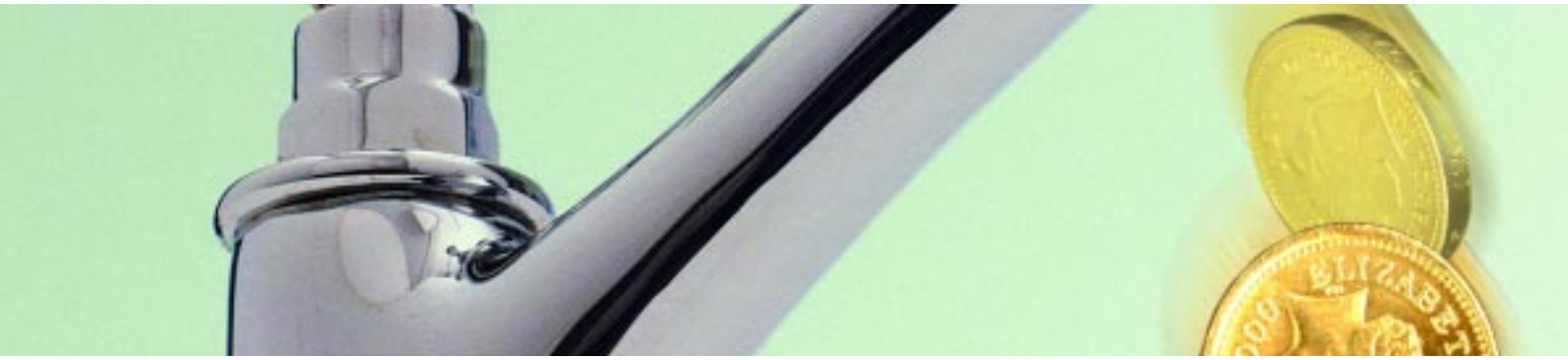
Office of Water Services

Leakage and Water Efficiency



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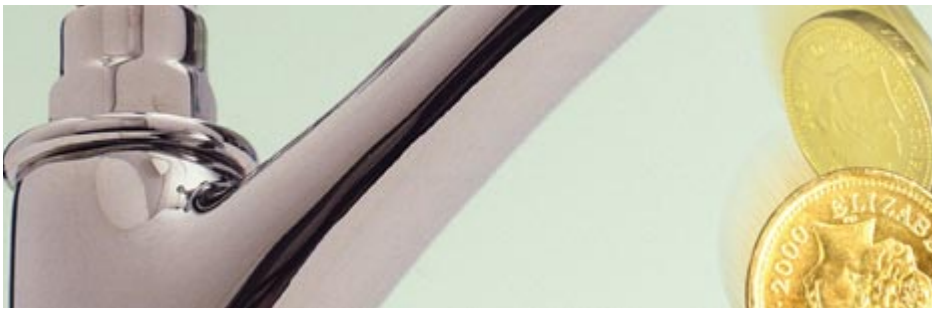
executive summary

In this chapter

1 Dry weather in 1995 caused some water companies to introduce temporary restrictions on the use of water affecting 40 per cent of the population of England and Wales. The drought also highlighted the fact that some 30 per cent of the water put into water companies' distribution systems was being lost as a result of leakage. And high levels of leakage contributed to serious difficulties in maintaining water supplies in West Yorkshire.

2 At the Water Summit convened by the Government in May 1997, the Deputy Prime Minister stressed the importance of reducing leakage and promoting the efficient use of water by customers. He presented a ten-point plan for the industry, which included the setting of mandatory targets for water companies to reduce leakage and the vigorous promotion of water efficiency by companies.



3 The Office of Water Services (OFWAT) regulate the economic activities of the 24 water companies in England and Wales, and have a key rôle in ensuring that the companies secure the Government's aims for reducing leakage and promoting the efficient use of water. The level of leakage has been of concern to the Committee of Public Accounts, and its control, and the promotion of efficiency in the use of water, are important in ensuring that water companies maintain a safe margin between the demand for water and the amount they can supply.

4 This report examines the progress that OFWAT have made in ensuring that water companies achieve the Government's aims. We were assisted in our examination by WS Atkins, consulting engineers, and Frontier Economics, expert economics consultants. We also surveyed the water companies in England and Wales and commissioned IPSOS to carry out a survey of 1,919 water users.

5 OFWAT's work on leakage and water efficiency has been carried out against the background of their wider rôle in regulating water companies and the progress made by the water industry in recent years. Since privatisation in 1989 water companies have invested some £34 billion in water supply and sewerage systems and made significant improvements in the standard of drinking water and the environment. Standards of service to customers have also improved significantly. And although customers' bills initially rose to pay for this investment, customers' bills in 2000-2001 are on average nearly 13 per cent lower in real terms than in the previous year, following a review of the companies' prices by OFWAT in 1999.

OFWAT have sought to reduce the amount of water lost through leakage and since 1995 the water companies have responded positively

6 OFWAT's powers and duties are specified in legislation and the water companies' licences (Appendix 2) and do not explicitly include the regulation of leakage. They do, however, include enforcing the companies' duties to develop and maintain an efficient and economical system of water supply and to supply sufficient wholesome water for domestic customers. In doing so OFWAT have a duty to seek to promote economy and efficiency on the part of water companies and to protect the interests of customers. OFWAT are empowered to set targets relating to these duties, which can include leakage to the extent that it affects the security of water supplies to customers or economy and efficiency, and to take enforcement action if companies breach their duties.

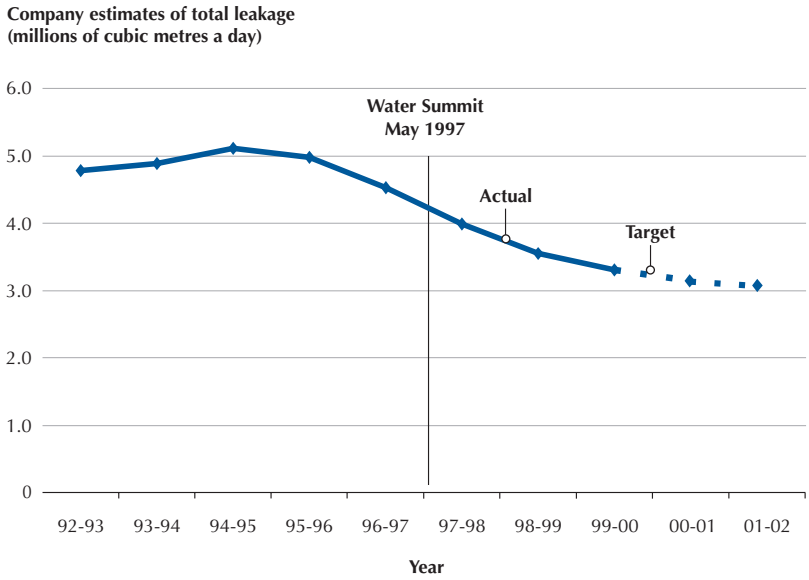
7 Following the privatisation of the water industry in 1989, OFWAT endorsed the generally held view that water companies should reduce their leakage to a level known as the economic level of leakage. This is the level of leakage that balances the cost of controlling leakage - which tends to rise as the level of leakage is reduced - with that of replacing water lost through leaks. The economic level of leakage differs from company to company depending on factors such as the condition of their water supply system and the availability of local supplies of water. Reducing leakage to the economic level minimises the cost of meeting customers' requirements for water.

8 Following privatisation, OFWAT asked companies to forecast their future leakage levels. OFWAT did not, however, set targets for leakage levels because they considered that companies already had a sufficient incentive to reduce leakage to their economic levels. This was because companies were subject to limits on their prices, and OFWAT expected companies to be able to increase their profits by reducing leakage to their economic levels. Leakage reduction appears, however, to have been a low priority for most companies; and some companies told us that they did not expect the price limits fully to reward them for reducing leakage to their economic levels. And from the point that reliable figures for leakage became available, in 1992-93, to the 1995 drought, total leakage rose by around one fifteenth, to some 5.1 million cubic metres a day.

9 In 1996 OFWAT required companies to set themselves targets to reduce leakage for 1997-98 and following the Water Summit of May 1997 set mandatory targets for all companies in 1998-99, 1999-2000 and 2000-01. Companies have generally achieved their targets and since the 1995 drought total leakage has fallen year on year, to around 21 per cent of the water put into supply in 1999-2000. In the light of the progress made and the industry's acceptance of achieving the economic level of leakage by 2002-03, OFWAT have not set mandatory targets for 16 of the companies. Instead, OFWAT will monitor these companies' progress towards their own targets based on robust estimates of the economic level of leakage. Mandatory targets have, however, been continued for the other eight companies. The targets for the companies for 2001-02 are to reduce total leakage to three million cubic metres a day, some 20 per cent of water put into supply and representing a reduction in leakage since 1994-95 of more than a third (**Figure 1**). As a result of the reductions made, total leakage levels in England and Wales are now generally better than average by international standards, and the better performing companies in England and Wales are now among the best in the world.

1 **Leakage in the water industry 1992-2002**

Leakage levels rose between 1992-93 and 1994-95, but since then have fallen.



Source: OFWAT, based on information from companies

10 The water companies told us that they acknowledged that the targets have had an important influence on the reductions in leakage they have achieved. Their behaviour has also been driven by recognition of the need to provide for a sufficient supply of water in the most economic way, and to avoid the bad publicity attendant on high levels of leakage. Their behaviour is likely to have been affected by the additional costs of some £150 million incurred by Yorkshire Water to improve water supply reliability during and following the 1995 drought.

Reductions in leakage have produced benefits, although the costs incurred are not clear

11 Reductions in leakage since 1995 have reduced the amount of water that water companies have needed to put into their distribution systems to meet customer demands. Since 1997-98 most water companies have had the capacity to supply significantly more water overall than has been needed. The balance between supply and demand is still tight in some parts of the country, but reductions in leakage have improved the water companies' ability to meet customer demands during dry years without placing restrictions on water use such as hosepipe bans in those areas. Reducing leakage has also provided the opportunity to benefit the environment by preventing over-abstraction of water from rivers (leaving them very low or dry) and postponing the need to develop new sources of water supply.

12 It is implicit in OFWAT's use of targets based on economic leakage levels that companies should understand the costs and benefits of leakage control, since the assessment of economic leakage levels relies on analysis of these costs and benefits. OFWAT, however, have not specifically monitored either the cost to companies of controlling leakage or the financial value of the water saved, as such information is not directly relevant to the approach that they have adopted to reducing leakage. We estimate that leakage control costs the water companies approximately £180 million a year, but cannot tell what proportion of this was required to achieve the reductions in leakage since 1995. We

estimate that the reductions in leakage since 1995 are saving water companies approximately £13 million to £39 million a year in operating costs. There is also a potential saving of capital costs by postponing water storage, treatment and distribution costs. Reducing leakage has also enabled water companies to maintain or improve the security of the supply of water to customers, without their having to invest in new capacity or plant, but there is insufficient information available to put a value on this benefit. The prices paid by customers since April 2000 have reflected higher expenditure by companies on leakage control, but customers are likely to benefit in the future as lower levels of leakage enable future expenditure to be avoided or postponed. Examples of this could include deferred development of new supplies of water, fewer supply interruptions and lower costs in pumping water.

There are nonetheless problems in determining how much further leakage should be reduced, which OFWAT need to resolve

13 OFWAT and the water companies agree that the aim should be for companies to reach their economic level of leakage (see paragraph 7 above) but disagree on the extent by which leakage should be reduced in practice. OFWAT have required water companies to undertake the assessment of where their economic level of leakage lies themselves, as the level varies between water systems, and its determination requires detailed economic and engineering assessments. They will monitor leakage in line with the companies' assessments for 16 out of the 24 companies in 2001-02, but this has been the first year in which the majority of assessments have been sufficiently robust for OFWAT to do so. Where assessments have not been robust, OFWAT have set their own "pragmatic" leakage reduction targets based on the balance between supply and demand for water in each company's area and leakage levels. Some water companies have told us that it had been difficult for them to identify clearly what OFWAT expected of them and that OFWAT had not given clear feedback when rejecting their assessments. Some companies were also concerned that they had received little explanation of how pragmatic targets had been arrived at, and OFWAT have now taken steps to ensure that full feedback and explanation is available to all companies.

14 Despite the progress that has been made since 1994-95, reported leakage remains at more than three million cubic metres a day - nearly half the rate of flow of the River Thames in London - and several important issues remain unresolved. These include:

- **There is uncertainty about the total amount of leakage**. Water companies cannot measure leakage directly but have to estimate its level. They commonly do this by monitoring the total amount of water they put into their distribution systems and deducting from this the amount used by customers and reconciling this to leakage with reference to minimum distribution flows. Most customers do not have water meters, so their consumption must also be estimated and the accuracy of estimates of leakage is dependent on the accuracy with which this is done. Companies' estimates of unmetered customers' consumption vary by up to 31 per cent. While some variation is to be expected, the uncertainties about reported leakage make it difficult for OFWAT to monitor progress against targets for the absolute level of leakage, and, in some cases, to assess the scope for further reductions. In addition, while it is possible for OFWAT to monitor, and set targets for, year-on year changes in leakage, this is more difficult when companies change their methods of estimation. Furthermore, these doubts make it harder to assess the impact of actions taken to make the use of water by customers more efficient.

- **The levels of leakage remain high in some areas but the need and scope for reducing leakage is unclear**. Some companies with a high level of leakage also have only a small margin between the amount of water they can supply and the amount needed by their customers. It is quite possible, therefore, that further reducing leakage could benefit the customers of these companies. Many water companies, however, consider that they have reached, or are very close to, their economic level of leakage and argue that further reductions are unnecessary and might need to be funded by an increase in water prices. OFWAT are not convinced that all companies have done enough to validate their assumptions about the costs of detecting and reducing leakage and consider that there may be scope for reducing leakage further without increasing costs overall. Furthermore, improvements in technology may reduce the costs of reducing leakage.

- **The value of water saved by reducing leakage is uncertain**. Since 1998, companies have been required to estimate the value of the water saved by estimating the long run marginal cost of producing it - the effect on their costs of changing the amount of water they supply. Companies' estimates have varied to such a degree as to indicate that they have used significantly different methods and assumptions in their estimates. OFWAT have told companies to resubmit their estimates and some companies suggested to us that there was a need to agree the method of calculation to be used.

- **There is uncertainty as to how the costs and benefits to the environment and Society of leakage and leakage control should be calculated**. In addition to the direct costs borne by companies, leakage and its control create costs and benefits for the environment and Society. For example, it is difficult to put a price on the increased risk of restricting supplies to customers (although research into customers' priorities suggests that reducing the incidence of hosepipe bans is not valued highly). Left to themselves, companies may put a lower valuation than Society on actions, such as reducing leakage, aimed at forestalling these effects. In particular, few companies have fully included environmental costs in their calculation of the economic level of leakage. Reducing leakage may, however, also impose costs on Society, for example when repairing water mains disrupts road traffic. Taking account of all of these non-financial costs may in some parts of the country show that further expenditure on reducing leakage would be worthwhile, but by how much is uncertain.

15 The Environment Agency regulate the use of water resources and the Department of the Environment, Transport and the Regions set the legislative framework for the work of both OFWAT and the Agency. In view of the uncertainties set out above, in May 2000 OFWAT, the Department and the Agency agreed jointly to commission a study of the future development of leakage targets. The study will recommend improvements to the current approach to leakage target setting and review possible adjustments that could be made to take more account of best practice in leakage management techniques. It will also seek to establish a set of key principles to be followed by the companies when they calculate their economic level of leakage, and to recommend where the quality of data used in the analysis of economic leakage levels may need to be improved and the data augmented.

Companies have made progress in promoting water efficiency

16 The Environment Act 1995 gave water companies a statutory duty to promote the efficient use of water by their customers and made OFWAT responsible for enforcing this duty. OFWAT have taken the view that all companies must carry out a minimum level of activity to promote water efficiency and that companies with a tight margin between the demand for water and the amount they can supply should take a more active approach. They also expect all companies to consider the contribution that water efficiency can make to balancing the demand for water with the supply available.

17 OFWAT's approach has been to require every company to develop and maintain a water efficiency plan showing how they will promote water efficiency, to scrutinise these plans, and to monitor and report companies' progress against them and the outcomes achieved. In our survey of companies, most companies told us they clearly understood OFWAT's views on water efficiency but six commented that OFWAT's approach lacked clear objectives that focused on what the companies were expected to achieve in terms of levels of reduced demand.

18 Between 1996 and 2000 companies implemented some 12 million actions to promote water efficiency. These included over five million cistern devices - mainly plastic containers placed in lavatory cisterns to reduce the amount of water used in each flush (around a third of water used in the home is for flushing lavatories). Other actions included more than four million information packs to help customers assess how they can save water, and the installation of more than one million water meters. In our survey of water customers, we found that 88 per cent said they were doing something to save water, and 57 per cent recalled seeing advice on the subject. What is less clear is what has been achieved by implementing these actions.

More needs to be done to enable water companies to determine which water efficiency measures are worthwhile

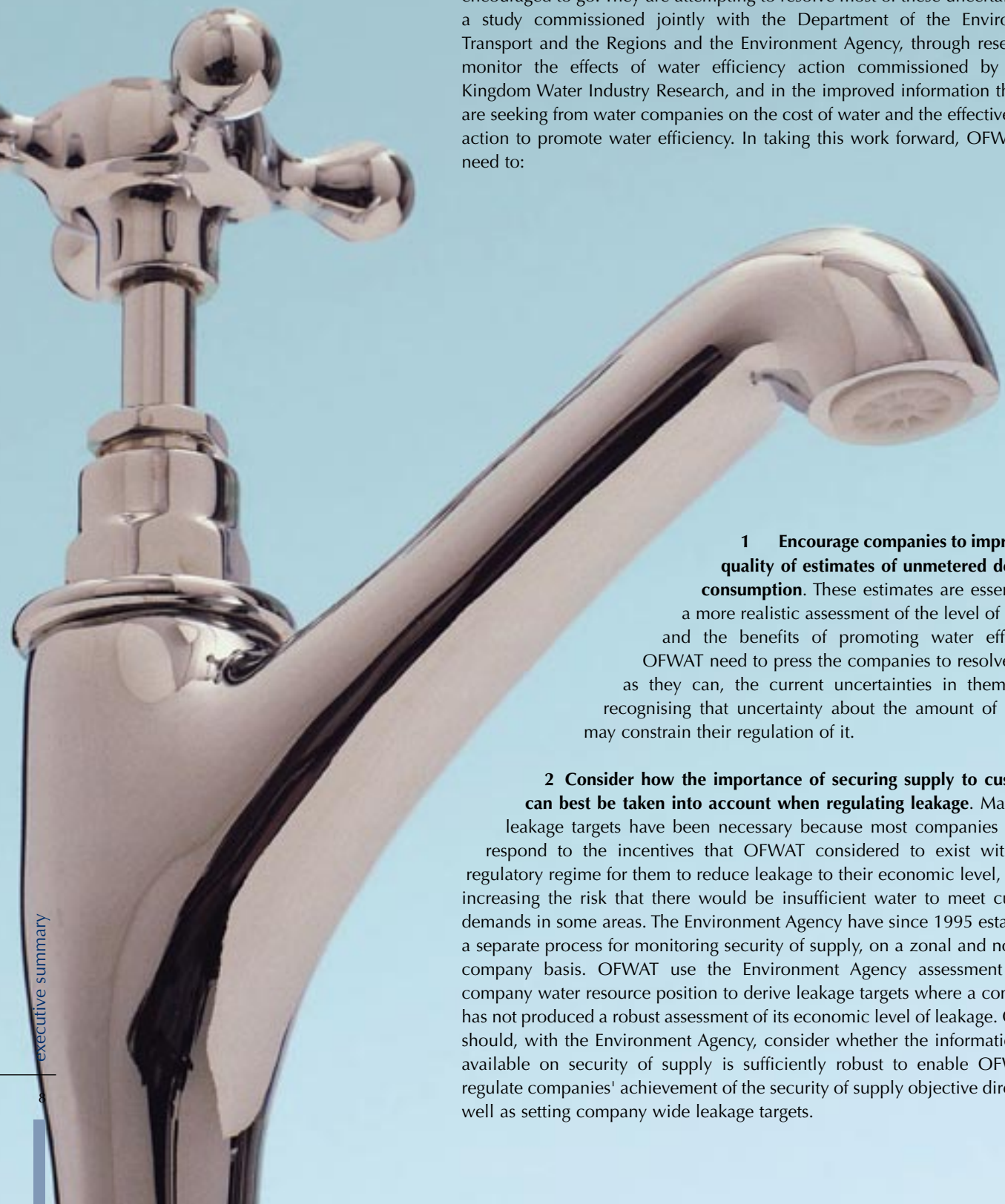
19 OFWAT have asked companies to monitor the amount of water saved by the promotion of water efficiency and some information is available on the results of some individual projects. For example, Thames Water have estimated that a scheme of theirs to help customers assess how they can save water saved around 17 litres of water per home per day (5 per cent). The information on results available is very incomplete, however, and there are significant uncertainties about the effectiveness of some types of water efficiency activity. For example, in our survey of customers we found that only half of customers who had received a cistern device were using it at the time of our survey, and research by companies has cast doubt on whether the long term savings initially expected from such devices are being achieved. Furthermore, figures for domestic consumption per head show a rising trend, in contrast to the trend in some other European countries, although it may be that water efficiency actions have slowed the growth in consumption.

20 As a result, OFWAT lack robust information on the amount of water saved by the water efficiency action being taken and on how long customers continue to save water as a result of individual initiatives. They are therefore not yet in a position to assess how much water is saved as a result of companies' action. Nor can they assess the financial value of this saving or the cost-effectiveness of the companies' action.

21 OFWAT recognise the need for better information on the impact of water efficiency actions, and have asked the companies to set out their intentions for improving the information available. They have been critical of some companies' apparent reluctance to share the findings from their water efficiency projects and have urged greater co-operation in identifying best practice. OFWAT are discussing with the Environment Agency, the companies and with Water UK (the representative body of the water companies) how best to secure this. As a result UK Water Industry Research have commissioned research, to which OFWAT are contributing, of what constitutes best practice in assessing the cost effectiveness of water company initiatives.

Recommendations

22 OFWAT have ensured that water companies have made significant progress since the 1995 drought and the 1997 Water Summit in both reducing leakage and promoting the efficient use of water by customers. They also recognise that important uncertainties need to be resolved to assess fully the value of what has been achieved and to judge how much further companies should be encouraged to go. They are attempting to resolve most of these uncertainties in a study commissioned jointly with the Department of the Environment, Transport and the Regions and the Environment Agency, through research to monitor the effects of water efficiency action commissioned by United Kingdom Water Industry Research, and in the improved information that they are seeking from water companies on the cost of water and the effectiveness of action to promote water efficiency. In taking this work forward, OFWAT will need to:



1 Encourage companies to improve the quality of estimates of unmetered domestic consumption. These estimates are essential for a more realistic assessment of the level of leakage and the benefits of promoting water efficiency. OFWAT need to press the companies to resolve, as far as they can, the current uncertainties in them, while recognising that uncertainty about the amount of leakage may constrain their regulation of it.

2 Consider how the importance of securing supply to customers can best be taken into account when regulating leakage. Mandatory leakage targets have been necessary because most companies did not respond to the incentives that OFWAT considered to exist within the regulatory regime for them to reduce leakage to their economic level, thereby increasing the risk that there would be insufficient water to meet customer demands in some areas. The Environment Agency have since 1995 established a separate process for monitoring security of supply, on a zonal and not just a company basis. OFWAT use the Environment Agency assessment of the company water resource position to derive leakage targets where a company has not produced a robust assessment of its economic level of leakage. OFWAT should, with the Environment Agency, consider whether the information now available on security of supply is sufficiently robust to enable OFWAT to regulate companies' achievement of the security of supply objective directly, as well as setting company wide leakage targets.

3 **Reflect the potential benefit to the environment of reducing leakage and improving the efficiency with which customers use water**. Few companies currently take full account of environmental and other non-financial costs in their assessments of their economic level of leakage. This may result in companies underestimating the potential benefits of further reductions in leakage. Subject to the outcome of the current tripartite study, OFWAT should consider joining with the Environment Agency in providing further guidance to companies on how to take account of such costs and on OFWAT's approach to such costs in setting future price limits.

4 **Establish the financial costs and benefits of leakage control and the scope for reducing costs through technological advances.** OFWAT are uncertain about how much it costs to control leakage and the value of the water saved, and the majority of companies cannot produce satisfactory estimates for these figures. It must be doubtful how much reliance can be put on companies' assessments of economic levels of leakage, the central purpose of which is to strike an appropriate balance between these amounts. It may be that more research into costs and benefits and clearer guidance to companies will produce more reliable estimates. If this is not the case OFWAT should instead establish what is required to maintain an adequate security of supply and then consider whether environmental considerations justify a lower level of leakage, having had regard to the effect on customers' bills.

5 **Obtain a better picture of the effectiveness of different types of action to promote water efficiency**. Ideally, OFWAT should focus their regulation of companies' water efficiency work on the outcomes achieved by companies, such as the amount of water saved and the cost effectiveness of activities, rather than on companies' inputs, such as the number of cistern devices that have been installed, in order to encourage companies to achieve such outcomes as efficiently as possible. But because of the serious uncertainties about what, if any, savings particular types of water efficiency action can make and the value of any water saved, OFWAT have lacked sound information on outcomes. Based on the results of the research by United Kingdom Water Industry Research, OFWAT will need to establish a clear plan for improving the measurement of the outcomes achieved by companies from their water efficiency work, so that they can better assess what they should expect companies to achieve from this work.

6 **Promote greater sharing by companies of the results of their monitoring of the effectiveness of action to promote water efficiency**. One way in which OFWAT are seeking to improve knowledge of the outcomes of water efficiency work is by requiring each company individually to monitor the outcome of their work on promoting water efficiency. Such knowledge would be of value to companies and might also be of use to OFWAT in comparing the performance and efficiency of companies. This work is technically demanding, however, and involves duplication of effort by companies where they take similar types of action. OFWAT should consider how the results of this work can be disseminated across the industry to provide companies with a common and well-grounded basis for taking decisions on future water efficiency initiatives. This could involve encouraging companies, or providing them with incentives, to share information that companies at present keep to themselves, for example by allowing companies to reduce the monitoring they do if they contribute to the monitoring costs of other companies taking similar types of water efficiency action.