

# Water Charges

## Equity, Efficiency, Sustainability

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*Think-tank for Action on Social Change*

*Independent research, challenging inequality and promoting a flourishing society*

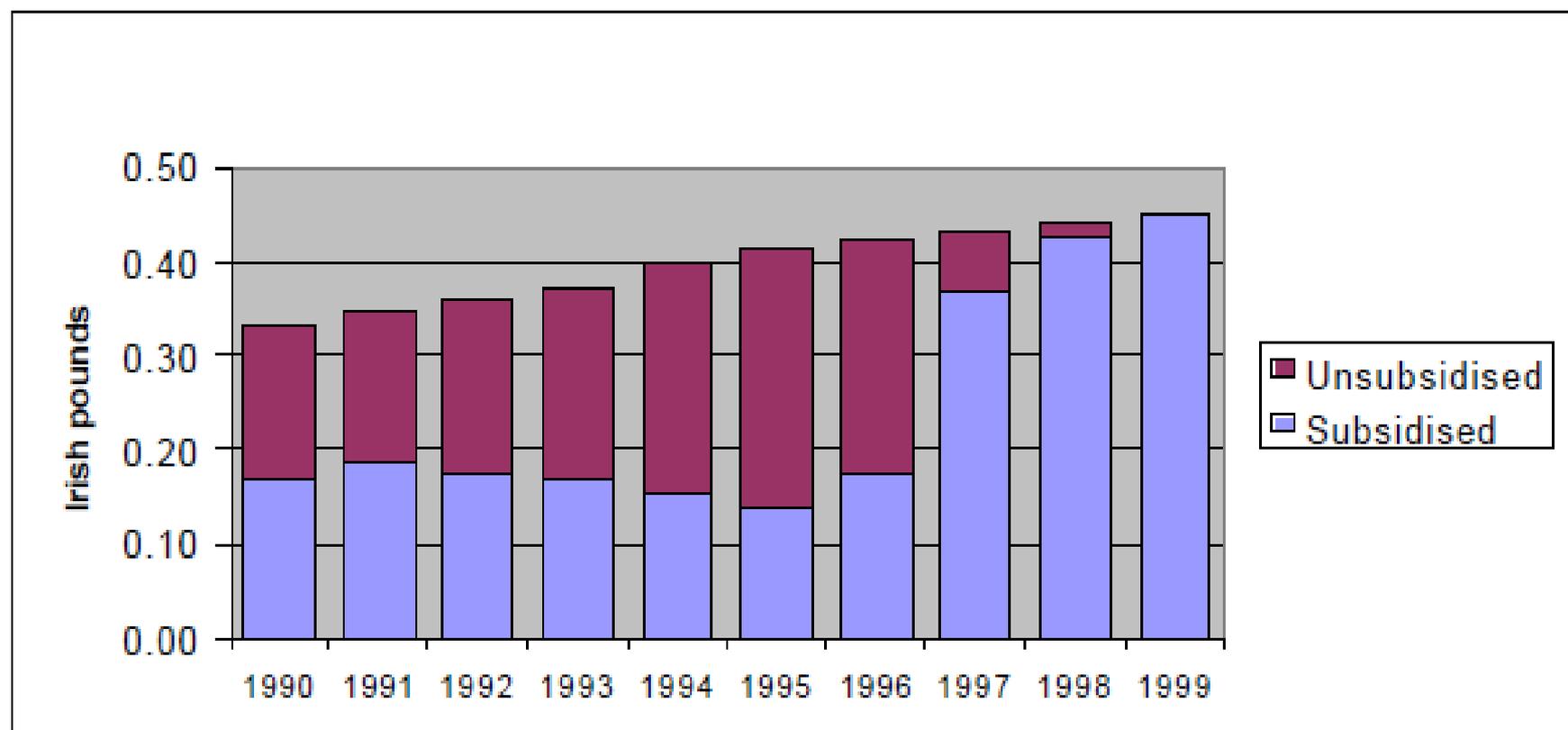
# Cost of water

- Walker Review (2009) on the cost of installation:
  - Cost of internal installation ranged from €125 to €454
  - Cost of external installation ranged from €346 to €556
  - With approx. 1.5 million households to be metered, the cost of installation ranges anywhere from under €190 million to over €830 million depending on the type of installation
- Cost of water and wastewater services in 2010:
  - OPEX = €715 million
  - CAPEX = €500 million+ (Central Government gave Local Authorities between €529 million and €544 million annually for CAPEX between 2007 and 2009)
- Current annual costs exceed €1.2 billion and to this we can add the cost of installation divided by the average service life of the meters
- Economies of scale and will reduce this figure but full cost recovery by Irish Water is likely to require revenue of around €1.1 billion

# Abolition of Water Charges

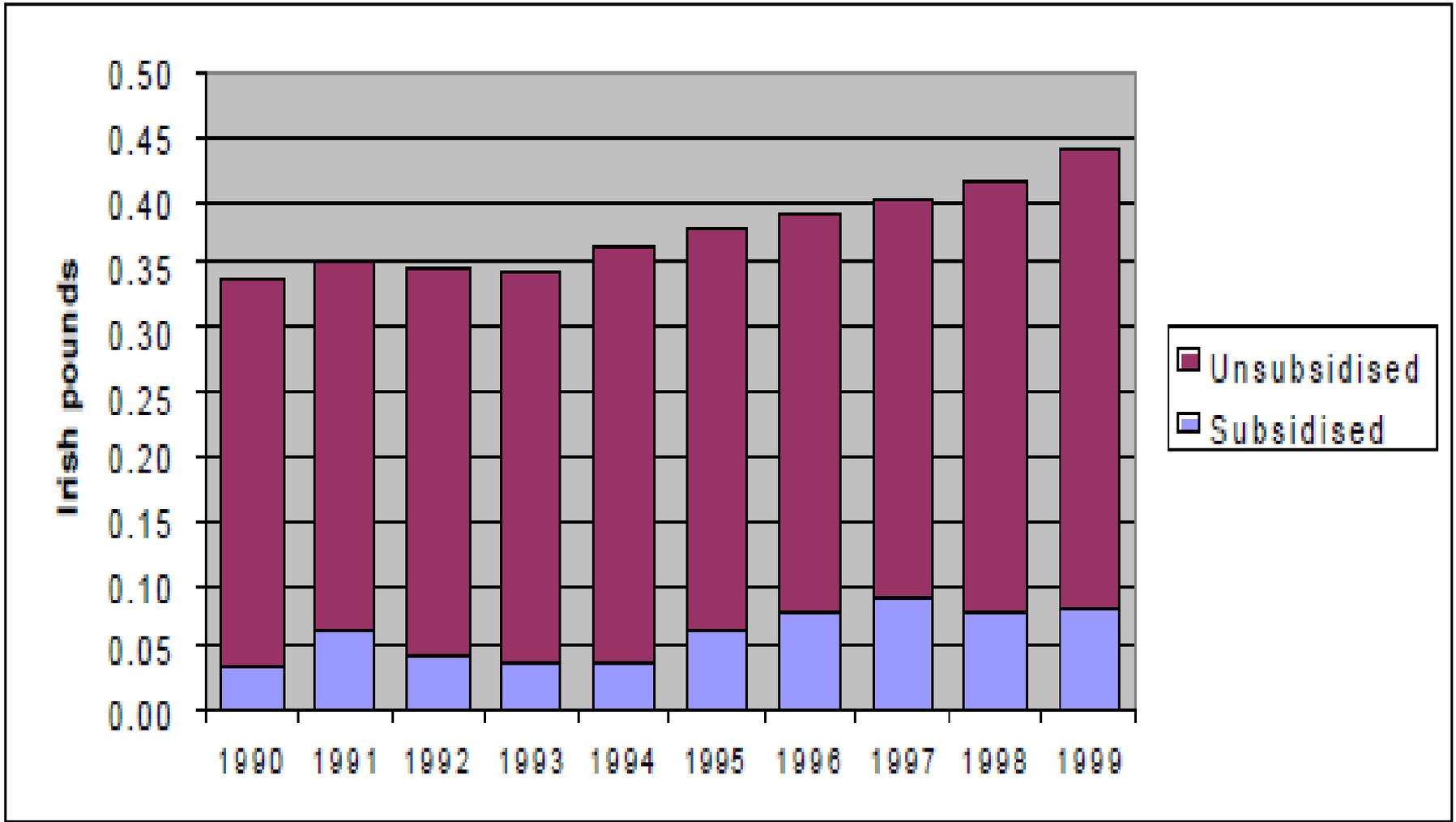
- Rationale was that they were unequally applied - some householders escaped water charges completely
- Environmental groups opposed the abolition of charges and questioned the equity of funding water through general taxation instead of polluter pays.
- No economic or environmental rationale given for the abolition of water charges.
- As commercial properties were the only ones to pay water charges in most areas during this period - they were effectively subsidising the residential sector.

Chart 1: Current cost and subsidy per cubic meter of water consumed by the domestic sector (estimates)



1 Irish Pound = \$US 1.4259 in 1998

Chart 2: Current cost and subsidy per cubic meter consumed by the non-domestic sector (estimates)



# Full supply costs

- Full supply or financial costs:
  - Operation and maintenance costs, associated with daily running of the water supply system, such as electricity for pumping, labour and repair costs;
  - Capital costs, covering both capital for renewal investment of existing infrastructure and new capital investment costs;
  - In addition, there is the cost of servicing debt

# Full cost of water

- Full cost of water =

Full supply costs + economic costs + environmental externalities + administrative and governance costs

- Economic externalities:
  - Costs to producers and consumers (upstream and downstream)
- Environmental externalities:
  - Costs to public health and ecosystems
- Administrative and governance costs:
  - Regulating the service, institutional capacity building, cost of implementing and devising policy etc

# Cost Recovery

- Informed by the polluter pays principle
- Options:
  - Full Cost Recovery (FCR) through tariffs
  - or
  - Sustainable Cost Recovery (SCR)
- If SCR – at what level should cost recovery occur e.g. x% of full cost?
- SCR: Combining up to three sources of revenue
  - Tariffs – or other charges linked with water use
    - Can apply to domestic and/or commercial users
  - Taxes – i.e. subsidies from national or local governments
  - Transfers - donors and charities
- Different revenue sources generate different incentives

# Reconciling Policy Objectives

# Trade-offs between multiple objectives

- Water policies pursue multiple objectives
    - These objectives can be structured around four ‘sustainability dimensions’ (Massarutto, 2007)
1. Economic efficiency
  2. Environmental sustainability
  3. Financial sustainability
  4. Social concerns

# Objective 1:

## Economic efficiency

- **Goal:**
  - Water is allocated to the most beneficial uses
- Allocation of resources to uses of highest value to economy
  - Compare costs with value
    - Measurement issues
  - Is water a merit good? – if so, this means we want a non-zero allocation for each household
- What is the appropriate role of the regulator?
  - Pricing as the allocation mechanism
- Achieving economic efficiency:
  - Long run marginal cost pricing (economies of scale)
  - Requires metering

# Objective 2:

## Environmental sustainability

- **Goals:**
  - Ecological preservation
  - Minimise waste

Supply side and demand side elements

- Emphasise demand side solutions to water scarcity
  - Encourage water saving
  - Discourage wasteful use
  - Volumetric pricing – polluter pays principle
- Supply side is still important (requires capex)
  - Fixing leaks
  - Efficient distribution
  - Suggests different prices for different regions (different supply costs)

# Objective 3:

## Financial sustainability

- **Goals:**
  - **To appropriately compensate resource inputs**
    - i.e. capital and labour
  - **To minimise lifecycle costs (cost efficiency)**
    - Cost of creating physical capital
    - Operation costs
    - Maintenance costs
- Financial sustainability requires Full Cost Recovery (FCR)
- In addition,
- Technological improvements and productivity gains are a function of continuous investment in physical and human capital
- Best practice for natural monopoly with economies of scale?
  - Marginal cost pricing is inconsistent with financial sustainability
  - Financing the renewal of infrastructures – fixed payments
  - Suggests a dual charging structure (fixed and volumetric components)
- but
  - How do we cope with affordability issues ?

# Objective 4:

## Social concerns

- **Goal:**
  - Equal access to water at affordable prices
- Linking water access to water need
- Equitable sharing of the cost of water resources
- Structuring of tariffs so that lower-income users can have affordable access
- Moving from general taxation to a system of volumetric water charges is regressive and without additional policy measures will increase poverty
- Universal free allowances address 'macro-affordability' issues (indicators related to national averages) but this misses the point completely
  - The real policy concern is the 'micro-affordability' issue (indicators related to particular groups e.g. those on low income)
  - A key indicator is the percentage of disposable income that the poorest income decile ends up paying for water

# Targets and instruments

- The four policy objectives can support each other, but sometimes they also give rise to potential conflicts
- Tinbergen:
  - Targets (objectives)
    - variables the policy maker wishes to influence,
  - Instruments (policy levers)
    - variables the policy maker can control directly.
- Achieving the desired outcome for a certain number of policy targets requires the policy maker to control at least an equal number of policy instruments.

# Dilemmas (1-3)

- Trade-off 1:
  - **Ecological sustainability vs. Social concerns**
    - Environmental ‘user/polluter pays’ volumetric pricing may not provide affordable water for those on low incomes
- Trade-off 2:
  - **Ecological sustainability vs. Financial sustainability**
    - Higher environmental standards will increase the cost of water provision
- Trade-off 3:
  - **Ecological sustainability vs. Economic sustainability**
    - The most efficient ‘high value’ allocation (in terms of financial rate of return) may not be consistent with water saving/preservation

# Dilemmas (4-6)

- Trade-off 4:
  - **Social concerns vs. Economic sustainability**
    - Should priority be given to merit uses (e.g. washing), or to high-value uses (e.g. industrial processes)?
- Trade-off 5:
  - **Social concerns vs. Financial sustainability**
    - Full cost recovery through tariffs may not be consistent with affordability
    - However universally low tariffs for all leads to declining infrastructure and deteriorating services which hurts the poor the most in the long-run
- Trade-off 6:
  - **Financial sustainability vs. Economic sustainability**
    - Water pricing for economic efficiency – **long-term marginal cost (MC)** pricing is the optimum
    - Water pricing from the utilities perspective – **MC pricing is inconsistent with the accumulation of funds for investment** – fixed costs should be paid for by a separate lump sum (annual?)
    - The lump sum could be obtained from general or hypothecated taxation, connection charges, or individualised fees – but none of these will reduce consumption

# The Affordability Question

# The affordability question

- The affordability question should be of central concern when designing the water charging system.
- Consumption charges are regressive and impact disproportionately on the poorest households
- Switching from a funding model based primarily on government subsidies, i.e. general taxation, to a funding model based on user charges will reduce the progressivity of the overall system of taxes and benefits.
- A 'free' universal allocation of water for everyone might sound like equality, but in reality this is inefficient and wasteful, with general taxation subsidising wealthier households who can afford to pay for the water they use
- A small free universal allowance will not address the affordability issue while a large free allowance undermines the other objectives

# What is affordable?

- How can affordability be assessed?
  - By comparing the water bill to the users capacity-to-pay
- How do we measure capacity-to-pay?
  - By looking at disposable income post expenditure on essential services e.g. healthcare/energy
- What are the absolute levels of water affordability for the lower income decile groups?
  - 5% of disposable income?
  - 3% of disposable income?
  - 1% of disposable income?
- A reasonable affordability goal is to ensure the cost of water does not exceed 2% of disposable income for the lowest income decile group

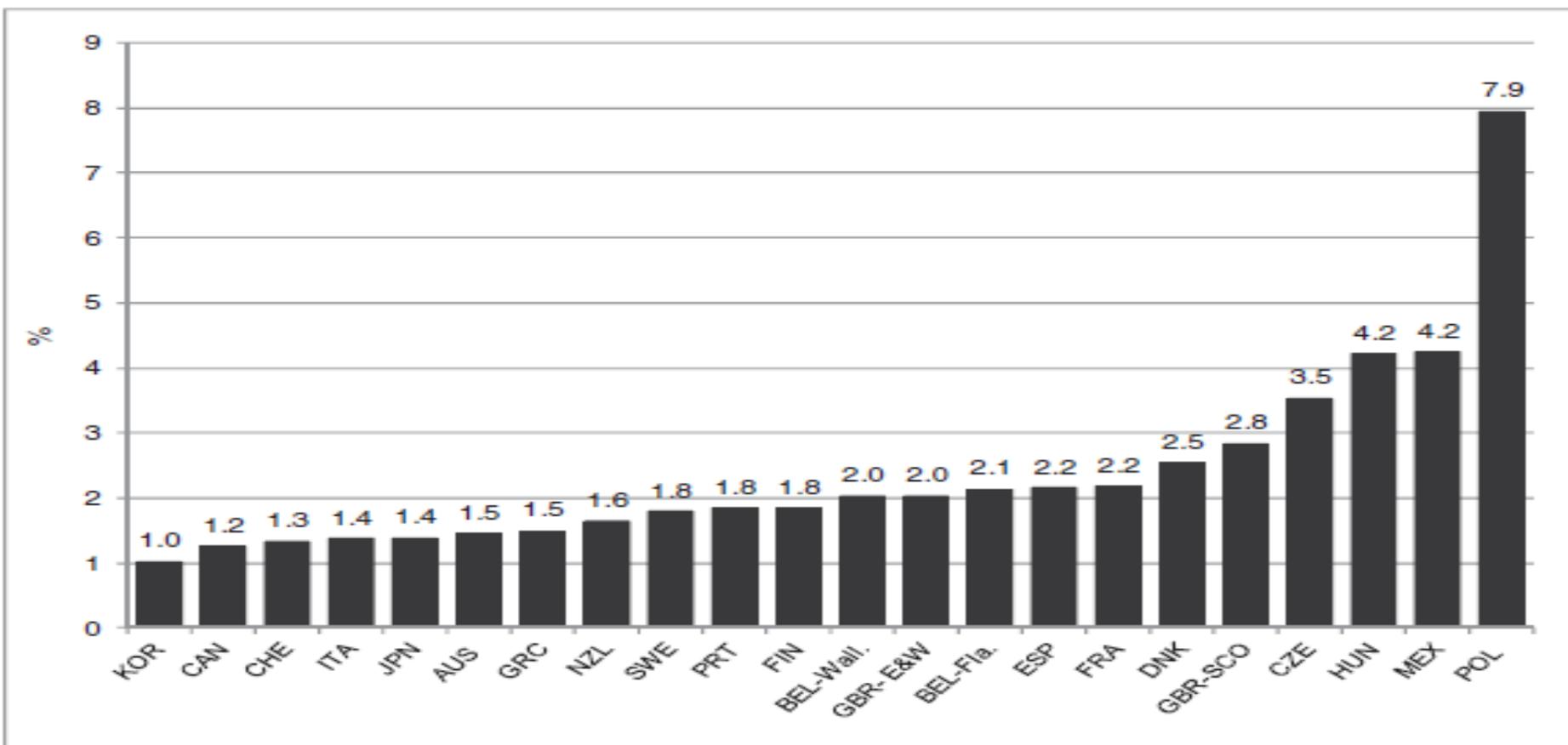
# Nominal Household Income, by decile in 2010

Collins (2012) derived from CSO SILC 2010 (2011)

	Annual disposable income (€)	2% Annual threshold for water charges (€)	1% Annual threshold for water charges (€)
Bottom	8,928	179	89
2 <sup>nd</sup>	14,776	296	148
3 <sup>rd</sup>	20,785	416	208
4 <sup>th</sup>	26,208	524	262
5 <sup>th</sup>	31,650	633	317
6 <sup>th</sup>	37,518	750	375
7 <sup>th</sup>	45,494	910	455
8 <sup>th</sup>	55,169	1,103	552
9 <sup>th</sup>	69,307	1,386	693
10 <sup>th</sup>	123,547	2,471	1,235
<b>Average</b>	<b>43,300</b>	<b>866</b>	<b>433</b>

**Figure 3.2. Water supply and sanitation bills as a share of disposable income of the lowest decile of the OECD population, 2008**

Average income of the lowest decile of the population



Notes:

Data for water tariffs are calculated for a consumption of 15 m<sup>3</sup>/month and expressed in USD adjusted at 2007 PPPs for private consumption.

Data for average income for the lowest decile of the population refer to 2005 and are expressed in USD adjusted for PPPs for private consumption.

Source: For water bills: OECD estimates based on country replies to the OECD 2007-08 Survey or public sources validated by the countries; for NDI: OECD income distribution questionnaire and other OECD databases.

# Tariff design and affordability

- How do we protect vulnerable groups:
  - The key consideration is not average tariff levels
    - Reducing average tariff levels through a universal free allowance actually reduces the scope for affordability measures for lower income groups
- Key questions:
  - What are the redistributive/affordability criteria?
  - What are the best non-tariff instruments?
    - Income support
    - or
    - Subsidised payments
  - What are the subsidisation criteria?
    - Household income?
    - Geographic location?
    - Other category? e.g. unemployed or over 65
  - Is cross-subsidisation a possibility
    - Higher tariffs for better off user groups
    - Politically and administratively difficult

**Table 6. Measures to make drinking water more affordable for domestic users**

	Large subsidies <sup>a</sup>	Reduced VAT <sup>b</sup>	Reduced WWT <sup>c</sup>	Progressive tariff <sup>d</sup>	Social tariff <sup>e</sup>	Targeted assistance <sup>f</sup>	No dis-connection <sup>g</sup>	Free block <sup>h</sup>	Un-metered <sup>i</sup>	No fixed fee <sup>j</sup>	Income support <sup>k</sup>
Australia				Y*	Y				Y		Y
Austria					Y		Y			Y	Y
Belgium		Y	Y	Y	Y	Y	Y	Y			Y
Canada	Y								Y		Y
Czech Rep.	Y	Y					Y			Y	Y
Denmark							Y		Y		Y
Finland						Y					Y
France		Y		Y/N <sup>l</sup>		Y	Y				Y
Germany		Y					Y				Y
Greece	Y			Y	Y						Y
Hungary	Y				Y	Y				Y	Y
Iceland							Y		Y		Y
Ireland	Y						Y	Y	Y	Y	Y
Italy	Y	Y		Y	Y						Y
Japan		Y	Y	Y							Y
Korea				Y			Y			Y/N <sup>l</sup>	Y
Luxembourg				Y	Y	Y	Y				Y
Mexico	Y			Y	Y	Y	Y		Y		Y
Netherlands		Y	Y								Y
N. Zealand									Y		Y
Norway							Y		Y		Y
Poland	Y									Y	Y
Portugal	Y	Y		Y	Y						Y
Slovak Rep.	Y										Y
Spain	Y	Y		Y	Y						Y
Sweden							Y				Y
Switzerland	Y	Y					Y				Y
Turkey	Y			Y							Y
UK <sup>m</sup>		Y			Y	Y	Y		Y		Y
US				Y/N <sup>l</sup>	Y	Y					Y

\* Y: yes; N: no.

a) Subsidies for water supply and/or sanitation over 30% of service cost (including investment).

b) VAT on water below normal rate.

c) Reduced waste water tax or other water charges for the poor (in many cases the WWT for households is flat rate and indirectly linked to property size or value; see Table 5).

d) Progressive water tariff in general use.

e) Social water tariff (reduced price for certain groups of users).

f) Targeted assistance, i.e. grants or forgiveness of arrears for water provided to poor people.

g) No disconnection of water supply of poor people with arrears for water or for municipal tax.

h) Provision of a first block at zero price for poor people or all people.

i) Provision of water to individual dwellings is unmetered in most cases (flat rate tariff for households).

j) Only proportional fee.

k) Income support for poor people.

l) Yes/No: used but not in most cases.

m) England and Wales only. For Northern Ireland, same as Ireland.

Source: Water Academy, "Solidarity for Drinking Water" ([www.academie-eau.org](http://www.academie-eau.org)). L'Harmattan, Paris, 2003; Eureau, 2004.

# Paying for water

# Potential revenue sources from domestic users

## 1. Connection fees

- Paying for installation

## 2. Recurrent fixed charge (flat fees)

- Uniform across customers, or
- Differentiated:
  - i.e. linked to customer characteristics (hedonic system)

## 3. Volumetric charge

1. (Volumetric rate) X (volume of water consumed)
  - Requires a metering system in place
  - Can also be uniform or differentiated

# Potential revenue structures

- Flat rates in a non-metered environment
  - Uniform rates or differentiated rates
- Volumetric rates in a metered environment
  - Can be uniform or differentiated
  - Possibly supplemented by a recurrent fixed charge
  - A supplementary fixed charge can itself be uniform or differentiated and may even be negative
    - A negative fixed charge effectively generates a free allowance under the volumetric system
- Block tariffs in a metered environment
  - Volumetric charges or flat rates – (uniform or differentiated)
  - Charge/rate increases or decreases for each block

# Examples of structures of pricing within the OECD

- Fixed cost + volume based
  - e.g. Poland, Turkey, Belgium, Iceland, Sweden, Switzerland, Netherlands
- Fixed cost + volume (increasing blocks)
  - e.g. Portugal
- Volume based
  - e.g. Spain, Denmark, Luxemburg

# Comparison of prices in OECD countries (2007/2008)

- Representative household consuming 15m<sup>3</sup> per month
  - Includes relevant volumetric charge and recurrent fixed charge transformed into volumetric rate – also includes indirect taxes levied on the bill
- 22 countries
  - Median equivalent = €1.66 or £1.41 per m<sup>3</sup>
    - Equivalent to €299 per annum
  - Cheapest European – **Portugal** = €0.90 or £0.77 per m<sup>3</sup>
  - Dearest European – **Denmark** = €4.89 or £4.17 per m<sup>3</sup>
  - GBR – **Scotland** (2<sup>nd</sup> dearest) = €4.17 or £3.56 per m<sup>3</sup>
  - GBR – **England/Wales** (6<sup>th</sup> dearest) = €2.79 or £2.38 per m<sup>3</sup>

# Estimating water bills

- While water service provision currently costs around €1.2 billion a year it is envisaged that efficiency gains under the Irish Water model would reduce these costs by at least €100 million per annum.
- Fitzgerald and Morgenroth (2012) note that the company sector pays about €230 million in water charges and envisage revenue from company charges being raised to €350 million
- This leaves €750 million to be paid for from a combination of government subsidies (in the form of water credits for households) and domestic charges.
- On the basis of circa 1.5 million households a zero subsidy model would amount to an average charge in the region of €500 per household.
- The average annual bill in 2013/14 in the United Kingdom is estimated at €456 (Ofwat, 2013)

# Water affordability based on 2010 incomes and 2% threshold

Decile	Water charge bill (€)	2% Annual threshold for water charges (€)	Required subsidy based on 2% threshold (€)	1% Annual threshold for water charges (€)	Required subsidy based on 1% (€)
Bottom	500	179	321	89	411
2 <sup>nd</sup>	500	296	204	148	352
3 <sup>rd</sup>	500	416	84	208	292
4 <sup>th</sup>	500	524	0	262	238
5 <sup>th</sup>	500	633	0	317	183
6 <sup>th</sup>	500	750	0	375	125
7 <sup>th</sup>	500	910	0	455	45
8 <sup>th</sup>	500	1,103	0	552	0
9 <sup>th</sup>	500	1,386	0	693	0
10 <sup>th</sup>	500	2,471	0	1,235	0

# Comparing affordability measures

# Comparison of water charging models

Model	Admin. complexity	Subsidises	Size of subsidy	Cost borne by	Socio-environment benefits	Cost to exchequer
Universal Free Allowance	Low	All	Fixed	General taxation	Low	3 (Highest)
Direct cash transfer	Medium to low	Lower income households	Variable (can be fixed)	General taxation	High (but public health risks)	2
Differentiated water allowances (water credits)	Medium to high	Lower income households	Variable	General taxation	Medium	1
Cross-subsidisation	High	Lower income households	Variable (sometimes negative)	Higher income users	Medium to high	0 (Lowest)

# Comparing costs (1)

## Universal free allowance

- OECD's representative household uses  $180\text{m}^3$  per year meaning households will have to pay an average of €2.78 per  $\text{m}^3$  to attain a yield of €750 million
- A universal free allowance of  $100\text{m}^3$  per household per year would cost in the region of €278 per household and cost a total of **€417 million**
- A universal free allowance of €100 per household would cost around €150 million
- A universal free allowance of €60 per household would cost around €90 million
  - This amounts to approximately 22 free cubic metres per household per year
- **To avoid breaching the 2% threshold** for the bottom income decile the universal free allowance would need to be €321 per household – **a total cost of €481.5 million**

# Comparing costs (2)

## Differentiated Water Allowances (DWAs)

- A system of income related water allowances (**water credits**) would address the affordability issue at a much lower cost to the exchequer and would be progressive
- In order to avoid breaching the 2% target the required subsidy would have to average 64.2% of the charge for the bottom decile; 40.8% for the 2<sup>nd</sup> decile and 16.8% for the 3<sup>rd</sup> decile.
- The required subsidy averaged over the population would be in the order of 12.18% or **€91.4 million**
- The contribution from domestic users would therefore be in the order of €658.6 million

# Alternatives to DWAs (water credits)

- **Universal free allowance**
  - Extremely inefficient and wasteful means of dealing with the affordability issue; No obvious advantages
- **Cash transfers**
  - Most economically efficient mechanism. However, the social health benefit of water uses exceeds the private health benefit suggesting a sub-optimal consumption of water by low income groups – potential public health risks
- **Cross subsidisation**
  - The most progressive option but likely to be administratively complex; might be socially divisive
- **Social tariffs**
  - What would be the criteria for deciding which groups qualify? e.g. the unemployed, the disabled, pensioners, low-income groups
  - Important to clarify what the purpose of the affordability measure actually is – it is to ensure water charges do not increase poverty and do not reduce the progressivity of the tax and welfare system
  - Income (and net wealth) are the only objective criteria
  - Exception might be appropriate for certain groups – individuals with increased water requirements – e.g. related to a disability

# How it would work (1)

- It is suggested that water bills (volumetric and fixed component) come due every 3 months.
- Before paying their first bill householders would be given the option to 'opt-in' for water credits by declaring the household's annual income (self-assessment and random audit) to the responsible Department
  - The stated annual income would have to be updated each year for all households that are 'opting-in'
  - Households could opt-out whenever they wished but would no longer qualify for water credits
- Based on the household's income (and perhaps other factors such as household size) the household would be assigned a number of water credits for each quarter – the State through the responsible Department would contribute to the household's water bill up to the value of the household's water credits for that quarter
- The household would be required to pay the remaining charge on the bill

# How it would work (2)

1. After taking the meter reading Irish Water sends bills electronically to the responsible Department. The bill would contain a code number representing the household.
2. The Department would match the code number with the householder details including the value of water credits.
3. If relevant the Department pays a portion of the bill up to the used value of the household's water credits
4. The Department sends the bill to the household outlining how the bill was calculated including the payments made to Irish water by the Department (the letter would also include an 'opt-in' form
5. The household pays the remaining amount owed to Irish Water

# Other notes...

- Tapering the credits is preferable to using a banded system as this reduces potential disincentives to work
- A universal free allowance per household will disproportionately benefit smaller households and persons with one or more home e.g. holiday homes
- Annual fixed charges could have an unintended consequence of multiple charges for persons moving home multiple times...it may be preferable to structure the fixed component so it is paid in four quarterly installments

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