Waste Not, Want Not

Sustainable Water Tariffs

A report by Paul Herrington for WWF-UK

Waste Not, Want Not?
Water Tariffs for Sustainability

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Report to WWF-UK

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Executive Summary

Currently less than one-third of households in England and Wales are metered and thus face a financial penalty for wasteful use of water services (water supply, and sewerage and sewage treatment). The result is ever-increasing pressure on the environment – in particular, on freshwater ecosystems. Recent household demand forecasts, together with the slow spread of domestic metering, declining household size and substantial population growth ensure these pressures will grow.

The slow growth of volumetric charging is due to first water companies and then the government shying away from compulsory metering. This was because low-income households of above average size would be hit hard financially by such an enforced switch. Fresh thinking on tariff structures for water is therefore needed. There are two requirements: for *sustainability*, metered tariff structures which encourage conservation and penalise wasteful use; and, in order to make metering acceptable, *social* tariffs which reduce the financial burden on lower-income households.

We conclude that the introduction of metering accompanied by a single, inclusive, and adaptable conservation-oriented tariff is necessary. The tariff structure should explicitly differentiate between basic and other water use in the home.

Options for sustainable tariffs

An appropriate tariff structure should have a number of characteristics. For *sustainability*, full cost recovery should be sought since subsidies send users the wrong signals. Most importantly, however, pricing should include a significant metered element, in order that the marginal environmental and economic costs of the provision of additional supplies are reflected in the price. This notion can be extended to prices for peak and drought demands, perhaps utilising ‘Smart’ meters.

Social tariffs come in two variants: passport tariffs and certain increasing block tariffs (IBTs). The first category includes any scheme which reduces charges for one or more carefully defined household groups constituting or dominated by lower-income and/or other vulnerable households. Eligibility is normally established by one or more household characteristics, e.g. already being in receipt of one or more of a specified list of government benefits, or a sub-set of such a group (e.g. those with dependent children).

The second variant refers to any general metered tariff for households which, through its structure and the tariff rates levied, reduces significantly the water charge burdens of financially or otherwise disadvantaged customers. The structure which most obviously fits this bill is that of an increasing block tariff in which a first ‘block’ of ‘basic’ water use is provided at a lower price than that of a further block or blocks representing higher rates of water use. The size of the ‘basic’ block should be dependent upon household size, either precisely or to some limited degree, so that larger families are not disadvantaged.

Evidence of the impacts of sustainable tariffs on demand

There is now significant evidence for the effects of metering and alternative tariff structures on demand:

- The more robust UK studies over 1970-1993 all revealed that the impact of introducing meters was a reduction of 10-15% in demand (on the Continent the range was 9-17%). Peak demand and ratio effects were, as expected, significantly larger.
- Evidence on the impact of the introduction of new tariff structures for already metered customers is mostly of necessity from abroad (Barcelona, the US): switching from non-IBT to IBT tariffs has been associated with average demand reductions of 10-14%, although sometimes other changes were also occurring. Introducing seasonal tariffs (six studies) generated various peak ratio reductions of 8-14% (average: 12%).

Existing sustainable tariffs

A number of sustainability tariffs now exist in developed countries. The current Mid-Kent Water 200-house seasonal tariff trial is the only UK example apart from limited IBT and seasonal tariff trials over 1988-93. Abroad, IBTs are standard in Mediterranean states, as well as many Far Eastern countries, and also found in Belgium, Australia, and north America. Seasonal tariffs are rare outside the US.

Four passport-type social tariffs operate in the UK: large-user tariffs in Anglian and Mid-Kent Water – high standing charge/low unit rate – introduced in the 1990s, before Ofwat had the power to reject company tariffs; the national Vulnerable Groups Regulations, capping the metered bills of a narrow range of larger lower-income metered households at their company average; and Wessex's Ofwat-approved 2007 *Assist* tariff: a scale of low fixed annual payments directed at can't-pay customers (rather than won't-pay)who are taking advice from a debt advice agency and receiving at least one means-tested government benefit.

In 2006 Anglian Water's proposed *Passport* tariff for unmetered as well as metered customers, granting a 25% water bill reduction to the 17% of its customers on at least one government benefit, was rejected by Ofwat, due to the knock-on increases on the bills of its other customers. This raises important regulatory issues.

Distributional impacts of sustainable tariffs

A key issue for sustainability tariffs is their distributional impact, in particular the impact on low income households. Four UK distributional desk studies of different tariffs (who gains, who loses?) have used well-established Domestic Consumption Monitors to model populations of households switching from unmeasured or orthodox metered tariffs to a range of other tariffs.

- Switching unmeasured households to a standard metered tariff gave large gains to the lower income deciles, because of the prevalence of 1- and 2-person pensioner households. The main losers were invariably, and as expected, larger households.
- Modelling switches to traditional fixed-block IBTs produced similar results: free first blocks force up other block prices and thus even higher losses for larger low-income households.
- Two 'runs' simulated switches to amended-IBTs with free but occupancy-determined first blocks. The result for a group switching from an orthodox metered tariff was as expected: a generally positive financial outcome for *all* low-income households and one superior to those generated by switches to any other of a range of social tariffs.
- For a group switching to non-standard metered tariffs – including IBTs - directly from unmeasured (rateable value-based) charging, however, the results were different. Moves into these measured tariffs produced mixed results with sizeable losers *and* gainers among lower-income households, although the latter outweighed the former. This implied some unmeasured low-income households with surprisingly high consumption. Three reasons were suggested: high discretionary (non-'basic') water use, medical needs and high basic water use, the latter most likely due to inefficient appliances (e.g., WCs, washing machines). The switch to measured

charging might well itself 'deal' with the first of these, but the other two possibilities would need, respectively, special arrangements and demand-management programmes targeted at lower income households.

The regulatory context

Any changes in water charging in England and Wales would have to take place within the regulatory and legislative context. Subtle legislative changes over recent years appear at times to have been pulling in different directions. One of the main results is that while promotion of the 'consumer objective' now figures more prominently in the economic regulator's and the Secretary of State's legislative duties, Ofwat's devotion to the no-undue- discrimination-or-undue-preference-in-water-charges clause remains virtually undiminished. As a result, the current framework creates difficulties for the widespread introduction of sustainability tariffs.

Conclusions

There is a pressing need in the UK for tariff structures that encourage sustainability in the water sector and thus for the environment, while simultaneously addressing affordability. It is the latter issue, affordability, that is key, for only by confronting it can more rapid household metering – including compulsory metering where necessary – become acceptable. That, in turn, is necessary in order to avoid a new wave of economically and environmentally costly reservoirs and other resource developments.

The candidate tariffs for addressing water poverty, and thus sustainability, are clear: *passport*-type tariffs and *amended-IBTs*. Passport tariffs have two significant advantages.

- In principle, they cover *all* households, metered or unmetered;
- They address affordability *directly*, reducing the water bills of predetermined customer groups by a known amount or proportion and thus *not* relying on consumers' necessarily uncertain behavioural reactions.

Amended-IBTs present a more diffuse set of advantages:

- They are 'inclusive' (one size fits all) and thus would probably command more customer support (some evidence is available);
- They present a sustainability message which is clear, appealing and persuasive;
- There is considerable evidence of their working satisfactorily abroad, even where information on household occupancy is imperfect;
- They have been shown in desk studies to have clear advantages for lower-income households already on a standard metering tariff and potential advantages for those on fixed charges, so long as companies recognise the medical needs issue and address through demand-management programmes the likely problem of high basic water use because of inefficient appliances;
- The structure is adaptable, in both price and quantity dimensions, as circumstances change.
- In addition, a limited passport tariff for those not completely catered for on an amended-IBT could always be appended.

Overall, we conclude that a single, inclusive, and adaptable conservation-oriented tariff is the best way forward. This should incorporate explicitly the differences between basic, discretionary and wasteful water use in the home – the first a 'social good' and latter two a 'private good'. Only this way can we obtain a water tariff structure which is fit for purpose: to encourage sustainability while addressing the issue of affordability for all

1. Project Background

1.1 WWF-UK

WWF, one of the world's leading conservation organisations, was founded in 1961 and its main mission today is to stop the degradation of the planet's natural environment, and to build a future in which humans live in harmony with nature, by:

- Conserving the world's biological diversity;
- Ensuring that the use of renewable natural resources is sustainable;
- Reducing pollution and wasteful consumption.

WWF, as part of the Environment and Development community, sees the next 10 years as crucial as providing a critical window of opportunity to address the causes of human-induced climate change – emissions of carbon dioxide (CO_2) and other greenhouse gases. To avoid the most serious impacts of climate change, the rise in the global average temperature must be kept to less than 2°C above pre-industrial levels – the critical 'tipping point' for people, wildlife and habitats.

We are over-consuming the planet's resources at an ever-increasing rate. Indeed, if everyone lived the way we do in the UK, we would need three planets to support us. In the UK, WWF works to ensure Government and the business community show leadership in order to change the way we produce and use energy in industry and in our homes, so that we live within the Earth's ecological and natural resource limits. This philosophy is known as *One Planet Living*(R)[1].

This report follows on from previous work by WWF-UK, aimed at Government and industry on important policy agendas, such as climate change mitigation and adaptation, sustainable homes and livelihoods, sustainable water management and social equity issues. It also provides a firm basis for WWF-UK's ongoing engagement with the energy supply industry, and provides a powerful complement to WWF's One Planet Living campaign.

See wwf.org.uk/oneplanet/ophome for further details.

1.2 PROJECT TEAM AND ACKNOWLEDGEMENTS

Centre For Sustainable Energy
Joshua Thumim (lead author and analyst), Vicki White (statistical analysis), Zoe Redgrove (modelling support), and Simon Roberts (strategic input).

The project team is also indebted to Angela Druckman, Research Fellow on the RESOLVE programme at the University of Surrey (see www.surrey.ac.uk/ces) for the initial analysis and data extraction of the Expenditure and Food Survey which underpins this study.

CSE is an independent charity which advances sustainable energy policy and practice through direct advice to the public, education and training initiatives, technical consultancy and policy analysis. CSE seeks energy solutions that engage people and communities to meet real needs for both environmentally sound and affordable energy services. For more details see www.cse.org.uk.

[1] *One Planet Living*(R) is a joint initiative of BioRegional and WWF based on 10 guiding principles of sustainability. The vision of *One Planet Living* is a world in which people everywhere can lead happy, healthy lives within their fair share of the Earth's resources.

Paul Herrington

Paul Herrington, author of the parallel WWF-UK report on water tariffs for sustainability, has been an independent environmental economist since 1997, specialising in the water sector. From 1964 he worked as an academic economist at Lancaster and Leicester Universities. He has written books, reports and papers about all aspects of water economics, especially demand analysis and forecasting, climate change, water conservation and tariff structure and design.

He was a Tribunal Assessor at the Yorkshire Water Inquiry in 1996 and has advised House of Commons Select Committees on Water Conservation (1996) and the 1999 Ofwat Price Review (2000). Recently he has worked for UKWIR, the Department of the Environment, the Environment Agency and the OECD. He is a member of the Watersave network. Before this he worked extensively for environmental organisations in challenging the naïve extrapolation of water demands, ignorance about consumption and leakage, and thus the need for additional reservoirs in England.

The author acknowledges with gratitude the help of Josh Thumim of CSE, Tom LeQuesne of WWF-UK, Guido Schmidt of WWF-Spain, David Bohanna of Anglian Water, Cosmo Graham of the University of Leicester and Jeremy Liesner, for information and discussions about some of the ideas in this report. The responsibility for the research, conclusions and proposals, however, is solely the author's.

1.3 STRUCTURE OF THIS REPORT

Section 2 describes the urgent environmental need in Britain for metered water tariffs that reward frugal users and penalise wasteful ones, and are at the same time fair to all consumers. After first asking what is meant by tariffs for sustainability and social tariffs, the apparent options available are broached. In section 3 answers to the question of what are the impacts of different tariffs on water demand are discussed for (i) changing price levels, becoming metered and a change of tariff structure, and (ii) both average and peak demands.

Next, examples of sustainability and social tariffs for water in Britain, the rest of Europe and the rest of the developed world are discussed, and then in section 5 the results of relevant distributional issues (who gains, who loses, by how much?), as relating to social tariffs, are noted. The legislative and regulatory context in which new tariffs would have to be introduced is faced, and this is followed by a chapter in which the two main tariff types for introducing more fairness are contrasted and compared. The increasing block tariff, amended to some degree to reflect household occupancy, is proposed for introduction in England and Wales as the structure that can best be used to pursue sustainability objectives and simultaneously enable financially and other vulnerable customers to reduce their water charge burdens.

2. The Key Issues

2.1 THE PRESENT SITUATION

The tariff structures used by United Kingdom suppliers to charge households for energy (gas and electricity) and water services differ greatly. For electricity and gas, households are 100% metered and the utilities either impose a separate standing charge or, as is now more common, roll it into an initial small block of units, thus generating a decreasing block tariff. Such tariffs risk encouraging greater consumption and certainly give the wrong general message, since the average unit cost of energy decreases the more a household consumes.

UK Household Water Metering Today

Table 1 shows that just under a third of households in England and Wales currently have water meters and are charged by volume. This proportion is presently increasing at only 2%-3% per annum, mostly due to optant metering and the metering of all new homes as and when they are built.

Table 1: Proportions of Households Paying for Water Services by Volume

All data refers to 2007	Total Households estimate* (millions)	Public Water Supply proportion of households charged by volume	Sewerage & Sewage Treatment: proportion of households. charged by volume[+]
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England & Wales	23.015	32.7%	32.3%
Scotland	2.312	0.022%	0.010%
Northern Ireland	0.677	0.0%	0.0%
United Kingdom	26.004	28.9%	28.5%

Sources: household numbers taken or interpolated from estimates and projections on websites of Dept. of Communities and Local Government, Welsh Assembly, GRO (Scotland) and NI Government; water data from Ofwat and WIC (Scotland) publications;
*Note*s * connected or unconnected to public supply; [+]paying for *S&ST* by volume of water *taken*

Nearly all other households pay water bills based partly on a standing charge (which is the same for all unmetered households in the company or area) and partly on the rateable value (RV) of the house or flat they live in.[2] These RVs, a leftover from the days of municipal ownership of water services in England and Wales, were last re-assessed in 1973, and in many cases are now a very unsatisfactory indicator of the relative value of a house. Thus over 70% of UK households are currently not subject to *any* financial discipline in deciding on their use of piped water and sewerage services. At the points of use their water is completely free to them; there is no direct incentive at all to avoid wasteful, excessive or unnecessary use, or to become more careful in their everyday use of water.

Household Demand Forecasts in England and Wales

This lack of financial discipline would not matter if the demand for water could be easily and cheaply met, without placing stress on the environment and, in particular, on freshwater ecosystems. But the reality is more nearly the opposite of this. Appendix 1 records the author's search for recent regional and national water demand forecasts, and the discovery of the forecast aggregate growth of household demands, up to 2025-26, of the group of water

[2] Severn Trent Water and South Staffordshire Water do not have a fixed charge for unmetered customers, and in two areas (Hartlepool, part of Anglian Water, and the Northern Area of Sutton & East Surrey Water) a fixed licence fee is paid: every household pays the same amount, irrespective of both ability to pay and the amount of water used.

companies which serve the area of the South East England Regional Assembly (SEERA), a statutory body covering nearly 30% of the population of England and Wales.

These forecasts suggest that total demands on the public water supply in the SEERA area are expected to rise by between 300 and 400 Ml/day (13% to 16%) over the 20 years after 2005-06, depending on the annual rate of new home construction. Household demands are expected to constitute between 63% and 70% of these increases. Rising standards of living and population increases are driving this growth. Against this, there is now more water company interest and activity in demand-management.

But the SEERA report still forecasts a sizeable net increase in household demands, to be met by new resource developments and/or *further* water efficiency savings. The report states that resource developments to 2030 proposed by the water companies in their 2004 water resources plans would yield over 360 Ml/day. These would cover nearly all the demand growth, whatever the rate of new home construction. The report names five new strategic resource developments, which 'may be needed': an Upper Thames reservoir; new reservoirs at Broad Oak, Clay Hill and Havant Thicket; and enlargement of Bewl reservoir.

However, this report will show that such sizeable intervention with new resource developments is probably unnecessary. A much more rapid spread of domestic metering can help to ensure that, instead, environmental protection is accorded the highest priority, by giving each household the financial incentive to buy the most water-efficient appliances and to be more careful in all its other uses of water.

Affordability as a Barrier to More Widespread Domestic Metering

The difference in the way most households currently pay for energy and water in Britain affects the way in which the two sectors will be treated in this report and the associated one on energy. For both sectors the aim has been to research and report on tariff structures which are both fair and affordable and which penalise wasteful, unnecessary and excessive consumption. In water, however, the emphasis is on the need is to devise, design and implement charging schemes which are *affordable for all*. This is because at present, even where the economic and environmental cases for charging by volume are clear-cut, the uni-dimensional volumetric tariffs on offer from most water companies would be likely to result in adverse financial consequences for a significant number of larger low-income households. Hence the continuing resistance to compulsory metering. *The pressing need in water tariffs is therefore to encourage sustainability but in order to do this it is necessary to address affordability.*

2.2 MOVING TOWARDS SUSTAINABILITY

What do we mean by sustainability?

For the first 75 years of the twentieth century the 'predict and provide' approach to the provision of basic utility services held sway in developed countries and thus, through knowledge and technology transfer, infiltrated into most continents. By the late 1970s, however, recognition of the growing economic and environmental costs of this ethos – and thus its clear *unsustainability* – was filtering through to governments and thus to international organisations. In 1987 the UN's World Commission on Environment and Development produced the influential Brundtland Report, concluding that it was in fact possible to create the conditions for, and to actually realise, sustainable development – defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

But how is it possible, in our consumption and other economic activity, to ensure that 'the ability of future generations to meet their own needs' is not compromised?

First, by making an assumption as to what their needs will be. A reasonable start is to plan so that they should be at least as 'well-off' – in economic, environmental and social terms – as is the present generation. And since this broadly-defined 'well-offness' depends very largely on the quantity and quality of capital (both economic and environmental[3]) that a generation has to work with, then sustainable development will in general require that a community's (or a society's, or a country's) stock of capital per head of population should not decline in the future. *In the absence of long-term population decline, sustainability as applied to water services then demands that the per capita stocks of capital involved in their provision should be at least non-declining into the long-term future*. The main types of capital involved are the *manufactured* capital base and *natural* (or environmental) capital.

For the public water services, *manufactured* capital is the sum total of the distribution networks, treatment works, reservoirs, sewerage and sewage treatment systems, etc.; while the *natural* capital category will includes all the relevant stocks of water resources, both groundwater and river flows (and also some lakes), which are used for, or otherwise affected by, a region's or country's water supply and effluent disposal activities.

Both quantitative and qualitative dimensions should be maintained in line with the population to be served, unless reasonably certain future efficiency gains – either in supply (larger quantities of water services supplied per unit of capital utilised[4]) or in demand (lower actual water consumption per unit of water services received[5]) – permit lower growth. Also, manufactured capital tends to wear out – through both use and age – and it therefore needs to be maintained, through periodic renewal, to ensure sustainable output.

From Supply-fix to Demand-management

If supply-fix had characterised much energy and water planning in the pre-Brundtland decades, Brundtland and the consequent 1992 Rio Earth Summit (the UN Conference on Environment and Development) heralded a questioning of demand and thus began to popularise demand-management as a way of partially resolving future supply-demand imbalances or conflicts6.

In principle, demand-management may be pursued through:

- changes in tariff structures and levels
- other economic instruments (taxes, subsidies and tradable permits)
- standards and regulations
- education and information; and
- moral suasion.

Because tariffs are required anyway, to raise the revenues necessary for full cost recovery, charges will have to be in place in some form or other. Additionally, certain tariff structures are capable of helping to manage complex demand patterns. Within the second category environmental taxes may have a similar role to tariff levels as regards their effects on demand, but subsidies will always be competing with other government priorities (as well as often giving consumers misleading messages about the value of a service) and tradable permits may be unsuitable for dealing with basic utility service demands. Standards and regulations are appropriate for appliance-specific energy and water use, but increasingly difficult to apply effectively to the more heterogeneous luxury demands associated with rising real incomes.

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[3] To which should be added, certainly, human capital and possibly social capital as well.
[4] e.g. more capital-efficient water treatment plants.
[5] e.g., even more economical economy washing machines and lower-flush wc's than at present.
[6] The intellectual origins of the incorporation of demand-management into decision-taking are to be found in Least Cost Planning, itself originating in the Office of Conservation at the United States Department of Energy in the mid-1980s. There it was recognised that consumers ultimately demand energy *services* and not energy *per se*, which gave a powerful new perspective on how to resolve what hitherto had been viewed as supply-demand imbalances in energy itself. Up to the 1980s in the UK there had been an almost total preoccupation by government and the water sector, and thus of legislation, planning and research, with water *resources* and water *supply*. Demand-management had been very seriously neglected.

Education and information provision are best regarded as complements to the other demand-management means, while 'serious' moral suasion is best reserved for crisis or pre-crisis periods.

2.3 TARIFFS FOR SUSTAINABILITY

In section 2.2 two categories of capital were highlighted as being particularly relevant to water utilities' activities: the fabricated asset base (manufactured capital) and the environmental asset base (natural capital). Maintaining these capital stocks at their desired sustainable levels over time (both quantitative and qualitative) uses economic resources, and all economic resources of course have a price. This is as true for restoring rivers which have been over-abstracted in the past (thus helping to maintain the quality of the country's 'environmental capital') as it is for, say, extending a water supply treatment works for a growing population in part of south-east England (thus appropriately augmenting the manufactured capital stock in that area). Water utilities therefore have all sorts of capital costs to meet, and these can be and are put on an annual basis[7] for cost-recovery purposes.

To these annual capital costs should be added all the 'operating' costs borne when a utility service is being provided. These cover raw materials, labour, bought-in services, etc., plus any other social costs incurred in the utility's 'production' activities. The result is a stream, into the future, of the annual costs (economic, environmental and other) generated by the particular demand (and therefore output) profile that the utility has planned for.

We can now state the first 'rule' about water charges for sustainability; it is that in general *all* the costs incurred by the water utility should be met by customers through charges. This principle is known as *Full Cost Recovery*. Subsidies are generally to be resisted, because they both give rise to a misleading signal for consumers about the worth of what is being provided and have been shown to lead, consequently, to the over-building of water systems, the waste of public funds and sub-optimal water use practices (OECD, 1987).

The second working rule for sustainability is that household tariff structures which rely on a fixed annual charge are generally inefficient and encourage waste. They should have only a very minor permanent role[8] in a country which takes its environmental protection seriously. The social benefits from more domestic metering stretch from the enduring cost savings, both operating and capital, that result from lower demands (see section 2, below), out to the benefits enjoyed by the water utility in the form of easier (and therefore cheaper) leakage detection and the improved demand forecasting and planning which is generated by knowing which customer groups are using how much water.

Third, the 'ideal' benchmark price of water for metered consumers is the *marginal cost* of its provision (that is, the extra cost of one more unit), because there is then in place a system whereby consumers can be relied upon to make decisions about consumption which accord with the social interest. Thus if the 'true' marginal cost of producing another unit (e.g. a cubic metre) of water is £3, and that sum includes any scarcity and environmental value of raw water, and also the appropriate share of the utility's manufactured capital costs, then £3/unit is the correct price signal to present to the customer (Pezzey and Mill, 1998; OECD, 1987).

[7] The expenditures incurred in maintaining (and adding) to a utility's manufactured capital stock are lumpy, so appropriately annuitised costs will have to be calculated with the aid of discounting, thus smoothing the flow. If some environmental costs (e.g. those arising from groundwater damage or depletion) cannot be valued, relevant environmental standards will have to be agreed in advance, and thus the economic costs of meeting those standards can be identified. An indirect valuation is thereby generated. Any other social costs arising from capital maintenance (and expansion) should also be included.

[8] Social cost-benefit analyses might indicate a continuing role for flat-rate charges in (i) some difficult (i.e. expensive)-to-meter houses and flats, (ii) apartments without gardens where, through efficient appliance installation, there is known to be little or no scope for wasting water and (iii) areas where water for abstraction and effluent disposal is easily available.

Tariff structures which incorporate such *marginal cost pricing* will usually come nearest to ensuring sustainability of water resources in both an economic and an environmental sense. However, in most mature economies, if a household were to pay that unit price for *all* of its consumption, the utility would probably make a very substantial (and entirely unwarranted) financial surplus. This should be unacceptable whether or not the utility is a private profit-seeking company. What it suggests is that it would often be both necessary and desirable to charge a much lower price for a household's 'basic' use of water, with one or more other succeeding 'blocks' then charged at successively higher rates. We shall return to this idea of *increasing block tariffs* shortly.

A fourth tariff rule is relevant if it is believed that it is peak demand reductions (e.g. hour, day, summer season) which are crucial for environmental sustainability; it therefore seeks to confront consumers with the true extra costs of (say) providing water supplies in the summer months (when rivers threaten to run at their lowest, thus increasing environmental costs) by incorporating them into a special summer tariff. 'Smart' – that is, more sophisticated – metering would normally be required to administer such a tariff system. Smart meters associated with Smart tariffs can signal economic, environmental and social costs more precisely, and would therefore generate the largest benefits in the south-east, during peak hours and seasons and during droughts; they also give more information to customers, companies and regulators (Baker, 2006).

Finally, it is possible to reverse the processes described above, by deciding upon a targeted stage-by-stage reduction in the public water supply at the outset and then fixing the price which is estimated to be necessary to start the process of reduction. This may be appropriate if a gradual approach to sustainability has been adopted, and if at the outset little is known or can be predicted about consumers' demand responses to price increases.

2.4 SOCIAL TARIFFS

In the context of basic utility services for households (such as those providing energy or water), what precisely is meant by a 'social tariff'? In the meagre literature available covering this issue, two distinct strands of thinking can be discerned.

Passport tariffs

One strand would include *any payments scheme – or amendment or rebate to, or discount on, an existing scheme – which is specially designed for and restricted to carefully defined low-income and perhaps other vulnerable households*, the aim being to reduce significantly the bills actually paid by such groups for a given utility service.[9] Because eligibility would have to be established, we use the term 'passport tariffs' to describe this type of social tariff.

For example, in recent research undertaken for Unison (CSE & NRtFC, 2006), most of a group of 24 fuel poverty and energy policy stakeholders who were questioned defined a social tariff as:

> "…a tariff only available to certain vulnerable or low income households and designed to help them pay for their fuel." (p. 25)

NEA (National Energy Action) echoes this view, recently stating in a policy paper that what constitutes a social tariff

> "…is uncertain, but…….is taken to mean any special payment arrangement, over and above those specified by the Supplier's Licence Conditions,

[9] If a given utility charging burden for a household is defined as the proportion of its annual disposable income accounted for by its annual expenditure on that service, the payment scheme might be designed to reduce the burdens to (say) no more than 10% for fuel and 3% for water services.

devised with a view to benefiting disadvantaged energy consumers."[10]

Following recent CSE/NRtFC research, the inadequacies of these definitions has been suggested, for both quotations are seen to be referring to intentions rather than outcomes. It is certainly arguable that a passport tariff that fails in its core social aim should not be classed as a 'social tariff'. However, that is a semantic issue which need not detain us now.

One-size-fits-all tariffs

In a quite different approach, no *special* charging arrangements are needed. Rather the term 'social tariff' could be (and has been) used, especially in World Bank and OECD literature[11] and in discussions about the water sector and water poverty, to describe *any general tariff for households which, through its structure (normally referred to as an increasing block tariff) and through the actual tariff rates levied, has the effect of resolving to a significant degree affordability issues* (again its success would be measured by reductions in the charging burdens of low-income and other vulnerable households). The advantage of this approach is that it does not require the implementation of means tests (which carry expensive administration charges), it does not stigmatise low-income households and there are no problems relating to non take-up from eligible households.

Note that this difference between different types of *social tariffs*, as defined in UK energy literature (in 2.4.1, above) and as reflected in the OSFA tradition, mirrors the debate in the UK within social security policy over means-testing versus universal provision (see, for example, Barnes, 1999). Thus, social tariffs in the UK energy tradition have almost invariably involved means-testing, while 'one size fits all' tariffs provide a universal approach.

There are numerous examples in continental European countries of increasing block tariffs (IBTs) for residential energy and water consumers which are referred to as social tariffs. They typically incorporate one or more 'early' low- or zero-priced blocks which are meant to cover basic/essential use and higher prices for 'later' blocks. These tariff structures therefore mean that, through a stepped relationship, the more energy or water a household uses, the higher will be the price paid for the next block or tranche of consumption. Under certain conditions – to be explored below – the effect of such tariffs can be to keep down the utility bills of low-income customers while still ensuring full cost recovery overall. Because in such cases each household is on the same tariff, we shall term these as one-size-fits-all (OSFA) tariffs.

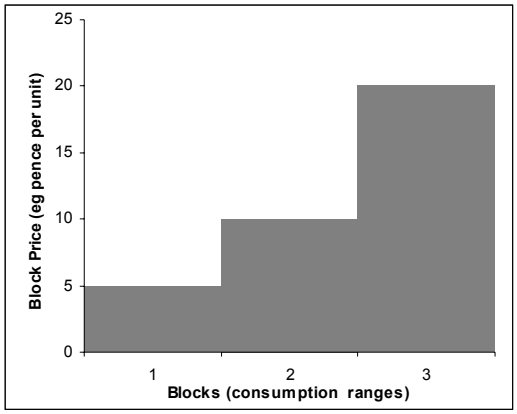

Figure 1: Increasing Block Tariff

One especially attractive variant of the OSFA IBT makes the width of the first, lower-price block dependent upon the size of the household, either completely or to some degree. Utilities

[10] www.nea.org.uk/Policy_&_Research/Policy_Position_Papers/Social_Tariffs , updated 24.4.07.
[11] e.g., in OECD (1999) and OECD (2003).

in a number of countries – mostly in continental Europe – have recently begun to use these structures, and these will be examined and discussed in section 4, below.

2.5 SUSTAINABILITY *WITH* AFFORDABILITY: THE OPTIONS

As has been seen in Section 2.1 and Appendix 1, water demand by UK households is expected by the water companies themselves to continue to increase steadily over the next twenty years, albeit probably not at the rate experienced in the last two decades of the twentieth century. Driving this increase will be rises in average real incomes which will lead to the acquisition of more energy- and water-using appliances, and substantial forecast increases in population, especially in the south-eastern half of the country. As argued in Appendix 1, the slow growth in household metering experienced with present policies should generate benefits (in terms of demand reduction) that will just about offset the adverse effects on per capita consumption of the predicted reductions in average household occupancy.

Section 2.3 discussed briefly five 'tariff rules' which could help a move towards sustainable production and consumption in this sector of the economy. It is indeed possible to design tariffs which hit hard at marginal, inefficient, wasteful or unnecessary consumption, and which encourage households to use water wisely. Prices at the margin are capable of reaching household behaviour which bureaucratic regulations and supplier persuasion can not reach at all or only with great difficulty.

But there is a problem. If such prices – and they would probably be much higher than are presently being paid by metered consumers – were to be charged on all of a household's consumption, they would pose intolerable burdens on the budgets of lower-income and other vulnerable households. They would also, as already noted, generate unacceptably large financial surpluses for the supplying utilities.

Government Predictions of Rising Water Charges Burdens

Indeed, even on present 'business as usual' charging methods and tariff structures[12], relatively large increases in water charges burdens in the current five-year planning period (2004-05 to 2009-10) have been predicted by usually cautious government civil servants. Thus Defra's *Report on the Cross-Government Review of Water Affordability* (Defra, 2004) estimated that over the five-year period the percentage of disposable income spent on water and sewerage charges by households with the lowest 20% of incomes (the first quintile) would rise from 2.2% to 2.6% in England and Wales as a whole (over the *whole* income distribution it would only increase from 1.0% to 1.1%). In Dwr Cymru (Welsh Water), South West Water and Wessex Water, the average household burdens in the lowest income quintile would increase to 3.2%, 3.9% and 3.1 % respectively.

By 2009-10 single pensioner households in the lowest income quintile living on minimum pensioner credit and paying the average bill for their company area could expect to be paying an average of 4.9% of their income in water charges over England and Wales as a whole. This figure would be 5.8%, 7.3% and 5.7% respectively in the three high-charges water companies listed in the previous paragraph. An estimated 28% of pensioners in the lowest income quintile across England and Wales on the minimum pension credit were paying more than 3% of their incomes on water in 2004-05, and this was forecast to rise to 42% by 2009-10. By any standards, these are very large increases, over a short period of time. After 2010, moreover, the real price of water is likely to continue to increase. So it can be seen that even *without* any new tariff structures to tackle the sustainability problem, the question of how to address the growing affordability concerns of low-income customers grows ever more serious.

[12] These are the existing tariff structures which restrict utility revenues to the recovery of financial costs (including profits), through regulatory price-caps in the water sector, and also a continuing slow increase in household metering across the country as a whole is assumed.

The traditional response of some politicians (and too many economists) to this issue has been directed at the tax and social security system. Ofwat has now reiterated for nearly 20 years its view that the best solution is for government to sort out via tax and benefits any affordability problems that result from higher real prices in the water sector. But governments of all colours and kinds in the UK have not contributed one pound for this purpose. Neither are there any plans to. With all the demands currently made upon the public purse, the likelihood is that this will not change in the future. There is indeed an increasing danger that the scale of future environmental programmes in the water sector will be determined not by a rational assessment of costs and benefits but by each programme's consequences for the water bills of the 10%-20% of households with the lowest incomes (Anglian Water, 2006).

If complete reliance on the tax/benefits option for resolving the issue is at best pie-in-the-sky and at worst intellectual laziness, it is understandable that both energy and water suppliers have themselves recently started to consider more seriously what can be done about affordability through their own tariff structures. Sometimes their efforts have been half-hearted (as occasionally in energy?) and one major utility company has had its very ambitious proposals dismissed by the regulator (in water). This report builds on that interest and concern, and uses both domestic and overseas experience to show how tariffs can be structured *to secure sustainability while simultaneously addressing affordability*.

It has been seen in section 2.4 that two sorts of social tariffs permit progress: *targeted passport tariffs* and the more inclusive one-size-fits-all *increasing block tariffs*. At this stage we do not attempt to rank these tariffs or state any preferences. Instead we shall examine in sections 3 to 6 the evidence on the existence, effects (demand and distributional) and regulatory context of both sustainability and social tariffs. In effect, we will now start to examine the criteria and the evidence by which eventually we will make a reasoned judgement on the best way forward, in section 7.

3. What are the Impacts of Tariffs on Demand?

Metering in the Developed World: the Overall Picture

As will be clear from section 3, much research has been undertaken into the effects of domestic water metering in the developed world. The results of this research are completely unambiguous: the effects of metering are significant, on both peak demands (with larger effects) and average demands. The effects are also enduring: none of these studies suggests any significant bounce-back, i.e. a return to original, higher levels of water use after an initial period. Over 90 studies support these conclusions, and summary results will be found in four locations: OECD (1987), OECD (1999), Pezzey and Mill (1998) and Herrington (2006).

3.1 THE THEORY OF DEMAND REDUCTION

Higher real volumetric prices for household energy or water services may induce lower demands for a number of reasons. Note that these behavioural effects would also result from the first-time impact on a household of metering a utility service, as price rises from zero to a positive level, and additionally from any real increases in seasonal or other temporal charges. The distinct effects are:

- some energy- or water-using activities with relatively low values to the household are now not worthwhile, since it is 'rational' for users to forego the benefits those activities brought, but save even more on the energy or water charges avoided
- reducing energy/water losses in the home (e.g., switching off appliances on standby, fixing water leaks) generally requires effort and/or expense by a household, but more action is now justified since the savings from avoided charges are greater than the costs
- users may find it economic to substitute labour-intensive for energy-intensive methods of undertaking household tasks (e.g. lawn-mowing, egg-whisking, teeth-cleaning) or to change to low(er)-water technologies (e.g. by introducing low- or dual-flush WCs)
- households may find it cheaper to substitute their own or an alternative supply technology to that provided by the utility service (e.g. solar panels, the collection of rainwater as a substitute for using the public water supply)
- there may result re-arrangement over time of activities using energy or water (e.g. use of Economy 7 tariffs and certain appliance usage, provision of extra storage for public water supply storage in the off-peak season when charges for may be lower)
- users may step up their search for new technologies (with lower energy or water inputs) in which any extra cost to, or effort by, members of the household is valued at less than the savings realised by lower energy or water charges; profit-seeking firms, responding to or anticipating such searching by consumers, then increase research and development activity because of the potential larger financial rewards.

As a result of all these factors, some operating in the short-term and some mainly in the longer-term, energy and water conservation are encouraged at the household level and human impacts on the natural environment are reduced.

3.2 THE IMPACT OF VOLUMETRIC PRICE CHANGES: PRICE ELASTICITIES OF DEMAND

The response of demand to changes in price (with the usual assumption of other things being given) is customarily measured as the proportional change in demand divided by the initiating proportional change in price This is known as the *price elasticity of demand*. Strictly speaking, this measure only applies to small changes in price. Converting proportions to

percentages, the price elasticity of demand may be regarded as the percentage change in demand per unit percentage change in price.

Price elasticity of demand estimates found in European research, covering seven countries (including England and Wales) for different periods in the last 35 years, are very consistent[13], all in the –0.10 to –0.26 range. A 'best estimate' of –0.15 with a range of –0.1 to –0.2, seems to be appropriate for average year-round demands (Herrington, 2006). Thus an increase in price in real terms (i.e. after allowing for general inflation) of 10% would be expected to lead to a reduction in demands of between 1% and 2%, with a best estimate of 1.5%.

3.3 EVIDENCE OF TARIFF IMPACTS ON WATER DEMANDS

What is the evidence concerning the effects on demands of domestic water metering, of tariff structure changes or differences, and of volumetric price changes? In Section 3.3 the emphasis is on summarising the European evidence (especially that from the UK) about these questions in turn, distinguishing between average and peak demands, and only turning to studies from further afield when the European evidence is decidedly thin, i.e. on the effects of changes in the structure of volumetric tariffs (including the imposition of seasonal tariffs and surcharges).

The underlying problem about estimating the effects of metering and tariff structure (and tariff level) changes (or differences) is that when the changes (or differences) are taking place (or being revealed), the likelihood is that there are simultaneously other factors at work that may also affect household behaviour. For example, if the town of Waterlooville was unmetered (UM) in 2001 and comprehensively metered (M) by the start of 2003, it is not good enough just to compare per capita consumption in the two years. The relevant question is, of course: what *would* have been the UM consumption in 2003, if the metering had *not* taken place. It is with that figure that the actual 2003 M consumption should be compared, in order to identify the 'metering effect'.

As a result of this important 'counterfactual question' there are in principle four approaches to estimating the demand effects. *Time series analysis* looks essentially at before-and-after differences with regard to the 'event' of first-time metering, of a tariff structure change or of a price increase, by trying to take account of what *would* have happened to demand had the 'event' not occurred. *Cross-sectional analysis* compares the demands of a metered household group with those of a hopefully similar control group, with any other known factors causing the two groups to have different demands being allowed for. *Trial and control area analysis* combines the two previous techniques, while *panel data analysis* tends to be used to describe the complex analysis of consumption of many individual households both over time and across households. The contemporary econometrics of all these analytical varieties can look quite fearsome, not for the faint-hearted.

Impacts of domestic metering on average demands

United Kingdom

The 'big studies' of domestic metering in the UK (for which read the relatively expensive ones) took place in England over 1970 to 1992, and the main results are summarised in the top section of Table 2, followed by other published studies up to the present.

[13] Save for some very odd Spanish results which alone estimated long-run elasticities to be less than short-run measures. The oddness results from the expectation that, following a price increase, demand effects would grow as time went on because some consumers would swap their water-using appliances for more efficient models as optimum holding periods elapsed. Capital substitution in response to a price increase is essentially a long-run business.

Table 2: Impact Effect of Household Metering: UK Evidence

Location	Year(s)	Reduction in Demand	
		average	peak
Four Major Studies			
Fylde	1970/1-1971/2	11-14.5%	-
Mansfield & Malvern	1976	12.5% (range: 8-17%)	-
Isle of Wight	1988/9-1991/2	21.3% (19.1%-23.5%)	-
National Metering Trials:	1988/9-1991/2	11% (-2%/17%)[11sites]	aver.P7D [11sites]:
11[9] sites (s.) in England		12% (7%/17%) [9sites]	18%/27% (wet/dry years)
Other Studies			
Anglian Water (SODCON)	1995	'around 15% – 20%'	P7D: 25% to 35%
WRc: 11 UM & 8 M DMAs	1994-96	-	PHR/DR/WRs: ↓ by 16%/13%/10%
Mid-Kent: Oaks Park)Canter-	1993-96	26% (Acorn group J)	3Q (1995): 50%
Mid-Kent: St. Peters)bury	1993-96	14% (Acorn group C)	3Q (1995): 32%
Two Chelmsford areas	1994-95	-	PDR:25%;PWR:26%
F/stone/Dover: 4 retmt.areas	Jan-Aug 1995	-	PWR: 44%/32%
NERA optants only:			
I (5 WCos.)	7/1996 – 12/2001	9%, ↑ to 11% after 1 yr^{+}	PM:16%; PQtr.:13%*
II (3 WCos.)	7/1995 – 6/2002	2-4%,↑to 8-9% after 3yrs^{+}	-

Abbreviations: UM: unmetered; DMAs: District Metering Areas; P7D: Peak 7-day Demand M: metered + vol.charging; PM: Peak Month Demand (Aug) PHR/DR/WR: Peak Hour/Day/Week Ratios; PQtr: June-August Demand. *estimates.at aver. real vol. charge of £1.60/m^3 (Jan.2000 prices)

Source: Herrington (2006)

Fylde was the first water metering study in Britain. A crude before-and-after comparison suggested an 11% reduction in the overall average use of nearly 300 households, with the largest cutbacks (16% - 18%) concentrated in homes in the highest and lowest rateable value bands, although consideration of what *would* have happened to the households if they had remained unmetered suggested an average 14%-15% effect at most. Hence the range in the table. A few years later the comparison of 1000 metered homes in Malvern with 1000 unmetered in Mansfield generated, with much more sophisticated statistical work, a mean difference of 12.5%, however many regressions were run. Omission of the outlier results gave the range of 10% to 15% metering 'savings', and this seems to have stood the test of time – it is often still quoted today as the 'likely' effect of domestic metering.

Although, following the complete metering of the Isle of Wight during 1989-91 (over 50,000 properties), the National Metering Trials Working Group (1993) stressed that the Isle of Wight trial was not designed to test the impact of metering on demand[14], the large consequent reduction in demand of 21% was carefully estimated and has not been discredited. However, the public profile of the Isle of Wight 'event' was abnormally high, and it has been thought unwise to transfer this result to other times and places. Analyses of the simultaneous small-scale National Metering Trials data from eleven sites (trial and control groups), covering a pre-charging year and three years after (*four* years after at six sites), suggest average impact effects of 12%-12.5%, in the middle of the range identified earlier. There was also no evidence of 'bounce-back', i.e. of the re-establishment after a time of households' pre-metering consumption patterns (Herrington, 2006),

The results of trials and studies since then have been broadly consistent with these figures, showing higher effects in the more affluent areas (e.g., the Mid-Kent Acorn group J result). The evidence also suggests slightly lower demand effects due to optant metering (round about

[14] It was in fact mainly intended to estimate the costs of a large-scale compulsory metering exercise.

10%), as might be expected as a result of optants generally becoming better off as a result of switching while most of those facing compulsory metering experience a tighter budget constraint.

Continental Europe

The few recent studies in continental Europe (see Table 3) are not out of line with what we would expect as deviations from the UK experience: perhaps higher demand effects in southern Spain, but a similar impact estimate emerging from a carefully-argued time series analysis of Groningen after comprehensive metering in the mid-1980s. The metering of individual apartments, following just a single master meter in an apartment block before, gives estimates that seem very high, but they may be reflecting the identification of plumbing losses in the building. In any case, there are no published UK results with which these can be compared.

Table 3: Impact Effect of Household Metering: Continental European Evidence

Location	Year(s)	Reduction in Demand	
		average	peak
Non-UK European Communities: SFHs			
Moss, Norway	1979-83	9%	PD: 41%; P7D: 34%
Netherlands: 2 'similar towns'	1972	28%	-
Groningen, Netherlands (pop: 410K)	1986-87	10%-15%	PDR: 9%↓
Barcelona, Spain (2927 hh's)	up to 1996	17%	PHR: 11%↓
Terrassa, Spain (57K hh's)	1993-94	12.7%	-
Mataro, Spain (40K hh's)	1983-93	min. 15.9%	-
Apartments only			*Number of apartments*
Paris, France	1986	27%	200
Nancy, France	1980-81	46%	120
Rennes, France	1987-88	34%	32
Hamburg, Germany	1996	15%	?
Copenhagen, Den. (pilot study)	1996	30-35%	?

Abbreviations: PD:Peak Day P7D:Peak 7-day Demand PDR:PD ratio PHR:Peak Hour ratio SFHs: Single-Family Houses hh's: households. *Source*: Herrington (2006)

Impacts of domestic metering on peak demands

United Kingdom

A *peak demand ratio* for an area is defined as the peak water demand (over an hour, day, week, month, etc.) divided by the average demand over the year (for an hour, day, week, month, etc.). Peak demand effects due to metering are probably best expressed as the differences in peak demand ratios between unmeasured and measured situations, over time or households or geographical areas.

Most UK studies, the results of which are summarised above in Table 2, have been of peak *day* and peak *week* ratio differences; in hotter summers the differences due to metering are seen to be *always* in the expected direction and *always* sizeable – usually of the order of 25%-45% (of the unmeasured peak ratio) in more localised areas and 20%-30% in larger (or averages of a number of) areas. In the hot summer of 1995, the peak quarter consumption[15] (July-September) of a small, affluent and recently metered (1993) area (Oaks Park: Acorn group J) in Canterbury (Kent) was estimated to be 50% less than that predicted, through regression analysis, if the area had remained unmetered. Even in wetter summers the ratio differences have been found to be 10%-20% for larger areas. Note that these are figures that

[15] In this case, the actual peak consumption, not the ratio,

materialise without any special seasonal tariffs – they result from just the *fact* of metering, and suggest that substantial consumption reductions may follow from presenting consumers with a financial disincentive to wasteful and unnecessary use of water.

Continental Europe

The very limited evidence here (Table 3) is easier to interpret for the Netherlands where, as would be expected in a country with much smaller water use in the garden, the unmetered/metered reductions are significantly less. There is no particular explanation available for the dramatic effects found following the universal metering of the town of Moss in Norway in the early 1980s.

Effects of tariff structure changes and differences

There is no experience in Britain in which a new metered water tariff *structure* has been imposed on an already-metered community or household group. The nearest we come to a case study is in the three areas which used increasing block tariffs (IBTs) in the National Metering Trials (NMTs) over 1988-92. In the large-scale Isle of Wight trial there was no 'non-IBT' metered tariff period with which the 'IBT tariff'[16] demands actually observed could be compared; in the potentially interesting Yorkshire (Normanton) small-scale trial (3 blocks, the first being free[17]), not only was there only one year's charging data – there were also serious basic issues for this trial as a whole concerning the comparability of the properties in the trial and control areas; and that leaves the Thames trial (Hayling Park, with only 750 trial homes) as the remaining small-scale 'IBT' area, which probably cannot be usefully compared with an average of the remaining 'non-IBT tariff trials'[18]. On *seasonal* tariffs, however, it may be useful to compare the two small-scale trial areas in the NMTs using seasonal tariffs with the other seven 'usable' non-seasonal tariffs (see below).

So most of the relevant evidence is going to have to be found abroad (see Herrington, 2006). Consideration of changes in (or differences across) volumetric tariff structures is, perhaps inevitably, largely documented through United States studies, the results of which are not directly transferable to a British environment significantly different in both household water use structure and climate. However, the results certainly are *suggestive*. As Table 4 shows, shifts in the from non-IBTs to IBTs (or additions to an existing IBT of an extra, higher-priced block) in the US and in Barcelona (the one example in Europe for which some data are available) lead to *average* demand reductions of 10% to 14%, although the simultaneous introduction of seasonal tariffs and/or more generalised conservation campaigns in four or five of the seven towns or cities means interpretation is made more difficult.

[16] The second (open-ended) block price was 88% higher than that of the first block in the first two charging years, but (for unknown reasons) only 64% higher in the third year.

[17] For Yorkshire (as with the other two examples) the block 'widths' are unknown, but the volumetric prices for water – in 1991-92 – were zero, 61 p/m3 and 87.4 p/m3 for the three blocks. Sewerage and sewage treatment (S&ST) charges were also on an IBT basis – volumetrically, set at zero, 45 p/m3 and 78.9 p/m3 for the three blocks.

[18] Hayling Park had a 3-block tariff for water with 2nd and 3rd block prices 50% and 115% (respectively) higher than those for the first block; for S&ST, however, there was no block system. For the record, the average metering impact over the NMTs three charging years was estimated as 11% at Hayling Park as against 12% at the other eight small-scale sites for which the data can be used with confidence.

Table 4: Evidence on Effects of Switching from 'Orthodox' Metering to IBTs

Study location	Pre-Δ tariff	Post-Δ tariff	Simultaneous introduction of		Effects on demands?	
			seasonal tariff?	conservation campaign?	Average	peaks
United States						
Elmshurst, Ill.	DBT	IBT (2-b)	No	Yes	15% ↓	22% ↓
Tucson, Ariz.	DBT	'Mild' IBT	Yes	Yes	sig. ↓	sig. ↓
Denton, Texas	DBT	IBT	No	No	sig. ↓	?
Palm Beach, Fla.	HBT	IBT (2-b)	No	No	14% ↓	?
Portland, Ore.	Orthodox	IBT	No	Yes	10% ↓	?
San Antonio, Tx	'Mild' IBT (3-b)	Steep 4th b. added	?	No	12% - 14% ↓	?
Spain						
Barcelona	IBT (2-b)	IBT (3-b)	No	Yes	PCC 10% ↓	?

Notes: DBT= Decreasing Block Tariff HBT=Humped Block Tariff (IBT, then DBT) b.= block sig.=significant
Source: Herrington (2006)

US evidence also shows significant impacts from the introduction of seasonal tariffs and surcharges. There the peak day ratio reductions following the introduction of seasonal tariffs are closely grouped (six out of seven studies with a range of –8% to –14%) and average out at 12%. And that is the reduction in the peak *ratio*; the percentage reduction in the peak *demand* will be even greater.

In the National Metering Trials in Britain the estimated effect of metering in the *six summer months alone* was to reduce demands by 20% in the two trial areas with seasonal tariffs (Chandler's Ford and Bromsgrove, with summer tariffs 62% and 54%, respectively, higher than the winter rates). In the other seven usable trial/control area records, *without* special summer tariffs, summer demands were estimated as about 10% less. Winter months reductions were very similar.

4. Social and Sustainability Tariffs for Water in Practice

In Section 4 we survey household energy and water tariffs which have been implemented or proposed in the UK or other developed countries, in order to further the sustainability and social objectives discussed in sections 2.3 and 2.4 respectively.

4.1 TARIFFS FOR SUSTAINABILITY

In seeking to identify tariffs for the promotion of sustainability (see section 2.3), it is important to distinguish between the sectoral 'macro' aim of *full cost recovery* (the desirability of which stands apart from the tariff structure) and the structure itself, which should seek to give consumers financial incentives to reduce inefficient, excessive or wasteful use of water. This means an emphasis on volumetric rates or, more precisely, on the *price (or prices) at the margin*, which should ideally reflect the long-run marginal social cost of the 'production' and 'delivery' of the service. That in turn draws attention to:

- the size of any standing charge (a lower standing charge will permit a higher volumetric rate, given the revenue requirement, e.g., full cost recovery);
- the desirability of an Increasing Block Tariff structure; and
- the importance of temporal tariffs (peak week, peak season, etc)

It is with that perspective that we now seek to identify examples of tariffs for sustainability which have been proposed and/or implemented in developed countries.

United Kingdom

Low or Zero Standing Charges

Anglian Water and Mid-Kent Water have maintained special 'low user' tariffs with zero standing charges and a higher-than-standard volumetric rate since the late 1990s, giving low users cheaper bills up to an annual consumption of 75 m^3 (see 4.2, below). It is understood that the rationale of these was 'social' rather than a sustainability aim linked to the higher rates; certainly the government's enthusiasm for such tariffs in the year 2000 seems to have been based upon their particular financial advantages for pensioner households.[19]

Increasing Block tariffs

In the National Metering Trials over 1988-89 to 1991-92, IBTs were trialled at two small scale trial sites – Hayling Park (Thames) and South Normanton (Yorkshire) – and in the large scale trial on the Isle of Wight. Possible results concerning demand have been discussed in Section 3.3.3 above, dealing with demand. No other IBTs are known to have been trialled in the UK

Seasonal Tariffs

In the National Metering Trials the use of a summer surcharge was tested for three years in the early 1990s at two sites: Chandler's Ford (Southern Water) and Bromsgrove (East Worcs. Water). Much more recently, since April 2006 200 new homes at South Ashford, Kent, with water-efficient fittings and washing machines as standard, are involved in a seasonal tariff trial. Between 2006 and 2010, half the homes will go on to Mid-Kent Water's standard tariff,

[19] The Environment Secretary's guidance to the Ofwat on social and environmental matters was published in February 2000. It stated, among other things, that all water companies should develop the option of a low user tariff for customers in their main homes, but that this should not lead to disproportionate increases in bills for other customer groups. Ofwat reported in May that nine companies had proposed such tariffs, with the Director rejecting them because the issue needed further examination and Ofwat wished to consult on the matter. This apparently showed only limited support for them, and Ofwat then made it clear it would not accept any new proposals.

for 2007-08 paying a standing charge of £23.40 and a volumetric charge of £0.90/m^3, and half on to a seasonal tariff, paying in 2007-08 the same standing charge and a volumetric charge of £1.78/m^3 over May-August and £0.46/m^3 for the rest of the year. This means that *all* 'summer' consumption for 100 homes will be charged at about four times their winter rate, and their 'experiences' – including their demands – will be compared with those of 100 similar homes which will be paying the same volumetric rate throughout the year.

Rest of the developed world

Standard Increasing Block Tariffs

The spread of what are sometimes called 'progressive tariffs' was significant in many countries in the later part of the twentieth century – significant because in the water sector charging systems had been notoriously resistant to change. Thus 57% of Japanese utilities were using IBTs by 1998 (about 2,000 public water suppliers were then each serving populations of more than 5,000 people in Japan), this being both "to reflect the increased development of water resources" and "to promote the consumption reducing effect" (OECD, 1987; OECD, 1999). The same sources recorded increases in the United States: IBTs were being used by only 4% of water supply utilities in 1982 but by 37% in 2002. In Italy the tariff reforms of the mid-1970s brought in three 'excess blocks' (the top 3 out of 5), the most expensive of which was priced in Rome at over 6 times the 'basic rate' (meant to reflect the average cost of production) and just over 20 times the socially-inspired 'reduced rate' (see s. 2.4.2, above).

In Australia, Turkey, Mexico, Greece, Spain and Portugal, IBTs have been used explicitly to pursue conservation and 'consumption-reducing' objectives. In Catalonia (serious pollution and water resource problems), Barcelona introduced an IBT structure in 1983, adding a third block in a serious drought in 1989. Athens moved from a 3- to a 5-block tariff over 1988-91, the highest price increasing from nearly twice to over seven times that of the basic block.

Amended IBTs

Moves to amend IBTs for social reasons (see Section 4.2 below) must themselves generate 'steeper' IBTs in price terms, since enlarging the low-priced basic block to accommodate larger households will, given the need to recover costs, push up the prices of higher-priced blocks. This is seen clearly for the five Spanish cities identified in Table 8 (below), where in four cases the highest block is priced at 2.5 to 4 times the price of the basic block (only Murcia uses a 'shallow' IBT, with P_5 just 40% higher than P_1). In Athens too, following the introduction of social tariffs in 1993, the relative price of the higher-priced blocks rose.

But the most dramatic case of this happening was in Flanders, where the introduction of the free allowance (of 41 lhd) in 1997 (see Table 8) meant that volumetric prices on the remaining units rose to 65% higher than they would have been if *all* consumption had been priced at a uniform rate.

Seasonal tariffs

Seasonal tariffs for residential water supplies remain very rare in the developed economies (and those for wastewater even rarer) although in the one country where they are in evidence – the United States – utility surveys have shown a steady growth in their incidence over a 20-year period, as Table 5 shows. Within the 'large' utility category (the 2002 survey divided up the responding utilities into larger, medium and smaller, by millions of US gallons per day sold), the prevalence of seasonal rates was much more marked.

In other developed countries the only known example of seasonal tariffs for the household sector is in Madrid. There summer (June-August) rates for the abstraction element of household tariffs (comprising about 70% of the overall water supply charge, the rest covering

distribution) are the same as the rest-of-year rates for the *basic block*, but 25% higher in the second block and 50% higher in the third (open-ended) block.

Table 5: Seasonal Tariffs in US Water Supply Utilities

Year	Number surveyed	Number with seasonal tariffs	Proportion with seasonal tariffs
1982	100	1	1%
1997	151	10	7%
2002	148	16	11%
(large only)	(36)	(10)	(28%)

Sources: OECD (1999); Raftelis (2002)

4.2 SOCIAL TARIFFS

United Kingdom

Passport Tariffs

Four social tariffs in which eligibility is established through customer characteristics are currently in operation in England and Wales. One is a national scheme introduced in April 2000 and known as the Vulnerable Groups Regulations.[20] These cap the water and sewerage bills of certain 'vulnerable' metered consumers at their water company's average household bill level. The other three are water company schemes. Two, in Anglian and Mid-Kent, are directed at lower-income metered households but who would not stand to gain from those companies' low-user tariffs (see below). The other scheme is new, introduced by Wessex Water on 1 April 2007. Customers with serious financial difficulties may be accepted for entry into the company's *Assist* tariff, which comprises a scale of relatively low fixed charges. Additionally, Anglian Water proposed a large regional passport tariff for 2006-07, but it was rejected by Ofwat. Consider now all these schemes in turn.

Vulnerable Group Regulations

This arrangement was established to help a narrowly specified group of metered customers who, fearing the consequences of building up large and unaffordable bills for metered water, might otherwise take action to restrict their use of water for essential purposes. Since April 2005[21], a qualifying household must be eligible to receive one of a defined list of government benefits or tax credits and either have three or more dependent children in full-time education and living at home or include someone who has one or more of a list of defined medical conditions (or another one, described on a doctor's certificate) which causes the household to use a significant amount of extra water. If qualifying, a household does not then have to pay more than the (pre-determined) current average household bill for their area, thus paying whichever is the lowest of its actual metered bill and the company's average bill.

In late 2004 the most recent data provided by Defra and Ofwat data suggested a take-up proportion of the then current VGRs of only 3%-7% of those eligible (Defra, 2004). Our own estimates and the latest Ofwat data suggest a 2006 take-up rate which is in the range 5%-10%. This remains an embarrassingly small 'success rate' for the only national 'social tariff' in existence in England and Wales.

Anglian and Mid-Kent Larger-User Tariffs

Introduced in 1998-99 and 1999-00 to deal with emerging affordability issues (before the Government's Vulnerable Groups Regulations had been drafted and before Ofwat became

[20] Legally, the Regulations do not apply to Wales, but the two Welsh water companies offer similar tariffs on a voluntary basis.
[21] Over 2000 to 2005 dependent children had to be under 16 and the allowed medical conditions were narrower.

responsible for approving company charging schemes), these two tariffs – now termed Aquacare Plus and Social/Medico in the two companies respectively (there are two variants in Mid-Kent) – remain available to those on one or more government means-tested income benefits in three areas (East Anglia & Hartlepool[22], and Mid-Kent[23]), where 18% of the metered households in England and Wales live. The tariffs combine a standing charge much higher (about 150%) than normal with a volumetric rate of about half the standard rate, financially advantageous if a household is using more than 100 m3/year (275 lhd) in Mid-Kent and 75m3/year (205 lhd) in Anglian's two areas (calculated from tariff rates set out in Ofwat, 2007). Some 2-person and most 3-or-more-person households therefore probably gain financially from a switch (if eligible). Take-up is about 4000 households in Anglian, 0.4% of metered homes.

Wessex Water Assist Tariff

In the words of its own information leaflet on the scheme, Wessex Water "has been concerned about affordability for some time" and "believes that it is important to take a first step to address this problem now at a company level". The Wessex scheme – termed the *Assist Tariff* - is innovatory for a number of reasons. Wessex is the first UK water utility to receive approval – from Ofwat, as is required by statute – for a tariff that is linked directly to the customer's ability-to-pay. It also applies to both metered and unmetered households. As Table 6 shows, the tariff is available at five levels, depending on ability to pay.

Table 6: Wessex Assist Tariff 2007-08

Assist Level	Water Supply (£/year)	Sewerage and Sewage treatment (£/year)
1	41	43
2	71	73
3	95	97
4	137	139
5	181	184
Average bill	181	186

Source: Wessex Water, *Assist Tariff* (leaflet, available upon request)

Assist is open to customers who "despite their best efforts are genuinely unable to pay the full amount of their water bills"[24]. Eligibility involves jumping two hurdles: a householder must, first, be on at least one of the six main means-tested benefits and, second, have taken advice from an independent debt advice agency which will have checked that all government or other assistance is already being received. The agency must recommend the customer for the tariff, and make a full means assessment available to Wessex Water. Wessex then makes the final decision.

Clearly the preparatory work is labour-intensive, so it is unsurprising that the company estimates that not more than 1% of its 500,000 customers will be eligible in total. No cross-subsidies are involved (the company presumably had to satisfy Ofwat on that account) because Wessex estimates that the consequent reduction in debt outstanding and the lower financial costs associated with unrecovered revenue make the scheme likely to pay for itself over time. Nevertheless, the company is initially bearing any risk of financial losses, not the customers. Additionally, financial incentives encouraging care with water use are removed for a small number of metered customers, although Wessex, in continuing to read the meters, will be able to monitor their consumption and no doubt feed back relevant information.

[22] Anglian Water maintains separate reporting data for its company areas in East Anglia and Hartlepool.
[23] The Mid-Kent *Help-U* tariff has been renamed '*Social'* and integrated with the government's VGRs scheme; thus eligibility is now narrower with the provision that there must be 3 dependent children in the applying household, and the Social tariff has a maximum annual charge of £160 (in 2007-08), equal to the company's average metered bill.
[24] Wessex Water Information leaflet (op. cit.)

Anglian Passport Tariff

During 2005 Anglian Water developed a comprehensive scheme for a new set of domestic tariffs for water services for less well-off customers in its region (Anglian Water, 2006). If approved by Ofwat, this would have become the largest passport tariff in the UK. Drivers of this development were (i) the company's declared belief in metering as the best long-term charging method for the residential sector (currently over 60% of its 1.8 m. households are metered); (ii) its relatively high average bills, currently 10% above the national figure; (iii) its past development of innovatory metered tariffs for low users (<75m^3/year) and all other households (>75m^3/year) on government benefits (Solow and Aquacare Plus, directed at pensioner households and low income families respectively); and (iv) recognition of customer research evidence at the 2004 price review that there was a correlation between income levels and willingness to pay for the financing of water quality and other environmental protection[25], which would lead to even more 'affordability drag' in the future.

Anglian's passport proposal was effectively to extend on a large scale its Aquacare Plus scheme by 25% reductions of in the bills of all households in its region (unmeasured or metered) receiving one or more of the seven means-tested benefits used for VGR qualification (see above). This would enable it to abolish its Solow (see below) and Aquacare Plus tariffs. The company estimated that 300,000 households (17% of its total) would be eligible, and take-up would rise to 80% by 2009-10. Ofwat, however, believed that the proposals in their present form would be inconsistent with Condition E of the company's licence, prohibiting a water undertaker from showing undue preference to or discrimination against any class of customers when fixing charges (Ofwat, 2006a; p.19). It thus rejected them. There are important regulatory issues at stake here, which will be discussed in s. 6, below.

Comparing Passport Tariffs

Table 7: Passport-type Social Tariffs in England and Wales

Aspect of Tariff	National VGRs	Wessex Assist	Anglian Aquacare Plus	Anglian Passport
Year introduced	2000-01 (strengthened slightly in 2005-06)	2007-08	1998-99 (as 'PLUS 4')	*proposed* for 2006-07 (Ofwat said NO)
Which households covered?	Metered only; in receipt of govt benefits [GBs] & either 3 dep.children or specified medical condition	M and UM; receiving GBs; to come through debt agency, CABx, etc.	M only; must be in receipt of GBs	M & UM; must be in receipt of GBs
Numbers on tariff (& % of those eligible)	min.of 15,000 (2005-06) (minimum 5%-10%)	< 5K households (< 1% of all hh's)	c. 4000 (2006-07) (2% of M. on GBs)	forecast 294K. in 4thyr: 17% of M+UM (80% of eligible)
Knock-on effect on other customers'bills	unknown, but 3000 VGR hh's in *Anglian*: +£0.64*on average Anglian bill	none, since savings in debt & revenue coll-ection costs larger	+£0.42* on average Anglian bill	+£5.20* on average Anglian bill in 1st year of scheme
Possible (dis)incentive effectson demands?	ex ante, incentive effects remain if average bill "can be beaten"; unlikely for 4 or 5+-person h/hold, so wld probably disappear	incentive effects removed for <1% of M households	marginal price 45% lower than would have been for 4K h/holds, so small demand ↑ (dep. on elasticity)?	marginal price 25% lower, so small demand ↑ (dep. on elasticity) for M households?

Sources: Anglian Water (2006); Bohanna (2007); Wessex Water (information leaflet, 2007);
Note: * using 2007-08 prices

[25] As reported in the Ofwat Director-General's letter to the Secretary of State, 19 December 2003.

Table 7 summarises various characteristics of four of the five passport tariffs described above. Note the small (or zero) estimated knock-on effects on other customers' bills arising from the three tariffs actually in operation, due in two cases to low take-up and in one (Wessex) to the nature of the planned scheme. The much more ambitious Anglian proposal would have had a more significant effect due to the planned rebalancing of tariffs on to non-Passport customers, but even here the annual savings arising from improvements in bad debt write-off and revenue recovery were predicted to have risen to £5m./year by 2009-10, when take-up was assumed to have increased to 80%.

The effects on household demands of the different schemes that are actually operating are all, in theory, likely to be movements *away* from sustainability, as either flat-rate tariffs replace volumetric ones or prices at the margin fall. Back-of-the-envelope calculations suggest that the resulting demand changes would be either trivial (e.g., in the new Wessex scheme) or, in the case of the Anglian proposal, at most +0.5 lhd on metered household consumption.

Low User Tariffs

It has been claimed that low user tariffs, introduced by Anglian Water (SoLow) and Mid-Kent Water (Low User) at the same time as their Aquacare Plus and Social/Medico tariffs, generate social benefits, in that the zero standing charge and higher volumetric rate permit water bills to be lower than they would otherwise have been, up to the 'break-even' point of 75 m3/year (= 205 lhd). They thus may benefit frugal 1- and 2-person homes, e.g pensioner households. However, the free choice for any household to go on to these tariffs means that all smaller households economical in their use of water, high *or* low income, may enjoy a measure of cross-subsidy from other households. We shall therefore not regard them as social tariffs.

Rest of the developed world

Increasing Block Tariffs (IBTs) as Social Tariffs

By the mid-1980s evidence was being assembled that IBTs for household water services in a number of continental European countries could and should be seen, at least in part, through 'social tariff' lenses. Reports during that decade from Belgium, Italy, Greece, Luxembourg, Portugal and Spain attested to this perspective (OECD, 1987). In Brussels, for example, the 1985 tariff allowed each household 110 litres/household/day (l/hh/d) for 'health and hygiene' at a reduced rate, while in a number of Belgian municipalities families with children were granted either an additional (and free) tranche or a reduction in the volumetric rate.

Important changes in tariff structures were introduced in Italy in the mid-1970s. Typically, five blocks were introduced: the reduced rate block had a low subsidised price for 'essential' domestic consumption (usually 6-8 m3/month, 200-267 l/hh/d), the basic rate block priced at the average costs of production, and third, fourth and fifth (open-ended) blocks priced at up to 1.5 times, 2-3 times and 3-6 times the second block price (OECD, 1987; Muraro, 2002). In Spain there are usually three or four blocks: the first block is considered as the 'social block', priced below cost; the second is presumed to be at average cost, and the third and fourth are "where water utilities apply incentives to discourage excessive use" (Maestu, 2002).

The origins of the IBT traditions in Japan, Korea and Mexico are unknown, while such tariffs did not make a serious appearance in the United States or Canada summary statistics until the 1980s. More recently, IBTs have begun to be adopted by a few water utilities in Australia (27% of the population covered in 2000), Hungary and the Netherlands.

Amendments to IBTs

The problem such tariffs, however, is obvious. It is that that the larger poorer household might find its essential water consumption (and sometimes, if the pricing is linked, of its essential use of the sewerage service also) well into a second or even a third block. Simultaneously a small affluent household might find the overall average cost per m^3 of its water much lower

than that of the large poor family. So equity and affordability objectives would not be served by such a tariff; indeed, the outcome might, depending on the joint distribution of poverty and occupancy, be the opposite of what many people would view as 'desirable'. So we certainly cannot assume unthinkingly that IBTs necessarily help to resolve affordability problems.

The last fifteen years have witnessed a number of attempts by countries, regions and water utilities to deal with this problem. In Luxembourg, Malta, Belgium, Greece, Spain and the United States there are examples of attempts to 'correct' the IBT structure so as to reflect in some degree household occupancy in the width of the first one or two blocks of IBTs.

Table 8 presents the salient current details of these attempts. It is seen that allowances for household size range from the 'nearly perfect'[26] (e.g., Flanders, Malta and Luxembourg, all with very good information on occupancy), through the 'default' assumption of a 4-person unit (the Spanish cities, Athens and Irwin Ranch), and out to the 'lumpy' system of Los Angeles.

Table 8: Amended IBTs, Household Size and Per Capita Consumption

Location	Period	H or C	Details of 'basic' 1st block (default if no claim made for extra H orC)	Allowances in first Block for extra H/C	Aver. per capita use l/h/d
Belgium					
Flanders	1997-now	H	15 m^3/h/yr. = 41 lhd,free	41 lhd free	104
Greece					
Athens	1993-now	C	165 l/hh/d up to C=2	150 lhd for each extra C	?
Thessalo			no changes in bl. width;		
-niki,	n.a.	C	for C=2, normal tariff;	not applicable	?
Larissa			for C>2 tariff is halved		
Malta	1999-now	H	0-11 m^3/h/4 mnths, =90 lhd is 85% < standard price (govt. subsidy)	90 lhd for each extra H, & with 85% subsidy	?
Luxmbrg					
A comm-	pre-1996	H	60 m^3/yr = 164 lhd for H=1	40 m^3/yr = 110 lhd	170 in ∑
une					of Lux.
Spain					
B'celona	1991-now	H	*DomesticOption 1*:3 bl's 200 l/hh/d upto H=4	49 lhd	174
Madrid	2007	H	30 m^3/hh/2m. (500 l/hh/d) for H=<5 200 l/hh/d:up to H=4	H=5 to 7 (>7): 1000 (1333) l/hh/d added to block 1(2) if cnsmptn<60 (80) m^3/hh/2m.	171
Malaga	2007	H	750 l/hh/d up to C=3	50 lhd	
Murcia	2007	C	16 m^3/m.,=533 l/hh/d	9 m^3/2m. = 150 lhd	189
Seville	2007	H	for up to H=4	3 m^3/m., = 133 lhd	161
					189
USA:					
L.A.	2007	H	1st block = f(lot size, temp. zone,ZIP code) assumes H between 1 and 6	H : 7 to 9 (or >9-13) adds 186 (or 93) lhd	?
Irwin Ranch	2007	H	5-block system; 'Indoor' allocation = 1st+2nd bl's =283.5 lhd (min.4)	283 lhd for each extra H (!!)	?

Notes: H/C = no. in household/of children; bl. = block; Spanish lhd are regional data
Sources: OECD (1999,2003); all 'now' and 2007 information from utility websites, with help from Guido Schmidt;

[26] A 'perfectly amended' IBT should reflect scale economies in household water use as occupancy increases.

The prices for the first blocks (P1) relative to the second (P2) vary greatly. The scheme in Flanders, now ten years old, is the only one to offer basic use completely free. Most other utilities for which information is available set P1 at between 30% and 50% below P2. The outliers appear to be Murcia (P1/P2=0.97) and Seville, where P1 is currently 60% less than the price of the only other block.

There are two other areas of some interest. One is the apparent uniform use in Spain and Greece of the 4-person default household before the first block is added to because of larger occupancy[27]. This leads automatically to increasingly generous per capita allowances for 3-, 2- and 1-person households, thus departing from overall fairness; the observed additions for H>4 do generally, however, ensure a measure of fairness as between households of 4 persons and more which is, of course, absent in the traditional IBT.[28] The second aspect of the details about 'amended IBTs' in Table 8 which would concern tariff designers is the size of the added per capita allowances relative to average per capita consumption – in other words, just how basic (and therefore how restricted) should basic use be? In this respect Barcelona and Malaga look quite 'tight', whereas Athens and Seville appear to be very generous. We shall have to return to these issues later in the report.

[27] In Spain it is understood that 'familia numerosa' generally refers to a family of more than four members, and that the state issues a certificate to such households enabling them to apply for a number of benefits.
[28] This is assuming we ignore the economies of scale factor mentioned earlier.

5. Distributional Impacts of Water tariffs

What would be the financial effects for different groups of households (e.g., the relatively poor, the relatively affluent) of switching to different tariff structures? In section 3 information about the possible effects of different tariffs on demands was collected together, and that is an important part of the full answer to the question. However, just as relevant is how different households (e.g., large, small, high-income, low-income) are affected by the different tariffs by virtue of their underlying water demand characteristics. We now examine the desk studies which have investigated this question. Note that we have already referred (in Section 2.5) to a UK Government desk study which *predicted* the effects of the 2004 Price Review on different household groups in different regions over the succeeding five years, but that exercise assumed the basic tariff structures were unchanged. Now we look at enquiries that have tried to predict the losers and the gainers when *nothing* is taken for granted in terms of tariff structures and where, to keep the analysis manageable, the imposed switch from one tariff structure to another has generally been assumed to be 'overnight'.

5.1 METHODOLOGY

Table 9: Methodology of Household Charging Distributional Investigations

Aspect of investigation	Institute of Fiscal Studies, for Ofwat	Maxwell Stamp, for DETR	OXERA, for UKWIR	Policy Studies Institute
Base year/publication date	1991-92/1993	1995/1998	1995/1998	2002/2004
The basic household sample	7000 hh's surveyed in 1984 FES; water expenditures updated to 1991-2 charges levels	20,600 hh's in 1995 FRS	1052 hh's in Severn Trent DCM (all UM)	1320 hh's in Anglian Water SODCON sample, 678 on RV-charging and 649 M.
Base year water bill?	1984-5 charges paid updated to 1991-92 levels; assume all UM	Unclear; all assumed UM: either actual recorded charges or calculated via house RV and location	ST 1997-8 DCM bills [UM] adjstc to be repr. of all ST UM homes & of 'typical' structure of E&W UM bill	Actual bills paid by the 1317 Anglian Water UM and M households used in the study
How to impute water consumption of households?	Regression derived from ST DCM (1500 hhs) used to estimate consmptn of indiv. & gps of hh's(deciles, hh types, etc)	Regression from Anglian Water (1000 hh's) used to est. cnsmptn of indiv. & gps of hh's (deciles, family types, etc)	Don't need to; water consumption known for 1052 because they are in a DCM	Don't need to; water cnsmptn known for 1320 because they are in a DCM
How to estimate incomes of households?	Incomes known from FES (but need to be updated to 1991-92 prices)	Incomes known from 1995 FRS and also incomes info. from Anglian SODCON sample survey.	Incomes not known in ST DCM, so 'vulnera-bility' proxy had to be used – Acorn groups D+F+G+H selected	Incomes available from Sodcon sample survey in six bands; lowest band corresp-onds to 2 lowest income deciles
Tariffs considered in study	3 flat-rate + 1 volumetric	5 flat-rate +4 volumetric +2 social-volumetric+2 seasonal	1 volumetric+2 social-volumetric+ 2 seasonal+ 1 social-seasonal	10 social-volumetric
Any allowance for demand Δs as a result of volumetric tariffs?	No	Decile results also presented for a uni-form 15% demand reduction (but no tariff rebalancing, so charges fall)	Yes; 3 scenarios:0%/-10%/-20%,& base and Jun.-Aug.price-elasticity assumptions for higher volumetric prices	No (obviously less necessary for already metered households)

Notes: FES/FRS: Family Expenditure/Resources Survey; UM: unmeasured; M: metered & volumetrically charged; DCM: Domestic Consumption Monitor; ST: Severn-Trent; SODCON: Survey of Domestic Consumption; hh's: households
Source: reproduced, with permission, from Table 13 (page 31) of *Critical Review of Relevant Research Concerning the Effects of Charging and Collection Methods on Water Demand, Different Customer Groups and Debt,* by Paul Herrington (commissioned and published by UKWIR, 2006)

Over 1992 to 2004 four detailed modelling studies were undertaken to try to answer the financial questions, and a further study sponsored by UKWIR – the most ambitious and complex of all – is at present under way. Table 9 sets out the basic details of each of the four completed studies.

All four studies undertaken made use of information between 1,000 and 1,500 households from one or other of two of the major Domestic Consumption Monitors (DCMs) – those of the Anglian and Severn-Trent water companies. The Institute of Fiscal Studies (IFS) investigation used income data from the FES (precursor to the FRS), and the Oxera study had to rely on a proxy for 'vulnerability'. Table 9 records the alternative tariffs tested, and it can be seen that in the three later studies a tariff range covering both the social and sustainability objectives was devised.

5.2 SOME MAIN RESULTS

Switching to an orthodox metered tariff

A standard metered tariff is considered to be made up of two parts: a standing charge and a single volumetric rate. All four studies modelled the 'overnight' switch of all UM consumers into such a tariff, with the initially surprisingly consistent result over 1992 to 2002 that it is the lower-income groups who *on average* would gain the most in proportional terms. This turns out to be largely because pensioner households figure prominently in these groups. The IFS study had their water bills 20% lower under metering, and one adult (1A) household bills down by nearly 30%. The Maxwell Stamp study (MS) had significant losers from such a switch in the four top income deciles, while the Policy Studies Institute (PSI) had 64% of those previously-UM households who were earning under £10,000/year (broadly, the lower two income deciles at that time) gaining from the change, of whom three-quarters were more than £50/year better-off.

Who would be the losers? In the early 1990s the IFS singled out households with three or more adults (bills up 20%) , and more recent studies have continued to pick out large families[29] (the losers in the low income groups) and some middle-income deciles. The large-family 'problem' has always been well to the forefront in the always heated and sometimes acrid domestic metering debates in Britain, and it was fuelled by a series of much-publicised reports about the water charges experiences of families living on refurbished or new housing estates (and thus metered) in the mid-1990s (OXERA, 1998; and Baker et al., 2003). It continues to be the case that larger low-income families would be those most adversely affected by compulsory metering programmes, which issue needs to be addressed and which of course returns us to the whole issue of social tariffs.

Increasing block tariffs

We now examine the effects reported in desk studies of switches to increasing block tariffs (IBTs), first IBTs of the traditional 'fixed block width' variety and then those with free or low-priced tranches dependent totally or to some degree on household occupancy. Traditional IBTs were first modelled in the Maxwell Stamp (MS) study, with a lower price for a household's first 60 m^3/year consumption, and then in one variant the unit rate rose 50% for all remaining use, and in the second a 50% increase for the next 100m^3/year was followed by an open-ended block priced a further 50% higher than the second block price. The block 'widths', therefore, were fixed irrespective of the size of the household. As would be expected, the heavy losers (more than £100/year) were the larger households: for the 2-block tariff, this applied to 28% of single parents with more than three children, 35% of families with one or two children and 45% of all 'large families'. These figures all increased by 5% when the 3-block tariff was considered. The significant gainers were once again pensioners

[29] Even in 1995 the MS study was predicting that 75% of large families would be losing more than £50/year following an enforced switch to metering; overall, 88% of large families would lose financially.

(generally small households) and single adults, with a large proportion of their water use being located in the first block. Indeed, in the first decile (that is the lowest incomes) gainers from switching outnumbered losers by between two and three to one.

MS also trialled the two IBTs with the first 60 m^3 provided *free,* and this made matters even worse for the losers: e.g., 56% and 59% of large families were now losing more than £100/year in the 2-block and 3-block variants. Funding these free tranches obviously involves setting even higher volumetric prices, which in turn have even more adverse effects on high-consumption households. Against this, first decile *gainers* now outnumbered losers by between four and five to one.

Amended increasing block tariffs

The Policy Studies Institute (PSI) investigation (Dresner and Ekins, 2004) tried simulation runs on two 'amended IBTs' that are of particular interest to us (recap the discussion involving household occupancy above): one with a free lifeline allowance of 15 m^3/year for all members of the household, and the other with a free allowance of 20 m^3/year for both the first adult and each child.

One new aspect of the results arose because the PSI was using the Anglian SODCON households (standing for 'Survey of Domestic Consumption) as its basic sample. It was thus able to examine the separate effects that each tested tariff had on the two household groups, M and UM (about 630 and 680 households, respectively), with the former of course already paying on the standard Anglian metered tariff. This affected the outputs significantly, with the interesting result that *if we assess all of the different metered tariffs tested by PSI in terms of the smallness of the proportion of the lowest-income households (<£10,000/year) that was made 'much worse off' following the change (defined as a financial loss, i.e. a larger water bill, to the extent of more than £1/week), then the two tariffs with the lifeline allowance linked to household occupancy emerge with the lowest figures, i.e. only 2% in each case*. So it can be argued that, restricting our attention to the *already-metered* household group, the apparent attraction in equity terms of the 'per capita low-priced allowance' is complemented by less 'household financial disruption' than is found with any other metered tariff trialled.

For the other, unmeasured, household group, there was no such support from the PSI desk study for the amended IBTs, in terms of the smallness of the financial disadvantage suffered by low-income households. In fact, if we restrict our interest to the four options that are those likely to be considered as 'feasible possibilities'[30], there is *no* tariff which does not make at least 16% of the lower-income households worse off by more than £1/week. The two 'amended-IBT' option simulations resulted in 21% and 23% of the low-income households (< £10,000/year) losing more than £1/week.[31]

These results are surprising, since it might have been expected that the two amended-IBT options (with a substantial free allowance depending on household occupancy) would generate the 'best' results for the lower-income groups, this resulting from a presumed relationship between household income and overall household consumption (other factors like occupancy being equal). So the first question to ask is: is that presumed relationship in fact correct? The PSI report confirms it is in general terms, but in an indirect way: "…it is not a higher income itself that makes households use more water, but other factors that tend to correlate with income."[32] The *other factors* referred to were found to include, for the sample of UM households: having a courtyard, a shared garden, or a garden; having a sprinkler; rateable value; and the number of bedrooms.

[30] Seven of the eleven metered tariffs in the PSI simulations, including either a volumetric rate and/or a free first block allowance that were determined in some way by the property's Council Tax band, were not considered in this summary of results, as they were adjudged not to be politically feasible and thus not practical possibilities.
[31] For the £0-10K. income group, 45% and 47% were predicted to be gaining more than £1/week in the two options.
[32] Dresner and Ekins, (2004), p. 28.

If, then, there seems to be a broad – albeit indirect – relationship between income and demand, why did the above amended-IBT option results occur? Clearly the financial losers in the low-income group identified in the simulations reported were unmetered water users with high consumption. So the question now becomes: why was their water use so high?

On reflection, there appear to be *three* possible reasons for this. First, because the UM group has no reason to be careful in their use of water, there will be some who consume significant amounts of discretionary (non-essential) water. For the PSI simulations, however, no demand reductions were assumed when households were switched over from UM to M tariffs. But in reality behavioural cutbacks – perhaps substantial – would have been expected from such a switch, and water charges thus reduced.[33]

Second, for some households, the high consumption might have been because of essential use for medical reasons. With the UM tariff they really are 'free' to use that water, of course; and a 'real' switch of such households to metered tariffs would qualify some of them for assistance via the Vulnerable Groups Regulations (see 4.2, above), thus reducing their financial losses.[34] Finally, it is plausible that lower-income households of given size and stucture are more likely than other 'equivalent' households to have ownership of less-efficient, older water-using appliances such as WCs and washing-machines[35] and thus their basic use may be, on average, greater than that of higher income groups.

We conclude that some of this high water use should, upon a 'real' switch to metering, be eliminated through the usual sort of financial discipline arising from unit pricing and some would have to be dealt with through special regulations or tariff arrangements for medical' cases'. The third reason, however, suggests that new special arrangements to help low-income households with demand-management, concentrating on the basic domestic appliances, would need to accompany any rapid movement towards higher metering penetration. Evidence concerning such programmes will be referred to in section 7, below.

Our conclusion is that, with the caveats just inserted, the evidence from desk studies is that moves towards increasing block tariffs, with allowances for basic use at least partly determined by household occupancy, would be likely to be beneficial for lower-income households. Even without the caveats, large numbers of such households would gain; and once likely demand reductions (following metering) were factored in, the remaining 'financial losers' might well be reduced to numbers that could be handled in targetted 'medical needs' and demand-management schemes.

Seasonal Tariffs

Finally, there is the issue of seasonal tariffs, which were addressed by the MS and Oxera studies. In the MS work, the big losers from such tariffs are, as expected, the top three deciles, but at the same time the 'losing' households among the two lowest income deciles surprisingly numbered nearly 40% of the total. For Oxera, the summer surcharge tariff was designed as an extension of the rising block tariff (with a fixed free allowance), which goes some way to explaining some of the adverse effects it has on lower deciles and vulnerable households. The effect on water demand is also pronounced – a 14% to 28% reduction - but this too is in part traceable to the very generous assumption that *all* consumption over June to August would be subject to a price elasticity of demand of –0.4.

[33] Unmetered water is surely one of the few goods and services that, at least in 'normal' (non-drought) times, low-income households are able to consume and enjoy without any regard for the implications of their consumption for the household budget. It follows that demand cutbacks in discretionary use following metering might be considerable.
[34] In any future compulsory metering programmes, it would be important that improved arrangements for those with serious medical needs for high water use were introduced.
[35] If household income is low and the marginal price of water is zero, why bother to change a water-inefficient appliance, attend to a dripping tap or even look after a leaking supply pipe? We are not aware of any evidence relating to this third possible explanation of high consumption among low-income households.

6. The Regulatory and Legislative Context for Water Charging

[A fuller description of the changing legislative and regulatory context affecting water charges in England and Wales since 1989 will be found in Appendix 2]

This short section highlights some of the legislative and regulatory changes, more fully described in the appendix, which may have implications for any future proposed introduction of new social tariff structures of the type that have been examined in earlier chapters.

The Secretary of State (SoS) and the water industry's economic regulator (now the Water Services Regulatory Authority: WSRA)[36] have been bound by a series of primary and secondary duties since the privatisation Act of 1989. The duty deckchairs were shifted around significantly by a new Water Act in 2003. This introduced a brand new primary duty, stipulating that the SoS and the WSRA must each exercise and perform their many powers and (other) duties "in the manner which he or it considers is best calculated…to further the consumer objective". And a new clause elaborated on those whose interests the SoS and the WSRA "shall have regard to" in furthering this objective – among others, individuals who are disabled or chronically sick, of pensionable age, of low incomes, and those residing in rural areas. In other words, groups including some potentially very vulnerable and financially disadvantaged customers, familiar to those interested in social tariffs, plus a group – rural customers – who have been hovering around in all the legislation from the modern beginnings in 1989.

In the 1989 Act the rural customers were uneasy and very close bedfellows with another ever-present player in the four Water Acts of 1989-2003: the *no-undue-preference-or-undue-discrimination-in-the-fixing-of-charges* clause. Uneasy, because the one group that receives most preference in charges are rural water customers (their supply costs are significantly higher than those for urban dwellers, but their tariffs are the same, so the cross-subsidies flow in some profusion). And very close, because up to 2003 they shared top place in the league table of secondary duties.

But in the 2003 Act rural consumers, as part of the elaboration of 'the consumer objective', appear to have been promoted, while the no undue preference etc clause now languishes in second place in the old second (i.e., secondary duty) division. So it might be thought that *no-undue-preference-or-discrimination-etc.* might now be pursued only to be subject to the SoS's and WSRA's regard (which the legislation says they '*shall* have', note [emphasis added]) for the interests of the various disadvantaged. But it's not so simple, for lingering in the background remains Condition E of each undertaker's Instrument of Appointment, prohibiting each company from showing any undue preference or discrimination in fixing its charges. Thus do apparent inconsistencies in legislation procreate.

The ironies are not over yet, though. For the 1999 Water Act gave the (then) DGWS and SoS important new powers concerning water company charging schemes; the former, the power to approve (and thus to reject) individual tariff structures or schemes proposed for some or all customers, and the latter, powers to influence charging schemes both directly (the SoS can establish regulations) and indirectly (he can give guidance to the (new) WRSA, which is bound to "have regard" to such guidance, whatever that may mean). The irony arises because the SoS immediately started to extol the virtues of social tariffs, seemingly encouraging

[36] The statutory name of the economic regulator up to 1 April 2006 was the Director General of Water Services (DGWS). Individual governance was replaced by corporate governance under the 2003 Act.

companies to go beyond the ill-fated Vulnerable Groups Regulations in devising and submitting to Ofwat new social tariffs; and, at more or less the same time, the DGWS, enjoying the new powers to approve and reject, began to turn down schemes intended to assist different customer groups and some of which previously had gone through unopposed (and still survive today – see the Anglian and Mid-Kent low-user tariffs and larger-user passport tariffs, described in section 4.2).

It is not that anything illegal has happened here. Rather are the words *hymn-sheet*, *singing* and *different* brought to mind, when considering the apparent intentions from 2000 onwards of the Secretary of State and what is now the WSRA. Thus, as we have seen in section 4.2, the recent Anglian proposal for a substantial Passport tariff, covering nearly a fifth of its lower-income household customers, seems to have hardly got over the first hurdle at Ofwat, despite claims that in 2009-10 – after four years' operation – the annual financial impact on the other 80% of its customers would have been reduced from £8m to £3m because of the expected reduction in bad debts (in 2006-07 prices; Anglian Water, 2006, and Bohanna, 2007). And £3m represents something less than 1% of the charges of that 'other 80%'.[37] What is and what is not 'undue'?

If Ofwat seems to own up to few chinks in its armour where new passport-type tariffs that impinge on other customers are concerned, the other social tariff route explored in this report – increasing block tariffs – reveals a slightly more encouraging story. For hidden away in a little-known Ofwat Briefing Note38 of April 2005 was the Ofwat Tariff Team's conclusion that

> "Rising block tariffs attempt to distinguish between essential and discretionary water use. They are much more likely to be successful in doing so if the first, cheaper block of water varies with the number of occupants in a household. Such tariffs might help to address affordability concerns without compromising the objective that charges should be cost-reflective. They present some practical difficulties, but we think that they merit further investigation……" (Ofwat, 2005; p. 9)

This suggests that Ofwat might be receptive to such ideas (and even their practical application?), notwithstanding the obvious difficulties in establishing just who gains and who loses, and by how much, if and when a compulsory switch from an orthodox metered to an amended-IBT were to occur. Indeed, perhaps it is the very difficulty in establishing the matrix of financial consequences that would be part of the attraction? This is an area where the Secretary of State could and should take an interest – perhaps through guidance to the regulator – if there is little sign of progress on the internal Ofwat front.

Because these matters are urgent – water poverty and the financial stress it engenders is growing and as a result household metering spreads slowly and thus the environment suffers – decisions on new tariff structures are required sooner rather than later. Appendix 2 therefore includes a shopping-list of what may have to happen to regulation and legislation if we are to take seriously the social and environmental imperatives that have only really been dabbled with since the millennium began.

[37] Calculations by the author, aided by Anglian Water (2006) and Ofwat (2006b).
[38] The note – see Ofwat (2005) – appears to have been presented to the Cross-Government Review of Water Affordability Follow-up Group on Tariffs at some point in the middle of 2005. It is available through http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/disc_log_foi92 : scroll down and click on *Briefing Note – April 2005*.

7. Assessing the Options for new Water Tariffs

In section 2 it was argued that because of current and predicted UK trends in demands and in the burden of water charges on low-income households there is an urgent imperative to devise and implement new tariff structures. These should promote sustainability while simultaneously addressing affordability. Indeed, without such tariffs in the water sector, it is likely that domestic metering penetration would be constrained to increase at the present inadequate annual rate of only 2%-3% of households. Water poverty would then continue to worsen (see s.2.5) and the protection and restoration of the aquatic environment would suffer.

Two types of social tariff were identified which may permit progress on affordability:

- targeted passport tariffs; and
- one-size-fits-all increasing block tariffs, as amended for household occupancy

In sections 3-6 there was then presented evidence relating to (i) examples of such tariffs actually in operation or proposed, both in the UK and abroad, (ii) the actual or predicted effects of such tariffs on demands and on the financial situation of different household groups across the income distribution, and (iii) the present regulatory and legislative contexts in which such tariffs would have to be introduced in Britain.

7.1 ASSESSMENT CRITERIA

No preferences have been expressed so far in this report regarding the different possible tariffs; but we are now in a position to bring together the evidence and offer a reasoned preference as to the best way forward for the water sector. This is the aim in this section 8, where eleven criteria will be dealt with in turn, as a way of comparing, contrasting and assessing the two candidate tariff types (for expositional efficiency, call them simply **passport** and **amended-IBT**):

- affordability benefits
- inclusiveness
- sustainability benefits
- coverage of customers
- UK and overseas experience
- distributional investigations
- regulatory/legislative implications
- fraud/exclusion
- customer attitudes
- adaptability of tariff
- possible optional status

[At Appendix 3 is a comprehensive comparison of the two tariff types, in tabular/note form, using these criteria as the basis of a series of questions which are asked of each tariff]

7.2 THE ASSESSMENT

Consider **affordability** first. Clearly this is the major advantage of *passport*, and it can be expressed as: '*you know exactly what you are getting'*. The size of the household group eligible for assistance and the extent of that assistance are both directly determined by the

utility, and will be known to everyone concerned. In a sense, the effect on water charge burdens is determined *ex post*.

For *amended-IBT*, however, the effect on affordability is much more indirect, partly via consumers' behaviour patterns. It is 'very ex ante', relying on a number of factors the size of which will be uncertain. First, there must be *some* link, somewhere, between income and water consumption, even if it is restricted to non-basic demand (or, for that matter, to wasteful and unnecessary use[39]). Second, the basic use tranche with the low or zero price has to be 'roughly right' – if it is too small (e.g., 10 lhd) it is trivial and not worth the bother. Third, there must be *some* way of granting 'larger' households a larger basic use allowance, for if even large households are accommodated in a relatively large (and mostly fixed) basic use allowance, the cross-subsidisation of smaller households (who find all their discretionary use neatly and profitably fits into their basic allowance) becomes intolerable. There are clearly important trade-off issues here to which we will have to return.

On the issue of **inclusiveness**, the positions are obviously reversed. The financial help resulting from *passport* splits customers sharply into two – those whose bills are reduced or capped at a particular level, and the rest whose bills will consequently rise – even though the change in incomes across the percentiles of the income distribution is gradual. That division, with all the usual problems attached to eligibility and the underlying means-testing, may breed resentment among consumers. *Amended-IBT*, however, is a single, coherent and inclusive tariff for all metered consumers: everyone – if they're metered – is in the same boat.

Amended-IBT also addresses the **sustainability** dimension with the powerful and appealing conservation message: 'the more you use, the higher the price (but we'll allow for your essential use)', rewarding the thrifty (who aim to stay in the lower-price blocks) and penalising the wasteful (who find themselves in the high-price blocks). The evidence? In the US and Barcelona, moving from orthodox to IBT or adding a more expensive block to an existing IBT was associated with average demand reductions in the 10-15% range, although there was sometimes a simultaneous conservation campaign ongoing. *Passport* offers no such extra incentives for careful use above those already embodied in the standard metered tariff – it simply redistributes the charges so that some – the better-off – find volumetric prices higher and *passport* prices lower, meaning that any net effect on demand is both once-and-for-all and of a low order of magnitude (especially given the section 3 evidence on price elasticities).

Against that, *amended-IBT* with occupancy allowances has less **coverage**: it affects directly only metered households. However, in a world where opting into metering continues, the allowances should attract larger UM households into the metered sector – this is the *indirect* effect of the amended-IBT, and these are precisely the households who at present quite rationally hold back from switching. If fear holds them back from switching, some of those UM low-income households are left with large bills (e.g., in the south-west), whereas the *passport* remit can be as wide as the utility wants, covering all customers if desired.

Section 4 covered the **experience in Britain and abroad** of both social and sustainability tariffs. Start here with *sustainability*. A small summer tariff trial has just started in Kent but there is no substantive evidence on the operation or effects of any UK IBT (s. 4.1). Overseas (s. 4.1) there are at least ten OECD countries with experiences of orthodox IBTs, and two of them (Barcelona, in 1989, and Athens, over 1988-91) have added one or two extra blocks. Seasonal tariffs have been restricted to a couple of UK National Metering Trials sites in the early 1990s, Madrid (recently) and around 11%/15-20% of US utilities/population. Finally, we note that some *passport* tariffs will, by capping bills, remove the financial discipline of

[39] If there was no such link of any kind, in a metered environment, there can hardly be an affordability problem, since all the high-water-charges households would presumably be effectively *choosing* their high burdens.

paying for water by volume; however, water companies can continue to read the customers' meters, and so be able to question unrealistically large increases in consumption.

On *social* tariffs, England and Wales has a recent history of *passport*, as s. 4.2.1.shows. The Vulnerable Groups Regulations are both restrictive in scope and, it seems, not very popular[40]; while the other schemes described in Table 7 (above) did not need Ofwat's approval powers when they were established (Anglian *Aquacare Plus*) *or* are so small that there's no knock-on effect on others' bills (Wessex *Assist*) *or* were planned to be so large that Ofwat deemed that *undue preference* might become rife among the passport holders (Anglian *Passport*). There are similar, much larger, schemes that have been long established in Australia and the US.

Concerning the *amended-IBTs* there is still only basic information available about the 'pure' amended variety of Flanders and Malta (see 4.2). Studies of the actual operation and effects of those tariffs have been sought, but unsuccessfully; and the same goes for the *partially*-amended IBTs reported in the Spanish and Greek cities, Luxembourg and the US.[41]

Distributional investigations are important because they provide the only available 'evidence' on how different customer groups (UM, or already-M) might fare financially if switched to an 'exactly'[42] *amended-IBT*. In section 5.2 it was noted that the already-M low-income households in the PSI study who were switched from a simple 2-part tariff to an amended-IBT fared better than if they had been switched into any other metered structure: of those on £0-10K./year, 80% gained and 20% lost (only 2% losing more than £1/week).

However, there was a different result when simulating an enforced switch for the *unmeasured* households in the PSI sample (of Anglian Water customers). Here many more lost out significantly (22% of the lowest-income class lost > £1/week, although 46% gained that amount), suggesting the losers had relatively high per capita demands. This could be due to (i) high discretionary use, (ii) medical needs or (iii) high basic use due to inefficient or 'old-technology' appliances. Under a metered tariff (i) need not be of concern (a volumetric price >0 should reduce such demands), but (ii) and (iii) both require special arrangements,

Some water companies already have policies in place to deal with special 'medical demands'[43], and such good practice can and should be spread. However, reason (iii) should be recognised as of potential concern, and would be best dealt with by a company-led demand-management programme to help low-income households manage their water use and thus their water bills. Such initiatives are not uncommon in the United States (e.g. New York City, Philadelphia, Portland) and more recently Australian utilities in Melbourne and Sydney have begun such programmes[44]. Recently (April 2007) South West Water launched – and funds itself – a home-visits programme called *WaterCare* helping up to 1% of its domestic customers simultaneously to pay their bills and save water at the same time.[45]

The present **regulatory** ethos in England and Wales suggests that unless companies can finance *passport* tariffs without any significant consequences for other customers (meaning they must be financed either out of profits or by proven reductions in debt costs), Ofwat will

[40] Alternatively, Ofwat's collected figures for take-up may be quite askew. In the course of the work for this report, it has emerged that there may be a significant divergence between the totals that Ofwat wish to collect from the companies and some of the numbers that are actually being reported to them.
[41] See OECD (2003), s. 3.3.4.
[42] i.e. one that gears the basic free or low-price allowance *exactly* to either the no. of persons in the household or, with more sophistication, to the no. of adults and no. of children separately. A third level of sophistication would also allow for economies of scale in basic use, e.g. via clothes washing and dishwashing.
[43] The national Vulnerable Groups regulations now deal with a wider range of medical conditions, of course.
[44] See OECD (2003), s. 3.3.6.
[45] See www.southwestwater.co.uk/index.cfm?articleid=3564

reject them[46], and there is some recent evidence of **customer opinion** in favour of this hard line (Consumer Council for Water [CCWater] deliberative research[47], February 2007). This is despite the questions that can be raised about the **legislation** relevant to these initiatives, as discussed in section 6. On the other hand, section 6 also suggested that Ofwat does not appear to have ruled out *amended-IBTs*, and the CCWater **consumer research** just referred to interestingly showed considerable focus group enthusiasm for this sort of metered tariff.

Three further aspects are now raised. First, we note the risks attached to both types of tariffs of the sort (**fraud, eligibility inclusion or exclusion**) which mean that consumers who 'should not' receive the benefits in fact do and those who 'should' receive the benefits in fact do not. It is probably impossible to eliminate these completely. Second, the potentially important issue of the **adaptability** of a tariff to cope with demand and affordability 'shocks' should be faced.[48] In this respect, the *amended-IBT* seems to possess relative advantages, since block width, the number of blocks and initial- and high-block prices may all be amended to cope with such future changes, whereas most *passport* tariffs can offer only the price dimension (i.e. the discount percentage), for tackling the affordability issue alone.

Finally, the '**optional or not**' issue should be broached. In one sense nearly every *passport* tariff is by definition 'optional', in that households will normally have to apply for it. The only exceptions arise when the water utility itself holds or is legally permitted to obtain the passport information on which a tariff discount is to be based – e.g.,a connected house or flat's RV (as at present, but the register is of course incomplete and increasingly inexact) or its Council Tax band (conceivable, in the future). An *amended-IBT* is clearly not 'optional' (it would normally be compulsory for all metered households), but it *is* perfectly capable of having a passport-type special tariff pinned on to it (a VGR-type tariff, e.g.) so that households with certain defined social or other eligibility characteristics may have their charges capped or otherwise amended under certain circumstances.

7.3 THE PREFERRED TARIFF STRUCTURE

Consideration of these criteria leads to a judgement that the occupancy-linked OSFA increasing block tariff is by far the best way of dealing with (and adapting to, over time, as necessary) the increasingly serious sustainability issues in the UK while still being able, if necessary with the aid of some ancillary measures, to deal with affordability problems that will continue to deepen if there is no substantial change in water company tariff structure policies.

We now turn to consider some of the practical considerations of this proposal.

The Benchmark

The benchmark *amended-IBT* is the Flanders water supply tariff, which recognises that water for people in their homes is both a 'social good' (basic use, free: 41 litres/head/day) and an 'economic' good (all other uses, at a single volumetric price). Since this is the benchmark – 10 years old in 2007 – it seems appropriate that any deviations from this particular *structure* have to be justified.

[46] Compare Ofwat's decisions on Wessex Water's *Assist* tariff with it's rejection of Anglian Water's *Passport* tariff, despite Anglian's estimates that the net impact of this tariff on other customers would be about £3m./year in 2009-10, equal to only about 0.5% of its annual turnover from households.

[47] *Deliberative research into consumer views on fair charging for the Consumer Council for Water*, report prepared by Corr Willbourn Research & Development, 5 February 2007, available via CCWater website.

[48] For example, an unanticipated increase in the underlying trend increase in luxury water use (sustainability) or an unanticipated widening and deepening of income differences within the income distribution (affordability), perhaps associated with ongoing globalisation.

How Many Blocks, and What Size?

Two is simple and straightforward, but it may not correspond to the reasons why and the ways in which people use water. *Three* would capture a division between (i) basic (really essential use), (ii) discretionary (perhaps the same as 'reasonable'?; there is a great deal of use here, from staying in the shower longer than x minutes, right out to washing your four pet sheep, and (iii) unnecessary/wasteful/absent-minded; and the relative prices would be set appropriately. If a summer tariff was employed, the block(s?) could be widened to reflect use in that season. Any fourth block would need a very special justification in a European setting where garden irrigation use is generally sub-Australian and sub-American.

It might even be possible to agree on a *basic use* figure nationally, since so much of basic water use in the home is quite homogeneous (give or take new water use regulations perhaps proceeding at different rates across the country, given different housebuilding rates relative to existing stocks?). It is not immediately clear whether the second block in a three-block structure should be occupancy-related as well; although the answer is probably not if, because of information deficiency, the basic use tranche has always to be geared to more than one person (see below). Maybe the answer to the original question (how many blocks?) should be: "as few as are necessary". I suspect the answer is not more than three. One more can always be added later (Barcelona did this).

What Prices?

With a two-block system and a free first block, there are no degrees of freedom – given expected demands, etc., the second-block price is determined. With three, four, etc., the possible relativities and permutations become huge (with each associated with different distributional effects [who gains, who loses, and how much?], different demand effects and different risks – of under- or over-shooting 'allowed' revenue – for the water company).

In Flanders there has been some criticism that the post-1997 price structure gives "the impression that water is not as important as it seems because we give it away for free" (OECD, 2003, p. 89), and this seems a good argument for a low, but not zero, price.

The Treatment of Household Occupancy Abroad

Only Flanders, Malta and the Luxembourg communes have (or nearly have) 'perfect' information on occupancy; none of the other examples detailed in Table 8 has a pure per capita system for calculating the width of the first block.

In the three largest Greek cities the change in the tariff structure is triggered by a third child; Athens gives a very generous per capita addition for each extra child after two, while the others simply halve the normal metered bill if C > 2 (a passport-type tariff in disguise?). One of the Spanish examples – Murcia – also has a generous per capita extra allowance triggered by a child count (> 3), while the other four all go for a 'default' household of four members, the explanation seeming to be that families of more than four members are entitled to a number of state benefits (and have a certificate to prove it). The basic block for up to four in those four cities varies enormously: 197, 200, 500 and 533 litres/household/day; given that the nearest estimate to those cities' per capita consumptions it has been possible to obtain is that of its 'region', and those regional figures vary only from 171 to 189 lhd, the conclusion must be that Barcelona and Malaga seem much 'tighter' with their basic use figure (consider a 3- or 4-person household), while Madrid and Seville seem much more at the generous end.

Of the other two examples (in the US), Irwin Ranch offers a basic indoor 1st plus 2nd block of 4 x 283 lhd, i.e. 1132 l/household/day (there is a separate outdoor use allocation), with another 283 lhd for each extra household member (applications are invited); while Los Angeles has a basic first block for up to six people, and then adds a higher per capita rate (186 lhd) for H = 7 to 9 and a lower per capita rate (83 lhd) for H > 9 and up to 13……so scale economies at work.

What of Estimating Occupancy in England and Wales?

Because there is no updated register of household occupants in Britain, it would seem necessary for a UK utility to use a default number and then invite applications (with evidence) for any additional household members, for whom the allowance would be suitably augmented.

There is potentially a large amount of work involved here, so information on occupancy in England and Wales was sought. The results from three national surveys (below) are consistent, and strongly point to a default occupancy also of four. Four would leave 6% or 7% of households having to make an application if they so desired, whereas three would mean applications coming in from up to 20% which burden might be too great.

Occup-ancy	FRS, 2005-06 England	FRS 2005-06 Wales	Survey of English Housing, 2006
1	29%	27%	28%
2	36%	37%	36%
3	15%	17%	16%
4	13%	13%	13%
5+	6%	6%	7%

Source: ONS *Note*: FRS = Family Resources Survey

A tougher approach which relaxes the 'inclusivity' claim for the amended-IBT, in order to reduce the default household occupancy basic per capita allowance to *two*, could allow information about household numbers for those on government benefits (GBs) to be passed to the utility so that all GB-receivers received the 'correct' number of allowances. Non-GB holders, however, would received the default of two allowances, but for each household with more than four people, one extra allowance would be added for each household member above four; thus for more than three people, X people would mean X – 2 basic allowances.

Children and Adults: Different or the Same?

Given that adults and children are thought to be associated with different water consumption rates (Dresner and Ekins, 2004, in the PSI desk study of section 5), fixing the 4-person default l/hh/d (or that for any other default figure) raises questions about (i) what to assume about the composition of the (default) household and (ii) whether to allow for – and, if so, how – the economies of scale in water use that are shown to operate in all cross-sectional comparisons of the PCCs of different household sizes. This should depend on the relevant information that is available to that particular company.

Pinning other Programmes or Assistance on the Amended-IBT

This has already been raised in 7.2, but it should be reiterated that there is nothing in the amended IBT tariff-type that has been described so far which stops a passport-style amendment of, or change to, a household's overall water bill occurring depending on the characteristics of that household (such as some indicator of its financial or other vulnerability).

Perhaps more 'constructive', however, is the idea also mentioned above of reducing the water bills of lower-income households who find themselves using larger amounts of basic use (because of old WCs, old washing machines, etc) through demand-management action instigated by the water company. This could even involve replacement of the appliances at a discounted price by the utility.

APPENDIX 1 HOUSEHOLD WATER DEMAND FORECASTS FOR ENGLAND AND WALES

1. As real incomes rise, the domestic demand for water for 'useful consumption' and recreation in and around the home will tend to increase, as long as other factors (such as the real price of water, water regulations, household occupancy, metered status of the household, climate, etc.) are notionally held constant. This has been the experience of virtually every country and there is no reason why it should change.

2. In 1996, a study was undertaken for the DoE of the possible effects of climate change on the domestic demand for water. This included an exercise which looked ahead to 2021 (from a baseline year of 1991) and forecast what per capita consumption (PCC) in the household sector would be at ten-yearly intervals, including the best estimate that could be made for the climate change effect. Because most of the data that informed the micro-components of domestic use which underlay those forecasts were from the south-eastern half of England and Wales (the then 5 National Rivers Authority regions from Bristol to the Wash were selected) and from a time when virtually every household was unmetered (UM), the forecasts were for that south-eastern half of the country and were for UM demand. Consumption in that area was found to be about 5% to be above the national average, but the difference has probably now widened.

3. The main forecast was that UMPCC in the south-east – 147 litres/head/day (lhd) in 1991 – would grow through 155 lhd in 2001 and 166 lhd in 2011 to just over 178 lhd in 2021 (*Climate Change and the Demand for Water*; DoE, 1996). In fact the 166 lhd figure was reached just over 5 years early, if (i) the south-eastern water companies' own estimates of unmeasured and measured PCC which Ofwat assembles and publishes each autumn are accepted (*Security of Supply, Leakage and Water Efficiency*; Ofwat, Birmingham, each year) and (ii) a small allowance is made for the companies that imposed supply restrictions in 2005, which meant that their supply figures could not be used as surrogates for demands. The result is that the 1991-based forecast for 2005 (interpolated) was overshot by about 3%.

4. The last national and regional demand forecasts undertaken and published by the Environment Agency date from 2001 (*A Scenario Approach to Water Demand Forecasting*; EA, Worthing, August 2001). If we choose that scenario (Beta, called *World Markets*) which was most like the UK economy then (and now), we find that household demands were being forecast to increase from 1997-98 to 2010 by 13% and from 1997-98 to 2025 by 19%. In fact, if again the annual Ofwat-collected data are taken seriously, we find that household demand has risen by about 5% from 1997-98 to 2005-06. This is just over half the *rate* the EA had been forecasting for the period until 2010, and meant the 2005 forecast had been *undershot* by about 3%.

5. The only recently-constructed demand forecast to be found in the public domain is that of an important group called the *Water Resource in the South East* (WRSE) group. This is a body of representatives of all the water companies in the south-east and of the Environment Agency that regularly reports to the South East England

Regional Assembly (SEERA). SEERA is the "representative voice of the region"; it has responsibilities in key areas including regional planning and housing, and therefore water demands and water resources are crucial to its work.

6. In May 2006 SEERA released a document submitted by WRSE entitled *Response to latest South East Plan Housing provision and distribution received from SEERA.*[49] It is possible from the data in this report to discern the aggregate demand forecasts of the water companies serving the SEERA region; the following table has been constructed from that data. The table will not be found in the document. The SEERA region is believed to cover about 15 million people, nearly 30% of England and Wales.

7. WRSE Group Forecasts Presented to SEERA, May 2006

All figures in millions of litres per day (Ml/d)	2005-06	2025-26 forecast	2025-26 forecast
Scenario for 2005-06 to 2025-26 housing growth	-	(A): 28,900 new homes per annum	(B): 40,000 new homes per annum
Total Dry Year Demand	2509	2837	2918
Increase over the period Household demand Non-household demand Target headroom increase Total		 206 9 113 328	 287 9 113 409
Increase in demand to be met by resource developments or demand-management		+13.1%	+16.3%
Resource developments to 2030 proposed by water cos. in PR04 water resource plans		364	364

Source: data found in WRSE document as detailed in para. 6.

8. Although it is impossible to estimate the percentage increase in household demand from this data (the 2005-06 figure is one of *total* demand, and the household component is not specified in the report), it is seen that the order of magnitude of the growth being forecast is similar to – perhaps a little less than – that in the 2001 EA forecast (para. 4). *This suggests that significant overall growth in water demand on present (water company) assumptions is still expected.*

9. Short of a full-blown forecasting project, there is probably only one other way to get a feel for what the future may bring, which is to look at recent trends in the companies' own household PCC estimates, both UM and M, and try to work out what the data are telling us. For the current decade this is a particularly difficult exercise, for in the period since 2000 all of the following factors have simultaneously been at work:

- household occupancy falling, so PCC is rising as scale economies lost
- metering is increasing at 2%-3%/year, so PCC tends to fall
- there is probably an underlying increase in demand
- the climate is all over the place, yet needs to be allowed for
- demand-management initiatives seem to have been stepped up
- significant supply restrictions in 2005 and 2006

[49] It can be accessed at:
http://www.southeast-ra.gov.uk/meetings/advisory/nat_res/water_resources-may06.pdf

10. Only (a) and (b) can be easily quantified. Demand analyses using panel data (many individual households' records over a long period) can help to estimate the elasticity of household consumption with respect to household occupancy, and statistical work done by Baker et al. (2003) gave a figure of + 0.4, for M and UM households (separately). This meant that, other things being equal, a 1% decrease in household occupancy (e.g from 2.0 to 1.98) would be associated with an decrease in household consump- tion of 0.4% (e.g., from 360 to 358.6 l/day, thus increasing PCC from 180 to 181.1 lhd). That may not seem much, but when it is expected to go on right up to 2031, it does make a difference: based on household size reductions alone, it can be estimated that an England and Wales overall PCC of 150 lhd in 2004 would rise to 161 lhd by 2031, an annual increase of 0.4 lhd. The effect of the slow increase of metering penetration can be estimated with the aid of stylised data (12% savings, e.g.), and this suggests that the annual reduction in demands because of factor (b) above would be a little over 0.4 lhd, thus approximately cancelling out (a).

11. The aim is to estimate to estimate (c), but it is impossible to know how to allow for (d),(e) and (f) from the raw data alone. So we stay with the conclusion in para.8: either the pressures on the environment are set to grow, or, as the WRSE group itself noted:

> *high levels of household water metering must be implemented across the South East to help secure the water efficiency savings that are a vital part of secure future water supply management across the region.(6.6)*

APPENDIX 2 SOCIAL TARIFFS: THE REGULATORY AND LEGISLATIVE CONTEXT

Historic and current legislation relevant to the charging powers and duties of the relevant Secretary of State (for the Environment) and of the Water Services Regulation Authority (WSRA, this Authority replacing the Director General of Water Services in 2006[50]) is to be found in the Water Act 1989 ("the 1989 Act"), the consolidating Water Industry Act 1991 ("the 1991 Act"), and the Water Industry Act 1999 ("the 1999 Act") and Water Act 2003 ("the 2003 Act"),which modified the 1991 Act to accommodate shifts in Government policy.

Primary Duties Pre-2003

What have come to be known as the *primary duties* of the Secretary of State (SoS) and the Director General (DG)/WRSA were first spelt out in the 1989 Act and remained broadly unchanged until 2003. The SoS and the DG were to exercise and perform the many powers and duties conferred upon them (individually) by the successive 1989, 1991 and 1999 Acts "in the *manner* [emphasis added] that he [the SoS or the DG] considers is best calculated":

- to secure that the functions of water and sewerage undertakers are properly carried out; and
- to secure the financing of the proper carrying out of those functions (e.g.,1989 Act, s. 7(2))

Secondary Duties Pre-2003

There was no elaboration of those two primary duties in the early legislation, but there *was* added a list of what have come to be known as *secondary duties*, which were also all about *manner* and remained unchanged until 2003. They were *secondary* because they gave the SoS and the DG another list of objectives they ought to be ensuring, promoting or facilitating (in short, ought to be concerned with), *but the pursuit of each of which was subject to the above-mentioned primary duties*. It is very clear in the legislation that the second list is subject to the first.

Thus, subject to s. 7(2), above, the legislation spells out that the SoS and the DG must each exercise and perform powers and duties "in the manner that he considers is best calculated":

- to ensure customers are protected regarding charges and other amounts levied by undertakers *and in particular that rural customers are so protected and that there is no undue preference or undue discrimination in the fixing of charges* and other amounts [emphasis added];
- to ensure protection for each customer concerning the terms and quality of services provided;
- to ensure customers' interests regarding land disposal proceeds are protected;
- to promote economy and efficiency on the part of a water company in carrying out its functions; and
- to facilitate 'effective competition', as considered appropriate, between actual and potential water and sewerage undertakers (e.g., 1989 Act, s. 7(3))

Ofwat's Position on these Duties

Clearly an intellectual route could be traced between the two primary duties above and a water undertaker's charging schemes; but it would be at best a very indirect one (save, of course, in the establishment of a company's overall level of charges, which is not the concern here). It is only when we turn to the secondary duties that we begin to identify issues which are potentially of direct significance to tariff structures and charging schemes.

[50] The statutory name of the economic regulator was changed to the Water Services Regulatory Authority as from 1 April 2006. Because the Authority is now governed by a Board, individual governance – by the Director General of Water Services – has been replaced by a corporate governance framework. However, the administrative organisation undertaking economic regulation of the water and sewerage industry in England and Wales continues to be known in its original abbreviated form, Ofwat.

The first bullet point of the pre-2003 *secondary* duties list (above) had three elements. The first of these seems to be a general and fairly anodyne restatement of the need to protect water services customers, who are, in the vast majority of cases, supplied by regional or local monopolies. No immediate message for tariff *structures* is apparent. The second element represented the result of a determined MP's efforts to ensure, at the time of the original legislation, that the large cross-subsidy already being enjoyed, within individual water company areas, by many rural consumers – resulting from the fact that typically supply costs to individual rural customers are significantly higher than those to urban dwellers in the same company – was preserved into the new privatised era. The third *no-undue-preference/no-undue-discrimination* element, also incorporated as Condition E in the Instrument of Appointment of all Water and Sewerage Undertakers, has generally been regarded by Ofwat as its most important duty in its consideration of charging schemes and tariffs, especially since it acquired the power to approve (and thus also to reject) company charging schemes in the 1999 Act[51].

The irony of the immediate proximity of the rural protection and undue preference/discrimination elements before the 2003 Act should not be lost. If it is believed that a charging system should be based on costs – and this is a position often taken, e.g. by Ofwat[52] – then it could be argued that the *no-undue-preference/no-undue-discrimination* clause was standing in apparent contradiction of its neighbour, the rural protection clause. On some approaches to (and interpretations of) the legislation, this was an unsatisfactory situation.

The 1999 and 2003 Water Acts – a Shift of Direction?

The 1999 and 2003 Acts introduced, respectively, significant new powers for the economic regulator and the Secretary of State concerning company charging schemes (1999) and a major recasting of the regulator's and the SoS's primary and secondary duties (2003). The 2003 Act also included a new section (40) spelling out how the SoS should formulate and give guidance to the WSRA about social and environmental matters. Consider these in turn.

New Powers for the SoS and DG Regarding Charges Schemes

Up to 1999 a water or sewerage undertaker obviously had been able to fix charges for services provided, and indeed to make a 'charges scheme' (s. 143 of the 1991 Act). The 1999 legislation, however, introduced new powers whereby (i) the DG had to approve (and thus could reject) an undertaker's charges scheme and (ii) the SoS was able to affect company charging schemes both *indirectly* – by giving relevant guidance to the DG (who was bound to 'have regard' to such guidance) – and *directly*, by establishing regulations covering a range of matters relating to charges including liability of consumers for particular items, the methods and principles for calculation and imposition, and special provision for disadvantaged or vulnerable groups. The legislation continued to indicate that both the SoS and the regulator should exercise their powers and duties – including these new ones – taking account of their original primary and secondary duties (set out in the 1989 Act, and unaltered in the 1991 and 1999 Acts), in the manner spelt out above.

The DG's and SoS's Exercise of New Powers

In 1999 the DG started to approve charges schemes for the year 2000-01, company by company. That year also the SoS made two regulations concerning limits on compulsory metering and the introduction of a tariff for vulnerable groups (the latter is the *VGRs* tariff; for details, see section 0 above). In August the same year the SoS published a draft of the

[51] For example, "The current principal statutory duty of the Director under the Water Industry Act 1991 with respect to charging is the avoidance of undue preference and undue discrimination in the setting of charges" (*1999-2000 Report of Tariff Structure and Charges*, Birmingham: Office of Water Services, May 1999, p. 14)

[52] "We expect [company tariffs] to take account of Ofwat's duties to [(i)] [e]nsure that charges are neither unduly preferential nor unduly discriminatory. We interpret this to mean that companies should charge customers with similar cost characteristics similarly….." (Affordability and the structure of household water charges – options, Ofwat Briefing Note, April 2005, p.1, available at www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/disc_log_foi92)

guidance which he proposed to give the DG on social and environmental matters relating to charging schemes, but the final guidance, published after consultation in February 2000, was too late for the DG to use in formally assessing company charging schemes for 2000-01. So the DG used the draft guidance instead, and under two headings of interest to us – *social* and *low user* tariffs – refused to accept a number of company proposals.

Social Tariffs: Guidance and Out-turn

The (final) guidance from the SoS on social tariffs included the statements that:

> "…..the aim of such protection is social, rather than economic. It is therefore right that the Government should take specific action through regulations to ensure that protection is offered to vulnerable customers"; and
>
> "Where companies devise well considered and workable proposals for social tariffs, which do not have an unacceptable impact on other customers' bills and do not represent 'undue discrimination', the presumption should be that such tariffs should be allowed in charges schemes".

The SoS thus seemed to be viewing his regulations as the minimum provision for vulnerable groups; certainly additional social tariffs were not being ruled out. In fact, some companies proposed measured tariffs which gave wider coverage than the narrowly-cast *Vulnerable Groups Regulations*, but the DG rejected them as he:

> "….considered that the Government had decided, through regulations, on the protection needed for categories of measured customer, and that it is not for companies, or him, to take a different view, except in so far as transitional arrangements were needed."

Notice Ofwat's presented reason for rejection: it is nothing to do with undue discrimination or undue preference, but rather that it is not the role of any water company to go further than the VGRs. This view – which suggests that the DG and SoS have a significantly different approach to the resolution of affordability problems[53] – was entirely consistent with the strongly-held and often-reiterated DG and Ofwat view (from 1989 to 2006), that any significant relief for affordability problems affecting low income and other vulnerable customers is best provided through the tax and benefits system.

Low User Tariffs: Guidance and Out-turn

The SoS's final guidance in 2000 had stated that all companies should develop the option of a low user tariff for measured consumers (with a zero standing charge and a larger-than-standard volumetric rate). As described in Section 0 above, two companies had already by that time established low user tariffs, before the DG was given the power to approve or reject such tariffs. In 2000-01, nine more companies proposed low user tariffs, but they were rejected by the DG on the grounds that there had not been a careful enough assessment of the implications for other customers' bills. Ofwat therefore consulted on the issue in 2000, revealing concerns about administrative problems, targeting and the implications for other bills. The Ofwat rejection was thus repeated. Because of our conclusion in section 2.2.1.1. that low user tariffs should probably not be classed as social tariffs (because they benefit all low users, rich or poor), we shall not pursue the issue here.

The 2003 Changes in Primary and Secondary Duties

After fourteen years of unchanged primary and secondary duties, the 2003 Act brought in significant changes. To the two earlier primary duties were added two more:

- to further the consumer objective; and

[53] For the Ofwat view is clearly at odds with the SoS's second statement about social tariffs in his final guidance, as quoted above.

- to secure the activities of a licensed water supplier are properly carried out (2003 Act,s.39(3))

New sub-sections were also added, explaining what was meant by *the consumer objective*. Section 39 (3) ["(2B)"] says that the "consumer objective mentioned above" is to protect the interests of consumers, "wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the provision of water and sewerage services." That is of little interest to those interested in tariff structures for sustainability, since it appears to be pursuing the competition agenda – which does not currently apply directly to the household sector.

Then in s.39 (3) ["(2C)"] it is made very clear that for the purposes of the furthering of the consumer objective the SoS or the WSRA *shall* have regard [emphasis added] to the interests of:

(a) individuals who are disabled or chronically sick;
(b) individuals of pensionable age;
(c) individuals of low incomes;
(d) individuals residing in rural areas; and
(e) customers of other companies holding an appointment under this Act, whose premises are not eligible to be supplied by a licensed water supplier, although regard may also be had "to the interests of other descriptions of consumer".

This list of (a) to (e) therefore constitutes a 'partial elaboration' of the first new primary duty.

Further into the legislation, s.39 (4) ["(3)"] replaces WIA 1991 s.2 (3) and (4) and presents a new list of the *secondary duties* of the SoS and the WSRA:

(a) to promote economy and efficiency on the part of the companies;
(b) to secure that there is no undue preference or undue discrimination in charges;
(c) to secure consumer protection concerning land disposal proceeds;
(d) to ensure consumer protection relating to certain other activities of a company holding an appointment; and
(e) to contribute to the achievement of sustainable development.

The lists of secondary duties in 1991 and 2003 are different in important respects, and in two in particular. First, in the 1991 Act the special treatment for 'customers in rural areas' was included as an element of the first *secondary* duty (the first bullet point of the 1989 secondary duties listed above). But now, in the most recent legislation, individuals (not 'customers' any longer) in rural areas *seem* to have got a promotion, in that they are now part of the *explanation* (or *elaboration)* of the first (and first new) *primary* duty.

Second, it should be noted that the *no-undue-discrimination/no-undue-preference* objective, which was in earlier legislation listed *alongside* the rural consumer protection clause, is *now* definitely a *secondary* duty, i.e. *one the securing of which appears to be subject to the pursuit of the consumer objective, and in which pursuit the SoS (or WSRA) therefore "**shall** [and not may] have regard to the interests of" the various groups of individuals listed above in the 2003 Act, s. 39 (3)* [emphasis added].

The Potential Importance of the 2003 Legislation

It thus now seems clear that if and when the two are pitted against each other the rural consumer protection clause takes precedence over the no undue preference/discrimination requirement. This is certainly what Parliament intended in passing the original legislation in 1989. The first is now part of the elaboration of a primary duty, and the second is a secondary duty. What to some would appear to be an apparent contradiction has been cleared up.

It then arguably follows that the SoS or WSRA (and thus Ofwat), in furthering the consumer objective (a primary duty) may, in its consideration of water charges and charging schemes (one of their many duties), consider the interests of individuals with, say, low incomes (or of one or more of the other groups of individuals listed in the new 'elaboration' sub-section (2C) to section 2 of the 1991 Act) so that those interests may take precedence over the no undue preference/discrimination requirement. At least, that is what Parliament appears to have intended in 2003. If, however, it is argued that Parliament did *not* so intend, it has to be asked why there was, in the legislation, such careful augmentation, re-shuffling and elaboration of the primary and secondary duties of the Secretary of State and of the new regulatory Authority?

At the same time it should be noted that Condition E of the Appointment of each of the water and sewerage undertakers remains, prohibiting undue discrimination and undue preference in the fixing of charges. This suggests that the current legislation (the 2003 Act) may not sit easily alongside Condition E.

Possible Legal Ways Forward in the Promotion of Social Tariffs for Water

In the light of this discussion of the relevant legislation, and that in earlier sections of this report, it is clear that the promotion and encouragement of some social tariff proposals has already encountered, and may well in the future encounter, difficulties in gaining approval from the economic regulator.

The exploration and discussion of legislation above has also suggested a range of ways forward for social tariff acceptance which may be appropriate (although this would obviously depend on specialist legal advice). We now list those procedures, on a spectrum in terms of the difficulty of arranging and implementing them, ranging from 'easy and soft' to 'tough and time-consuming':

1) The Secretary of State might issue guidance to the DG under s. 143 (7) and (8), as inserted by the 1999 Act, as to how he should treat certain types of tariff structures proposed to him by undertakers.

2) The Secretary of State might issue appropriate new regulations under s. 143A [(2) and (3)] governing the tariff structures to be or which may be employed in company charges schemes.

3) It would be open to, say, a relatively high cost (and therefore high charges) water or sewerage company[54], that was seeking to make its charges more affordable for low income customers, to argue that a new tariff being proposed was well within the spirit and the letter of the 2003 legislation, and that, being thus, any apparent discrimination against higher income groups (whose charges might consequently rise) could not be said to be undue[55]. This would have to be tested against, first, the WSRA in the submission of the proposed tariff, and then, if it was rejected by Ofwat, through some sort of legal challenge.

4) Condition E may have to be revised.

5) New primary legislation may be required.

[54] High cost for locational rather than inefficiency reasons.
[55] What is 'undue' and what is 'not undue' evidently needs some sort of reference point to be established.

APPENDIX 3 TABULAR COMPARISON OF PROPERTIES OF PASSPORT AND AMENDED-IBT TARIFFS

Question or Criterion	Passport Tariffs	IBTs (with household occupancy allowance, = oa)
INCLUSIVENESS (1) Tariff 'inclusive' or not?	No	Yes
AFFORDABILITY BENEFITS (2) How does each tariff address the affordability issue?	Directly, specifying precisely the h/hold groups eligible and lowering their charges at the expense of other consumers whose charges consequently rise	By linking oa's with a presumed measure of association between income and overall water use or income and discretionary water useor income and peak demands (for M.households only, however)
(3) Is essential use provided at a price which will not discourage use for low-income households?	Depends on the % reduction in charges for the passported groups; for UM consumers, marginal price remains at zero, so no discrgmnt	Yes, if occupancy allowances (oa's) are 'wide' (=big) enough to accommodate the basic water use of all low-income households
COVERAGE (4) Are metered (M) and unmetered (UM) consumers both included?	Yes, possible in principle and in practice	No, M only. But operation of such IBTs should increase metering penetration & the UM affordability problem would reduce
SUSTAINABILITY BENEFITS (5) Is frugal use rewarded and wasteful use penalised?	Only to a limited degree, for non-passport -holding M. households, since the vol. prices they face increase;but the reverse is true for M. passport-holders (whose marginal prices and overall charges fall)	In principle, yes, for all M. consumers (the result with a Flanders-type tariff, with 'per- fect' oa's); in practice, smaller households escape penalty if all use is charged at low prices, because basic oa's in practice may have to be fixed for 3- or 4-person h/holds
UK & O/S EXPERIENCE (6) What experience is there of such tariffs?	Australia; Flanders(w/watercharges); US (diff.tariff discounts); UK (VGRs: M.only but could be applied to UM)	Per capita oa's: Flanders/Malta/Luxmbg; Occupancy-linked oa's: Spain/Greece/US Nos. of blocks: range from 2 to 5
DISTRIBUTIONAL STUDIES (7) Ex post or ex ante studies of which UK household group gains/loses and by how much?	Some desk studies have stdg.charge &/or vol. price &/or free/low-price allowance = f(Council Tax band)	Most desk studies trial IBTs with various zero-/low-price allowances; PSI trialled two tariffs with free per capita oa's
REGUALTORY/LEGISLATIVE (8) Will tariff find favour with Ofwat on present indications?	No (Ofwat decision re Anglian proposal in 2006)	Some sympathy apparent (Ofwat Briefing Note April 2005)
(9) Can the tariff be introduced under present UK legislation? [clearly, a professional legal opinion should be sought on these matters]	Uncertain; informal legal advice suggests prob. not (undue pref./dscmntn. etc); but see the Regulatory section of Report.. Also possible for Secy of State to give guidance to Ofwat on the matter (s. 40 of 2003 Water Act)	Probably, if it can be shown that price dscmntn.btween customer groups is linked to their demands & thus the costs they impose; possibly, if Sec.of State issues new regulation that each water company must move to occupancy-amended IBT
FRAUD/EXCLUSION (10) Risk of fraud?	Some, paralleling fraud incidence in obtaining and use of passport benefit	Depends on money saved arising from inventing fictitious household members
(11) Risk of exclusion of 'deserving cases' from full benefits as intended?	Some (those deserving the passported benefit but failing to obtain it lose out on this 'spin-off')	Occurs if low-income h/holds' per capita basic water use is > per capita oa, due to age/inefficiency of fittings/appliances
CUSTOMER ATTITUDES (12) Customer opinion? (CC Water, Feb. 2007 report)	Extending eligibility for social tariffs strongly rejected	Liked IBT option combining environmental gains with oa's & lower bills for the frugal
OPTIONAL/ADAPTABLE? (13) Is there any case for such a tariff to be optional rather than compulsory?	Yes, h/holds could opt in (indeed,that was Anglian's proposal); a limited passport-type tariff could alternatively be used to underpin an OSFA IBT	No (to make it attractive enough for people to opt for metering in greater nos., overall charges would have to be lower; thus water company would lose money)
(14) Can tariff be amended to cope with demand and afford-ability 'shocks'?	Cannot really handle demand shocks; affordability shocks need 'price' responses; hence uncertainty	Yes; quantity dimension available to deal with both kinds of shock; basic block width alterable, & additional block can be added

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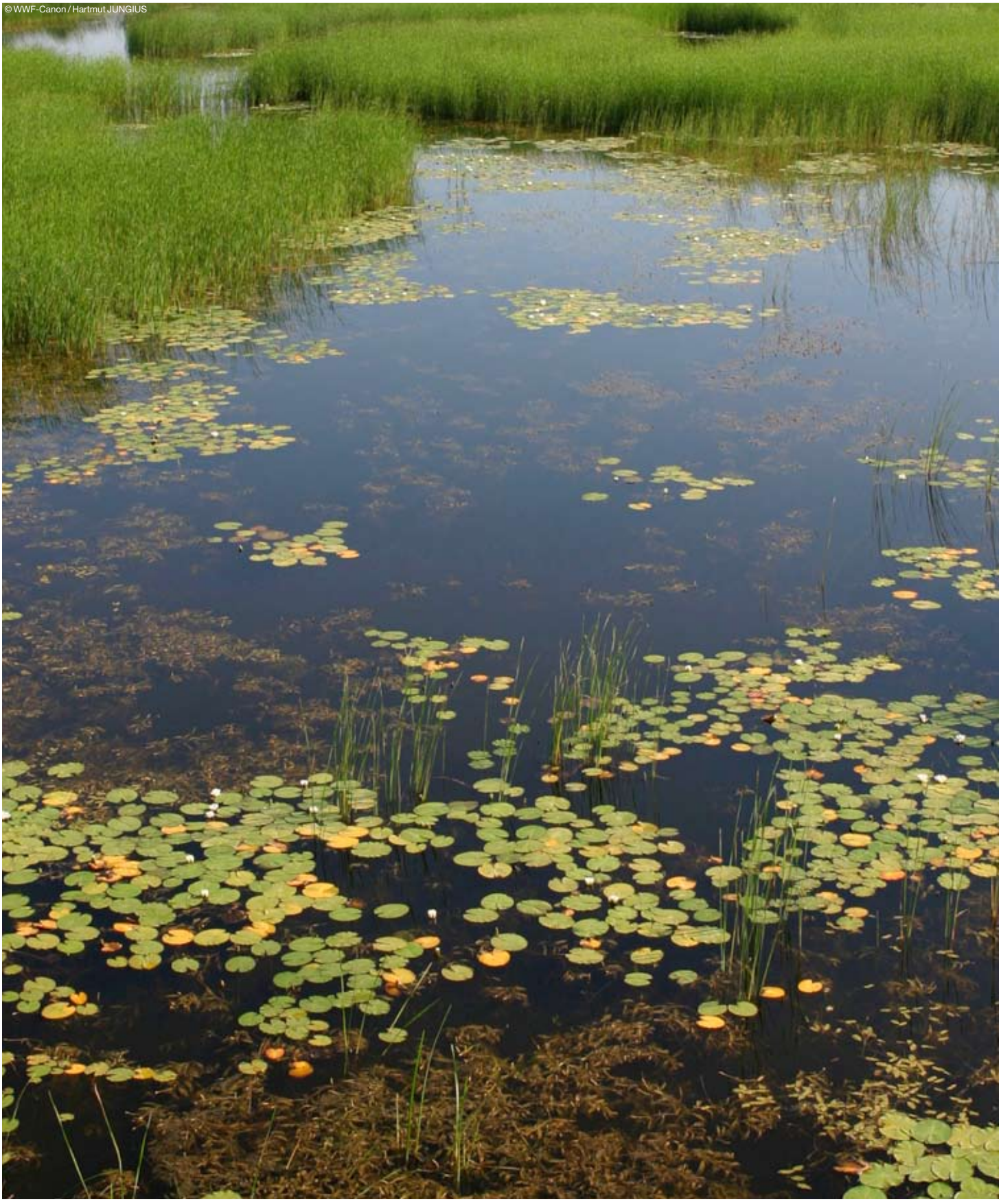

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- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
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