, respectively.

While the overall individual demand is 47,000 litres, or 129 litres per person per day, this information is not informative in its own right, as individual demand tends to drop based on the number of occupants in a dwelling. The rate of demand by an individual occupant changes depending on the number of occupants in a dwelling. Figure 3.1 highlights that the first occupant in a house will always use more water than subsequent occupants, i.e. average personal demand decreases with the greater number of individuals living at the dwelling. This is due to the sharing of common water-demand drivers, e.g. use of a washing machine or a dishwasher.

The CRU analysis indicates that the first occupant in a dwelling uses 76,000 litres a year. The demand in a two occupant dwelling only increases by a further 35,000 litres, with an additional increase of 23,000 litres and 17,000 litres when a third and fourth occupant is present, respectively.

Figure 3.1: Average dwelling demand per occupancy level in 2016 (thousand litres/year)



If leaks are removed from the analysis, individual demand maintains broadly the same trend. Although the average annual demand per occupant is significantly lower when dwellings with leaks are excluded, the incremental per person demand (from one to five occupants only) is of similar volumes to those seen in the data including leaks.

This indicates that the volume lost due to leaks is not always related to the demand at a dwelling, and may occur at a similar rate in a house when it is in a state of low or high demand. In simpler terms, this indicates that leaks are independent of occupancy levels and contribute to water losses regardless of the number of people that reside at a dwelling, as would be expected.

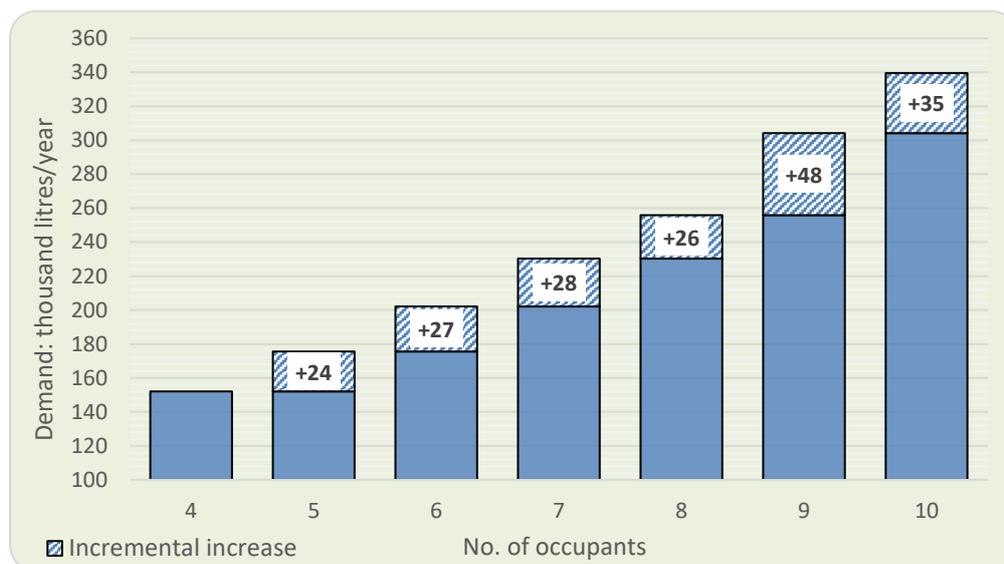
### 3.3.3 Impact on demand when the number of individuals exceeds four

Finally the CRU examined the impact on demand where the number of individuals who ordinarily reside in the dwelling exceeds four. The CRU excluded houses with an occupancy above ten. This was due to sample size issues. For example there were only thirteen dwellings with eleven occupants that could be included in the analysis, and only 59 dwellings with ten occupants. Such a small sample size was considered to be unreliable.

The results of the analysis are highlighted in Figure 3.2. Based on the CRU’s analysis, the impact on demand in 2016 when the number of individuals exceeds four ranges from 24,000 litres to 48,000 litres per year.

When these results are averaged and weighted against the number of dwellings in each occupancy bracket (i.e. five occupants, six occupants...ten occupants) the result is an increase of 25,000 litres per occupant per year. Five-person or six-person dwellings are far more common than, say, nine-person or 10-person dwellings. For this reason, the overall incremental demand is at the low end of the range by virtue of the fact that there are more customers with those occupancy profiles.

Figure 3.2: Average dwelling demand when number of individuals exceeds four in 2016 (thousand litres/year)



The range is quite broad as a result of the sample size decreasing as the number of occupants increase. This is because a reduced sample size can be more easily effected by outliers, resulting in a larger range. When dwellings with leaks are removed from the analysis, which essentially removes some outliers, the result is a range of 20,000 litres to 26,000 litres, with an average rate of demand for dwellings with a greater occupancy than four of 22,000 litres.

## 4 Conclusion

### 4.1 Introduction

This section provides a consideration of the results and examines possible reasons for differences between the various studies outlined in Chapter 2 and the CRU's analysis herewith. This is a legislative requirement of the CRU under the Act.

These studies are discussed in greater detail in Sections 4.1.1 – 4.1.3 and an overview of the methodologies and some of the results are presented in Table 4.1 in Section 4.1.4.

#### 4.1.1 Rate of demand to dwellings

The CRU has calculated an average demand to dwellings of 125,000 litres in 2016.

The Irish Water Quarterly Consumption Reports (IWQCR) did not calculate an average dwelling demand and therefore does not provide a comparator for this section.

The Irish Water Consumption Research Project (IWCRP) estimated an average dwelling demand of 109,000 litres per year. This figure excludes outliers. Although the CRU gives consideration to the IWCRP result of 109,000 litres per year, this calculation was based on a small sample size and it excluded leaks. As dwellings with leaks are customers of Irish Water the CRU is of the view that they should be included in the analysis.

The CSO found that the average dwelling demand in 2015 was 140,000 litres per year. With regard to the CSO result the CRU is of the view that because the CRU's analysis was carried out for a more recent period (i.e. 2016) it provides a more accurate representation of the current demand to dwellings. However, the CRU's result for the same period (i.e. 2015) differs from the CSO's result. This indicates that the differing results must also be due to other factors such as the data and methodologies employed by each study rather than just the differing periods of analysis.

For example the CSO made use of Irish Water's raw meter data which did not include the additional integrity checks undertaken before entering Irish Water's billing system. In addition approximately half of the meters in the raw meter data system are associated with unregistered customers. The CRU's analysis indicates that the average demand in an unregistered dwelling tends to be higher than a registered dwelling. This may explain the higher figure which the CSO arrived at. The CRU did also receive this same raw meter data but given the CRU's more detailed requirements (we need demand, occupancy and leak information combined in the same dataset) a decision was taken to use the dataset formed from a combination of the customer billing and meter data systems. Irish Water were also more comfortable providing metered demand information which benefitted from the additional integrity check of being checked against

their customer billing system. The CRU considers its sample analysed in this report to be the most robust and reliable source of data to assess average demand to a dwelling.

The CRU will continue to review the applicability of both datasets as part of its requirement, under Section 53A of the Act, to review demand from time to time and not less than six months before the expiration of the Water Charges Plan.

The CRU JOC submission calculated an average dwelling demand of 127,000 litres per year. This is similar to the CRU's latest analysis, which found that the average demand by dwellings was 125,000 litres in 2016. The CRU expects that the difference between the results is due to the differences in the period of analysis. As the CRU's current analysis covers an entire year rather than one quarter it provides a more robust result.

#### **4.1.2 Rate of demand by an individual**

The CRU's latest analysis resulted in an estimation of rate of demand by an individual of 128 litres per day (i.e. 47,000 litres per year).

The CSO analysis did not produce data on an individual basis but rather on a per dwelling basis and therefore does not provide a comparator for this section.

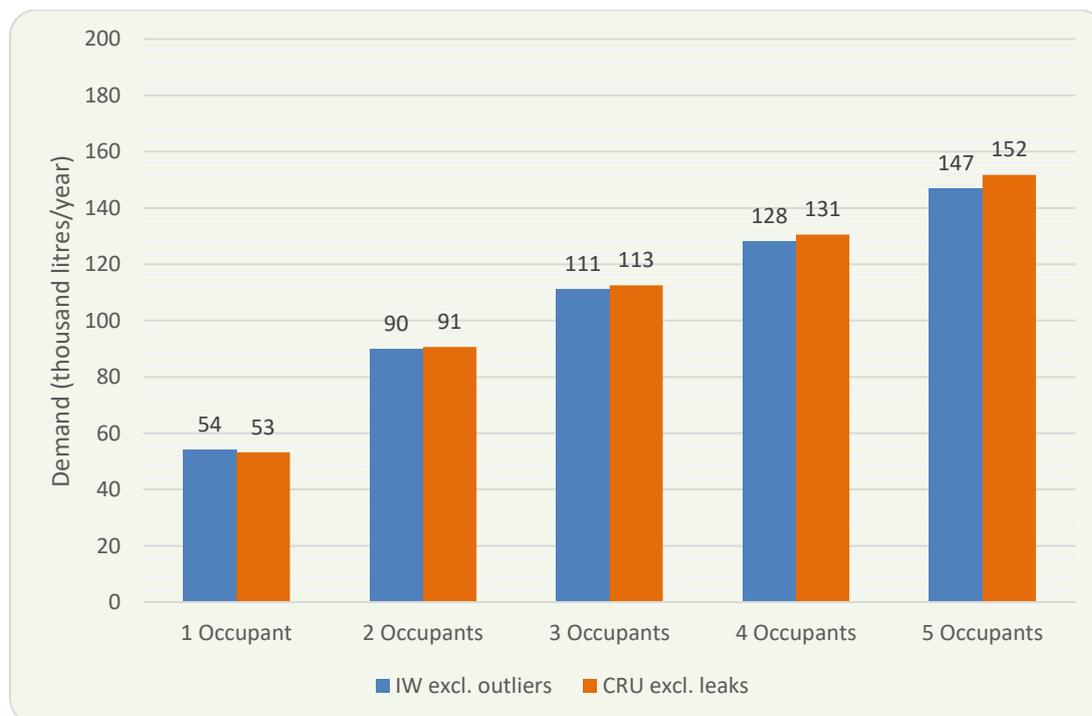
The IWCRP found that the rate of demand by an individual is 40,000 litres per year. When outliers (i.e. those whose demand was over 800 litres of water per day for occupancies up to five persons and over 1,000 litres per day where occupancy was six or more) were included this rose to 44,000 litres per year. When the survey was weighted against the 2011 CSO census data set, the outlier-excluded average demand increased slightly to 40,500 litres per year. The IWQCRs had similar results with average demand by an individual ranging from 40,000 litres per year to 43,000 litres per year depending on the period of analysis. It is important to note that the Irish Water analyses excluded outliers, i.e. those whose demand was over 800 litres of water per day for occupancies up to five persons and over 1,000 litres per day where occupancy was six or more.

Although the CRU gives consideration to the Irish Water reports, it notes that Irish Water excluded those customers that were considered to be outliers, using a metric defined by the utility itself. As dwellings with leaks and dwellings considered to be outliers remain customers of Irish Water the CRU is of the view that they should all be included in the analysis.

The CRU's JOC submission which included outliers and those with leaks naturally resulted in a higher estimation of rate of demand by an individual of 48,500 litres per year. The CRU's latest analysis resulted in a similar figure of 47,000 litres per year. As stated, the CRU's current analysis covers an entire year (2016) rather than one quarter. It should, therefore, provide a more recent and more robust analysis of demand than a quarterly analysis.

Figure 4.1 presents Irish Water’s analysis of average annual dwelling demand per occupancy level. Alongside this is the CRU analysis which excludes dwellings with leaks in order to aid comparison. The trend of reduced incremental demand as occupancy increases is clear. This is due to the sharing of common water-demand drivers, e.g. use of a washing machine or a dishwasher. The similarity of the trends gives confidence in the accuracy of both sets of analysis.

Figure 4.1: Comparison of IW and CRU average annual dwelling demand per occupancy level



### 4.1.3 Impact on demand when number of individuals exceeds four

The CRU’s 2016 analysis of metered data results in an incremental demand of 25,000 litres per year when the number of individuals exceeds four.

The CSO analysis did not produce data on an individual basis but rather on a per dwelling basis and therefore does not provide a comparator. In addition the CRU’s JOC did not examine the demand of additional occupant but noted the analysis completed under the IWCRP which referenced demand for additional occupant as 21,000 litres per annum.

In all of the IWQCRs, the child water demand remained less than the free allowance of 21,000 litres per year, with an average annual demand across the analysed quarters of 19,000 litres per year.

The difference between the CRU’s latest analysis and the 21,000 litre allowance is likely a result of the CRU not excluding outliers (high-water users) from its analysis and the fact that the CRU did not differentiate between adults and children when presenting its results, as required by

legislation. The CRU analysis found that child water demand is on average less than adult demand. This finding has also been reported by Irish Water.

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#### 4.1.4 Overview

Table 4.1 below highlights the different data sources, the period of analysis, any treatment of data and some of the results included in each study.

Table 4.1: Studies of domestic water demand

Study	Data source	Period of analysis	Outliers	Other	Dwelling demand per year	Per person demand per year
IWCRP	Survey of dwellings – IWCRP	Q1 2014	Outliers removed from analysis <sup>7</sup>	Standard dwellings only <sup>8</sup>	109,000 litres excl. outliers	40,000 litres excl. outliers, 44,000 litres incl. outliers
IWQCR	IW combined meter and billing data	Quarterly from Q1 2015 - Q3 2016	Outliers removed from analysis <sup>7</sup>	Standard dwellings only <sup>8</sup>	Not analysed in this study.	40,000 – 43,000 litres excl. outliers
CSO	IW raw meter data	2015	Outliers not removed	Extrapolation <sup>9</sup>	140,000 litres	Not analysed in this study.
CRU - JOC	IW combined meter and billing data	Q2 2016	Outliers not removed	Standard dwellings only <sup>8</sup>	127,000 litres	48,500 litres
CRU	IW combined meter and billing data	2016	Outliers not removed	Standard dwellings only for per person demand analysis <sup>10</sup>	125,000 litres	46,500 litres

<sup>7</sup> Irish Water defined dwellings with exceptionally high usage as ‘outliers’. Outliers were those metered dwellings where demand was over 800 litres of water per day for occupancies up to five persons and over 1,000 litres per day where occupancy was six or more.

<sup>8</sup> In other words not permanently occupied dwellings and unregistered dwellings were excluded from the analysis.

<sup>9</sup> The CSO carried out some extrapolation in its analysis. This involved converting the readings into monthly demand figures by allocating the difference in two readings proportionately between the dates that the meters were read. Although this may result in an over or under estimation of demand during a particular month, the overall demand should remain the same.

<sup>10</sup> In other words not permanently occupied dwellings and unregistered dwellings were excluded from the analysis of per person demand. However all dwelling types were included in the analysis of the average dwelling demand.

## 4.2 CRU Recommendation

The CRU has presented its analysis which determined the rate of demand by an individual; the estimated rate of demand to dwellings, and the impact on that demand where the number of individuals who ordinarily reside in the dwelling concerned exceeds four.

In addition to its own analysis the CRU has considered trends or patterns in water demand identified by Irish Water and communicated to the Commission; statistics published by the Central Statistics Office relating to trends or patterns; and any other available information considered relevant by the CRU, as required under legislation.

The CRU is of the view that an analysis of the current rate of water demand in Ireland should not disregard customers with leaks or customers that may have exceptionally high demand. As a consequence the CRU has on a number of occasions arrived at different results when calculating the metrics in question when compared to analysis by other bodies. However, it is important to note that the CRU's findings when leaks were removed were generally consistent with the previous research.

The CRU estimates a rate of demand to dwellings of 125,000 litres per year.

In keeping with previous analysis the CRU found that the first occupant in a house will always use more water than subsequent occupants, i.e. average personal demand decreases with the greater number of individuals living at the dwelling. This is due to the sharing of common water-demand drivers. On average the estimated annual rate of demand by an individual was 47,000 litres per year.

The CRU recommends an incremental allowance of 25,000 for each additional occupant above four in a dwelling.

## 4.3 Next Steps

The CRU has issued this advice to the Minister within one month of the legislation coming into operation, as set out in the 2017 Act. After considering this report the Minister will set a threshold amount and an allowance amount. The threshold will be set at 1.7 times the CRU's estimated rate of demand by a dwelling. Customers that use water above this threshold will be charged for the excess portion demand. The rate of this charge will be examined in 2018.

The CRU is not required by legislation to set a threshold amount. However, for information and based on this report, multiplying the rate of demand to dwellings (125,000 litres per year) by 1.7 gives an annual threshold amount of 213,000 litres per year. Customers that use greater than this allowance would be liable to a charge for demand that exceeds that threshold. The CRU's analysis indicates that in the year 2016 such a threshold, which includes an additional allowance

when the number of occupants exceeds four would have resulted in 7% of dwellings facing a bill. This 7% of customers consume 31% of the total water demand.

The CRU notes that the findings provided herewith are applicable to both metered and unmetered customers of Irish Water. Approximately 58% of Irish Water customers have a meter. Customers that use water above this threshold amount will, in 2019, become liable for a charge for the volume of water used above the threshold.

The CRU will continue to monitor the rate of demand throughout 2018, under Section 53A of the Act, which requires the CRU to review the matter from time to time and not less than 6 months before the expiration of the Water Charges Plan.

## Appendix A: Analysis Published to Date

### A.1 Introduction

This appendix is a useful reference for Chapter 3, above. It provides a more detailed account of the background to the analyses listed in Chapter 2, the precise method used in each study, and their findings.

This appendix details the results of:

- Irish Water's Water Research Project.
- Quarterly reports published by Irish Water.
- Analysis completed by the CRU as part of its submissions to the Oireachtas Committee.
- Analysis completed by the CSO in April 2017.

### A.2 Irish Water Consumption Research Project (IWCRP)

#### Background

In 2014 Irish Water conducted a Consumption Research Project (IWCRP) to gain an understanding into demand patterns ahead of the development of its Water Charges Plan (WCP). The IWCRP had three phases with the results used in the development of domestic tariffs and a child allowance in the original WCP, published in 2014<sup>11</sup>. The study was based on door-to-door surveys with meter readings collected by Irish Water.

The aim of the survey was to help inform demand assumptions to aid the development of tariffs for non-metered domestic customers. The survey data was used to provide confidence that the distribution of unmetered customers' water demand between low, medium and high was meaningful relative to metered customers, and to support the development of the tariffs for those that do not have a meter.

#### Method

In the initial study, a target sample of 7,588 dwellings was identified. A market research company then went door-to-door and carried out a survey to collect details on occupancy, dwelling type and number of bedrooms in the dwelling. The 7,588 dwellings were selected to be geographically distributed and representative of the architecture mix in the 2011 CSO census of population.

The dwellings were required to have meters installed prior to December 2013 for them to have sufficient meter data available at the time the study commenced (April 2014). From the sample of 7,588 dwellings, 1,650 agreed to take part in the survey.

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<sup>11</sup> Irish Water Charges Plan ([CRU/14/747](#))

Irish Water removed outliers from the sample when carrying out their analysis. This means that only dwellings that consume less than 800 litres per day (292,000 litres per year) were used to derive averages.

## **Findings**

The following points are the key findings from the IWCRP<sup>12</sup>:

- Average demand when outliers are excluded was 109 litres per occupant per day (40,000 litres per year), when outliers were included in the analysis it was 120 litres per occupant per day (44,000 litres per year).
- When the survey was weighted against the 2011 CSO census data set, the outlier-excluded average demand increased slightly to 111 litres per occupant per day, or approximately 41,000 litres per occupant per year.
- The CSO weighted outlier-excluded average dwelling demand is approximately 109,000 litres per year.

Other points of note from the IWCRP survey of 1,650 participating dwellings include the following:

- The top 1% of dwellings with the highest demand for water account for 22% of the total demand for water;
- 79% of dwellings have a demand of less than 150 litres of water per occupant per day (55,000 litres per year);
- 3% of dwellings have a demand of less than 30,000 litres per year;

## **A.3 Irish Water Quarterly Consumption Reports (IWQCR)**

### **Background**

Since Irish Water commenced operations it has rolled out a domestic metering programme nationwide. As at December 2016 approximately 884,000 customers, i.e. approximately 58% of its customers, have had meters installed.

The large-scale rollout of domestic meters has allowed Irish Water to monitor domestic demand over a period of time. The CRU decided in 2014 ([CER/14746](#)) to monitor domestic demand patterns and seek metered data from Irish Water to assess and consider the accuracy of demand allowances.

The CRU requested that Irish Water produce quarterly and annual consumption reports which

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<sup>12</sup> [IWCRP Phase 1](#)

provide a breakdown of metered consumption of water. The purpose of the quarterly domestic consumption reports is to monitor quarterly trends and assess customer demand.

Changes to legislation after the initial tariff setting process in 2014 meant that the only water allowance granted to customers was the 21,000 litre allowance for children. These reports analysed the appropriateness of this allowance, while also giving regard to the many other useful demand data that emerged from the monitoring process.

Irish Water has furnished the CRU with demand reports for each quarter from Q1 2015 to Q3 2016. The key metrics monitored in these quarterly reports include:

- Regulated Per Capita Consumption (Regulated PCC);
- Child Water Allowance analysis;
- Regulated PCC per region; and,
- Annualised dwelling demand per occupancy level.

## **Method**

Irish Water provided reports to the CRU on a quarterly basis from Q1 2015 to Q3 2016. These reports focused on the accuracy of the child water allowance.

The raw data used to develop these reports is the same as the data Irish Water provided the CRU. Therefore these reports are also reliant on the occupancy data being accurate.

The reports were based on the demand of metered customers of Irish Water. Very high demand dwellings (deemed those that use over 800 litres of water per day) were considered to be outliers and removed from the dataset in order to replicate the methodology used in the 2014 tariff setting process. In addition the reports only included Standard dwellings in its analysis.

The reports provided detailed analysis on the following areas:

- Child water demand, analysing demand patterns in dwellings with occupancies of varying adult/child combinations;
- Regulated per capita consumption (PCC) for different occupancy levels, i.e. average demand omitting high users;
- Annualised dwelling demand for different occupancy levels;
- The percentage of dwellings at each occupancy level;
- The percentage of dwellings in different regions of Ireland and the regulated PCC per region;
- The average increase in dwelling demand for each additional occupant;
- Numbers of dwellings that consume over 800 litres per day and the number that appear to have a leak.

## Findings

### *Dwelling demand per occupancy level*

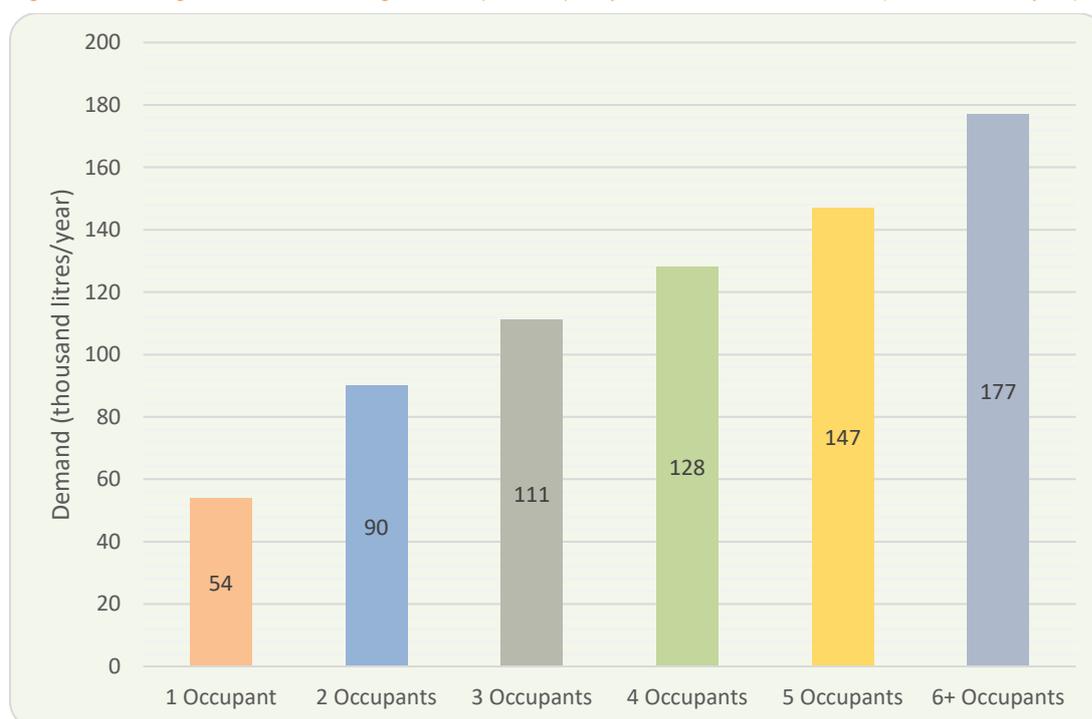
The Irish Water quarterly consumption reports analysed metered dwelling demand across each occupancy level, from single occupancy to dwellings with six or more occupants. The quarterly demand was then annualised. The consumption reports did not calculate the demand for an average dwelling.

Figure 0.1 summarises the data reported by Irish Water. The annualised dwelling demand per occupancy level for each quarter and is averaged over the seven quarters in the analysis.

On average during the period Q1 2015 to Q3 2016 on an annual basis:

- Single occupant dwellings used 54,000 litres of water;
- 2 occupant dwellings used 90,000 litres of water;
- 3 occupant dwellings used 111,000 litres of water;
- 4 occupant dwellings used 128,000 litres of water;
- 5 occupant dwellings used 147,000 litres of water;
- 6+ occupant dwellings used 177,000 litres of water.

Figure 0.1: Average annualised dwelling demand per occupancy level - Q1 2015 - Q3 2016 (thousand litres/year)

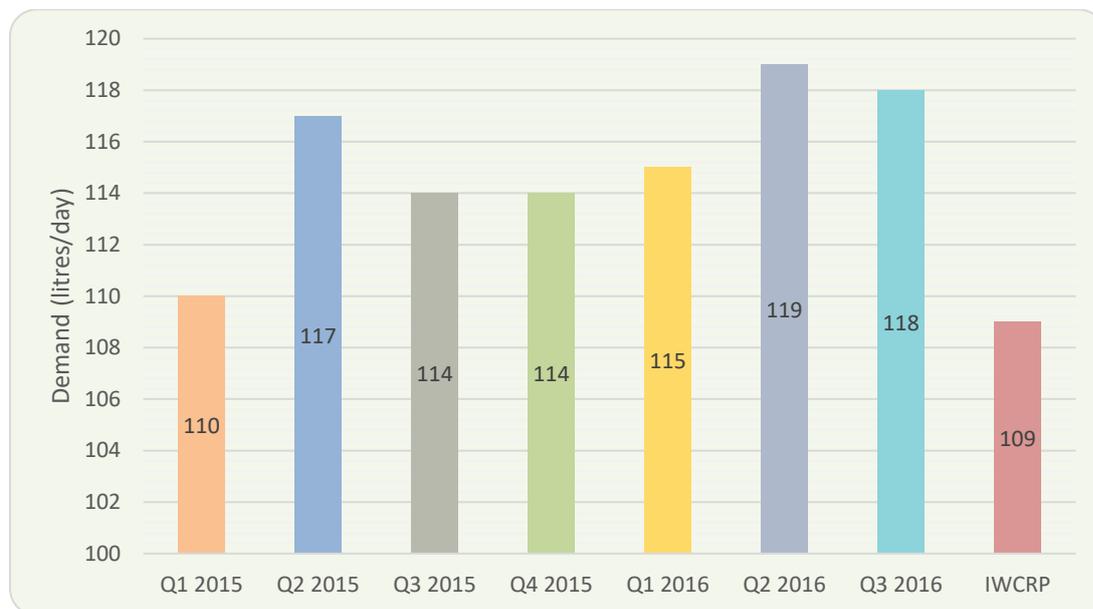


### *Personal demand*

The reports provided regulated per capita consumption (PCC) for different occupancy levels in dwellings. The data in Figure 0.2 captures the average demand across each occupancy level for the period Q1 2015 to Q3 2016. Average demand for individuals in each quarter analysed ranged from 110 litres per person per day (40,000 litres per year) to 119 litres per person per day (43,000

litres per year) over the period.

Figure 0.2: Trend in average per capita water demand - Q1 2015 - Q3 2016 (litres/day)



*Fair demand*

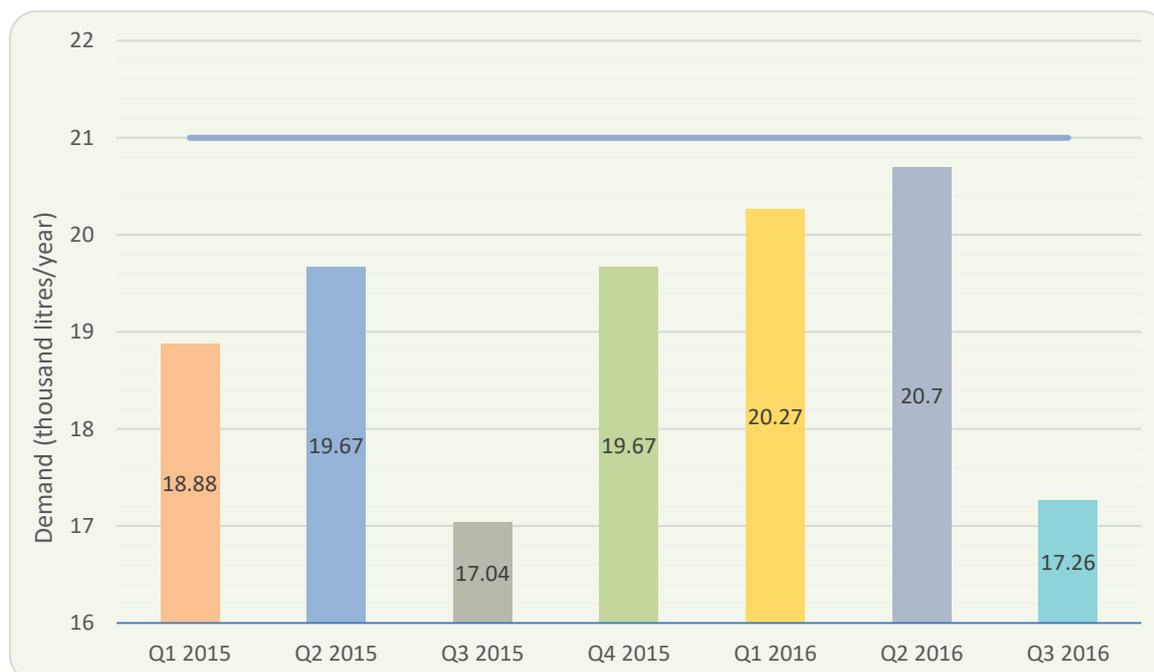
The Irish Water consumption reports show that about 3-4% of all dwellings consume more than 800 litres per day (292,000 litres per year). This percentage includes leak and non-leak dwellings.

The reports show that about 1% of customers with no apparent leakage at their property consume more than 800 litres per dwelling per day. These customers do not have a leak alarm sounding. This trend is consistent throughout 2015 and trended upwards slightly in Q4.

*Child allowance*

Throughout the quarterly reports, child water demand remained less than the free allowance of 21,000 litres per year. It was, however, consistently close to 21,000 litres as highlighted by Figure 0.3. The average annual demand across the analysed quarters was 19,000 litres per year.

Figure 0.3: Annualised child water demand (thousand litres/year)



The analysis also suggested that child water demand is on average less than adult demand.

Irish Water noted in its analysis that at least two full years' metering data would be required to enable it to identify any emerging patterns in quarterly demand. It noted that identifying if there is a consistent pattern in quarterly demand is necessary to understand trends in seasonal demand.

## A.4 CRU Analysis for Joint Oireachtas Committee

### Background

In 2016, charges to domestic customers for water and wastewater services were suspended, and an Expert Commission was established to examine the funding of domestic public water services in Ireland. The Expert Commission provided its report<sup>13</sup> for consideration to a newly formed Joint Committee on the Future Funding of Domestic Water Services.

The Joint Committee was tasked with considering the report of the Expert Commission and then providing recommendations to both Houses of the Oireachtas.

The Joint Committee invited submissions and presentations from different stakeholders<sup>14</sup>, including the CRU, prior to publishing its report<sup>15</sup>.

While relevant information is available on the Oireachtas website, the CRU also published the

<sup>13</sup> The Expert Commission's report is available [here](#).

<sup>14</sup> Further information on submissions and presentations is available on the Oireachtas website [here](#).

<sup>15</sup> The Oireachtas Committee's report is available [here](#).

information<sup>16</sup> which it provided following requests relating to the work of the Joint Committee on the Future Funding of Domestic Water Services. Some of that information related to the domestic water demand and this is discussed further in this section.

## **Method**

The CRU analysis was based on one quarters worth of metering data (for Q2 2016 only) of approximately 380,000 metered dwellings provided by Irish Water. The CRU analysed the data for Standard dwellings only (i.e. dwellings for which occupancy details were registered) and excluded dwellings that do not have registered occupancy details. Therefore these reports are also reliant on the occupancy data being accurate.

The data was then annualised.

The CRU generally included those with leaks and outliers (i.e. very high demand) when carrying out its analysis.

## **CRU analysis**

Some key points are outlined below regarding the analysis provided to the Joint Oireachtas Committee. These points were also outlined within the submissions:

- The analysis indicated an average dwelling demand of 127,000 litres per year. When dwellings with leaks were excluded from the analysis the result was 102,000 litres per year
- The analysis found an average demand of 133 litres per day per occupant (48,500 litres per year). This was calculated by dividing the total volume of water used by the total number of occupants.
- The analysis indicated a number of ways of calculating average per person demand and provided results for each. These ranged from of 109 to 155 litres per day per person (40,000 – 57,000 litres per year). An extract which formed part of a CRU response to a query raised as part of the JOC process is provided in Appendix A.
- The CRU also noted that the first occupant in a dwelling normally uses more water than subsequent persons.
- The CRU did note the analysis completed under the Water Research project (outlined above in Section 2.2 of this paper) which referenced figures for the demand of the ‘first occupant’ and each additional occupant. The former was referenced as 66,000 litres per year and the latter was referenced as 21,000 litres per annum.

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<sup>16</sup> The information provided by the CRU is available [here](#).

Other points regarding CRU analysis:

- The analysis was completed to outline how the normal demand could be determined based on available data. The CRU noted that, if the approach under discussion was to be implemented, then all calculations should be repeated using a complete dataset to ensure robustness.
- The CRU noted that this was an initial analysis, and had not been subject to challenge via consultation or discussion with all relevant stakeholders. The CRU stated that other options and alternative methodology could emerge through any consultation process.

## A.5 CSO Publication

### Background

The Central Statistics Office (CSO) is Ireland's national statistical office. Its mandate, under the Statistics Act 1993 is "The collection, compilation, extraction and dissemination for statistical purposes of information relating to economic, social and general activities and conditions in the State".

Irish Water is one of the bodies upon whom the CSO carry out statistical analysis. In April 2017 the CSO released its first analysis on demand of water by domestic customers of Irish Water.<sup>17</sup> The purpose of the study was to analyse on an annual basis domestic water meter readings obtained from Irish Water.

### Method

The CSO analysed domestic water demand using meter readings provided by Irish Water. The analysis was carried out on demand trends throughout 2015.

Irish Water provided monthly files of meter readings to the CSO. The files contained both meter readings and derived demand data. Meter readings that were irregular in the series, e.g. readings lower than previous readings, were excluded. Before excluding any readings, the CSO examined the series of readings for meters where there was a decrease of 100 cubic metres or more between two readings. The higher reading was excluded if it was the irregular reading in the series. Only demand figures for a full month were included in the analysis e.g. a meter that was last read before the end of a data month is excluded for that month.

The CSO converted the readings into monthly demand figures by allocating the difference in two readings proportionately between the dates that the meters were read. Months with partial data have been excluded e.g. if the last reading for a meter was during December, and there were no

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<sup>17</sup> [Central Statistics Office, 2017, Domestic Metered Public Water Consumption](#)

meter readings available yet from the following year, then that month was excluded. The first month's reading for every meter has been excluded as the CSO does not know the period covered by that reading - for the 2015 release many of these first months occurred in 2014.

## **Findings**

The CSO found that the average dwelling demand 2015 varied from 274 litres per day to 383 litres per day depending on whether domestic water meters recording large demand are included or excluded.

The CSO did not analyse demand data on a per occupant basis.

Other findings from the CSO analysis are as follows:

- Around 69% of total water demand by domestic metered customers in 2015 was accounted for by 96.6% of customers.
- At a higher threshold of 10 cubic metres or 10,000 litres per meter per day, 88% of total water demand was accounted for by 99.7% of customers. This left the remaining 0.3% of customers accounting for 12% of total water demand.
- The median is a less-sensitive measure of daily meter demand and it varied from 245 litres per meter per day (89,000 litres per year) at the one cubic metre threshold to 252 litres per meter per day (92,000 litres per year) when all data for 2015 were included.
- In both years 2014 and 2015 the median demand was 246 litres per meter per day (90,000 litres per year) while there was a small increase in mean demand from 381 in 2014 to 383 litres per meter per day (139,000 – 140,000 litres per year) in 2015.