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Water Management

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NOTE:

The Report of the Committee is published in Volume I, HL Paper No 191-I.
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No 191-II.

Reference in the text of the Report as follows:

(Q) refers to a question in oral evidence

(p) refers to a page of written evidence

EXECUTIVE SUMMARY

Water resources in England and Wales (especially in south east England) are threatened by below average rainfall in the short-term and climate change in the longer-term. The use of these resources is also facing increasingly tight regulation in order to meet ever higher ecological requirements. Simultaneously, demand for water is increasing because of population growth, a decreasing average household size and growing use of water-intensive appliances.

There is general agreement that meeting these challenges will require the “twin-track approach”—that is, a balance between resource development and demand management. But this balance will not be achieved until the currently fragmented institutional arrangements for water management are simplified and coordinated. We therefore make recommendations in a number of key areas.

- There should be wider stakeholder engagement, by means of new regional boards consisting of environmental and consumer interests as well as Ofwat representatives. These boards would determine how resource development, leakage reduction, network renewal and demand management could most appropriately be balanced in each area, with the resulting plans guiding Ofwat’s funding decisions.
- Ofwat and the Environment Agency should take a realistic approach to the essential development of new resources. To enable the water companies to undertake the necessary long-term planning for new resources, we call on Ofwat to agree indicative water prices for each company for up to 24 years into the future.
- Ofwat and the Environment Agency must also work together to ensure that water companies maximise their promotion of water efficiency, and have the necessary resources to do so. We also recommend that the remits of the Energy Saving Trust and the Carbon Trust be extended to cover water efficiency.
- Current levels of leakage from the distribution network are unacceptably high in parts of the country; this has a negative impact on the public’s attitude to sensible water use. We call on Ofwat to sanction increased water company expenditure on reducing leakage. Leakage reduction targets should take greater account of environmental and social factors, as well as economics.
- The Government should make it easier for water companies to impose meters on households in the driest parts of the country, in order to cut demand and to ensure that consumers are charged fairly for their water. To help the many customers who struggle to pay their bills even at current levels, we recommend that the Government provide assistance through the tax and benefit system. To tackle the unacceptably high number of people who are failing to pay their bills even though they can afford to do so, water companies should be permitted to disconnect them partially from the water supply.

We make recommendations on many other issues. These include: investment in long-term research and development; competition in the water industry; the planning system and delivery of the water and wastewater services for sustainable communities; water re-use and recycling; the use of water efficient devices in the home; industrial and agricultural water efficiency; and delivery of the Water Framework Directive and the management of diffuse pollution.

Water Management

CHAPTER 1: INTRODUCTION

Scope

- 1.1. In July 2005 we appointed a Sub-Committee to examine water management in England and Wales, the membership of which is listed in Appendix 1. We set out a number of questions in our Call for Evidence, which was issued on 21 July 2005 and is reprinted in full in Appendix 3. Our report encompasses the regulatory and legislative framework; demand for water; water supply; water efficiency; and the interaction between water and the environment—but not flooding or fluoridation, which are significant topics in their own right. The report does not cover water management in Scotland and Northern Ireland, which are subject to different institutional arrangements.
- 1.2. Responsibility for water-related issues in England and Wales is divided amongst many Government departments and agencies. By contrast, our intention was to consider water management in the round, bringing the many issues together with a view to developing an effective and holistic strategy. We look to the Government to respond in the same spirit.
- 1.3. As the inquiry progressed, the urgency of the issues became increasingly clear. The dry winter of 2005–06 exacerbated the water shortages in south east England and, on the whole, rainfall continues to fall at or below the long-term average. Overall, in the past 18 months the region has received only about 85 percent of its average rainfall.¹ Water shortages are now having a marked impact on the public consciousness, particularly since Folkestone and Dover Water's successful application for water scarcity status (allowing them to implement compulsory metering in households), the widespread imposition of hosepipe bans in the south east of England and the decision to grant a six month drought order to Sutton and East Surrey Water, enabling the company to limit or prohibit non-essential uses of water.
- 1.4. We trust that this heightened public awareness of the importance of successful water management will encourage all stakeholders—including the public themselves—to take seriously the problems and potential dangers highlighted in this report and to show the necessary sense of urgency in addressing our recommendations and implementing the most appropriate solutions at the earliest opportunity.

Acknowledgements

- 1.5. We received valuable written and oral evidence from the witnesses listed in Appendix 2, for which we are grateful. We also thank those who took part in our seminar at the Royal Academy of Engineering on 17 October 2005.
- 1.6. We are especially grateful to those who made our visits to Australia, Yorkshire Water, Essex and Suffolk Water, Anglian Water and BedZED so valuable. In particular, we thank the British Consul-General in Melbourne,

¹ See article by Baroness Young of Old Scone, *The Guardian*, 12 April 2006, Society p 8.

Mr Peter West, and the Consul-General in Sydney, Mr Tim Holmes, and their staff for all their assistance during our visits to those cities.

- 1.7. We also thank Professor Adrian McDonald of the University of Leeds for his valuable research on housing growth in the south and east of England, which helped us greatly.
- 1.8. Finally, we are most grateful to our Specialist Adviser, Professor Richard Ashley, for the invaluable advice he has provided. His expertise and enthusiasm have contributed greatly to our work. However, we stress that the conclusions we draw and recommendations we make are ours alone.

CHAPTER 2: BACKGROUND

Introduction

- 2.1. In this chapter, we outline the background to the issues raised in this report. We look at privatisation and the legacy taken on by the water companies, at the primary roles and responsibilities of the key stakeholders and at the concepts underpinning the successful management of water resources.

Historical Background

The Municipal Inheritance

- 2.2. The origins of much of the existing water infrastructure in the United Kingdom can be traced back to the mid-nineteenth century and the establishment of a Royal Commission on the Health of Towns in 1843. The Commission's second report led to the Public Health Act 1848, which gave town councils or local Boards of Health responsibility for the supply of water to houses, waterworks, drainage, sewerage and street paving. The Public Health Act 1875 consolidated the powers and duties of local authorities, becoming the "Magna Carta" of sanitation.
- 2.3. In the course of the twentieth century, the legislation was updated and revised several times. The Public Health Act 1936 clarified the duties and responsibilities of local authorities, but by the end of the Second World War it was clear that further changes were necessary and the Water Act 1945 encouraged the amalgamation of water companies and local boards. This was followed in 1948 by the setting up of river boards with responsibilities for land drainage, control and protection of fisheries, and the prevention of pollution. The Water Resources Act 1963 replaced the river boards with river authorities, with powers to control the abstraction of water and pollution.
- 2.4. The most important change came about through the Water Act 1973, under which ten Regional Water Authorities (RWAs) were established to succeed the water undertakers, sewerage and sewage disposal authorities and the River Authorities. The RWAs had responsibility for water conservation, controlling pollution of inland and tidal waters, land drainage and flood control, fisheries and supply of water and sewerage services. However, the assets inherited by the RWAs—many originating in the nineteenth century—had suffered decades of neglect, with renewals and repairs hampered by the previously dispersed nature of ownership and by under-investment.

Historic Under-Investment

- 2.5. The 1970s and 1980s were challenging economic times for the water industry. The Treasury exercised strict controls over public sector borrowing and spending, which resulted in cuts in the industry's capital expenditure. Between 1955/56 and 1973/74 capital spending by the water industry had tripled in real terms, but in 1979 the Government instructed the RWAs to reduce planned investment by 11.2 percent and to increase the proportion of capital expenditure financed out of current surplus. By the 1980s, investment had fallen to between a quarter and a half of what it had been in real terms ten years previously.

- 2.6. The spending controls hampered works required to meet environmental and water quality objectives and to cope with infrastructure deterioration. The impact was not just on capital and operational programmes but also on the industry's ability to plan for the future. The effect was assets being "sweated", with a deterioration of environmental and physical capital, at a time when obligations under the European Community's (EC) various water-related Directives were mounting.
- 2.7. By the mid-to-late 1980s the water industry was not in a position to meet standards specified in certain Directives. It was estimated that the investment programme required to comply would cost £24 billion, much of which would be needed to meet the backlog of infrastructure maintenance. The Government were reluctant to sanction public expenditure on this scale. It was hoped that privatisation of the water industry would, amongst other things, allow the necessary funds to be raised from the private sector.

Privatisation

- 2.8. The water industry was privatised under the Water Act 1989. Most of the assets and personnel of the ten RWAs were transferred into companies which were floated on the London Stock Exchange. In addition, the Government gave the companies a so-called "green dowry" for environmental investment, wrote off significant outstanding industry debt and provided capital tax allowances.
- 2.9. To protect the interests of consumers and the environment, three separate public bodies were established to regulate the privatised companies and the existing smaller water-only companies. These were the National Rivers Authority (since succeeded by the Environment Agency), the Drinking Water Inspectorate (DWI) and the Office of Water Services (Ofwat).
- 2.10. Privatisation has undoubtedly enabled the industry to finance service and environmental improvements and in doing so to make progress in meeting statutory requirements under EC and national legislation. In particular, point source pollution (the discharge or spillage of contaminants from an identifiable point) has been reduced through the improvement of wastewater treatment works—thus raising the general quality of river water—and drinking water quality has improved significantly. Water companies have also improved their operational efficiency substantially.
- 2.11. However, there have also been negative consequences, especially in the first years after privatisation. The large increases in prices to customers were matched by the increases in company profits. This high level of profits prompted Ofwat to review the pricing mechanism after just five years instead of the ten originally envisaged. This development has now become standard practice for the industry, with quinquennial asset management planning (AMP) and price reviews (PR).
- 2.12. Moreover, market forces have not always provided the necessary incentives to address wasteful behaviour: for example, it took the 1995 drought and external political intervention for the issue of leakage to be taken seriously. Similarly, the requirement to prepare water resources plans and drought management plans, now a statutory duty under the 2003 Water Act, also arose as a result of external factors. Nonetheless, the result of privatisation has been a substantial level of investment: between 1989 and 2005 more than £50 billion was invested by the water companies in improving water

services and environmental protection. It is anticipated that a further £16.8 billion will be invested by 2010.²

Roles and Responsibilities

National and Local Government

- 2.13. The Department for Environment, Food and Rural Affairs (Defra) has overall policy responsibility for water, covering areas such as water resources, the water industry, drinking water quality, water conservation, flood and coastal defence and inland waterways. Accordingly, it provides the necessary legislative and statutory framework within which the various regulatory bodies and water companies operate, and issues guidance where appropriate. In addition, Defra is responsible for promoting and monitoring sustainable development and is in this respect the lead department within Government.
- 2.14. The other Government department of relevance is the Department for Communities and Local Government (DCLG), which replaced the Office of the Deputy Prime Minister (ODPM) in May 2006. Throughout the report, we refer to ODPM when discussing historical events but address our recommendations to DCLG. The new department performs a complementary role to Defra in that it is responsible for the spatial planning and policy framework within which local and regional government and development takes place. Through its role in planning matters (including sustainable communities) and its responsibility for Building Regulations, DCLG is able to influence future demand for water.
- 2.15. DCLG's responsibilities encompass Planning Policy Statements (PPSs), which "explain statutory provisions and provide guidance to local authorities and others on planning policy and the operation of the planning system".³ These can be of particular relevance to water management. For example, PPS 11 sets out Government policy on Regional Spatial Strategies (RSSs) which provide a broad development strategy for each region over a 15 to 20 year period. This encompasses new housing, environmental priorities, infrastructure and other issues.⁴ The principal responsibility for preparing draft revisions to each RSS lies with the relevant Regional Assembly—except in London—although the Regional Development Agency (RDA) is also involved.
- 2.16. At a more local level, under PPS 12, local authorities and other bodies must be in general conformity with the RSS in the preparation of their own plans, such as Local Development Frameworks (LDFs). Like RSSs, these can have a significant bearing on water issues, particularly future demand for water.

Regulators

- 2.17. There are three regulators in the water sector: the Water Services Regulation Authority (WSRA), which replaced Ofwat on 1 April 2006 (although the WSRA wish to remain known as Ofwat); the Environment Agency (EA); and the Drinking Water Inspectorate (DWI). The responsibilities and

² Ofwat, *Future water and sewerage charges 2005-10: Final determinations*, December 2004, p 11.

³ See <http://www.odpm.gov.uk/index.asp?id=1143803>.

⁴ See http://www.odpm.gov.uk/index.asp?id=1143843#P20_625.

effectiveness of these regulators will be discussed in greater detail in Chapter 3.

Ofwat

- 2.18. Established at the time of privatisation, Ofwat is the economic regulator of the water industry. It carries out its duties through an Instrument of Appointment (or licence) with each water company—setting out the reciprocal functions, powers and responsibilities of the two parties—which may under certain circumstances be modified. Licences are held for 25 years after the original appointment before renewal.
- 2.19. Ofwat's primary duties are setting limits on what companies can charge; ensuring companies are able to carry out their responsibilities; protecting the standard of service consumers receive; encouraging companies to be more efficient; meeting the principles of sustainable development; and helping to encourage competition where appropriate.⁵
- 2.20. The responsibilities of the economic regulator have not changed with the advent of the WSRA, but the Director General of Water Services has been replaced by a board consisting of a chairman, a chief executive, two executive directors and four non-executive directors. The first chairman of the new board is Philip Fletcher, previously Director General of Water Services.

Environment Agency

- 2.21. The EA was established under the Environment Act 1995, assuming and consolidating functions previously exercised by a number of bodies. The establishment of the EA represented a centralisation of power and authority over environmental matters. Its principal aim is “so to protect or enhance the environment, taken as a whole, as to make [a] contribution towards attaining the objective of achieving sustainable development” in England and Wales.⁶
- 2.22. The EA is responsible for the water quality of water bodies, water provision and protection against flooding from main rivers and critical watercourses. One of the principal instruments through which the Agency works is the use of agreed plans, some prepared by the Agency and some by the water companies. These include, among others: Catchment Abstraction Management Strategies, Water Resources Plans, Catchment Flood Management Plans and Drought Plans. There is also a requirement under the Water Framework Directive⁷ for the preparation by the EA of River Basin Management Plans (RBMPs), which involve setting environmental objectives for all ground and surface waters and devising strategies to meet them.
- 2.23. The EA also manages water resources through abstraction licences, which regulate abstractions from sources including rivers, lakes, canals and underground aquifers so as to minimise damage to the environment. The Water Act 2003 introduced a number of changes to the way in which the EA manages abstraction, including time limits for new licences, the ability to revoke licences, greater flexibility to raise or lower licensing thresholds and the extension of licensing to abstractors of significant quantities who were previously outside the system.

⁵ See http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/protecting_interests280905.

⁶ Environment Act 1995, s. 4.

⁷ Directive 2000/60/EC.

- 2.24. Finally, discharges to “controlled waters” (rivers, water courses, lakes, canals, reservoirs, underground sources, estuarine and coastal waters) require a discharge consent from the EA to ensure that the quality of the receiving waters remains within acceptable levels.

Drinking Water Inspectorate

- 2.25. The Drinking Water Inspectorate monitors the safety of drinking water to ensure that water companies comply with their statutory duty to supply wholesome water. The DWI carries out its functions through audits that entail checking the results of the sampling and tests carried out by water companies and verification visits to inspect aspects of operating procedure. Summaries of the results of the testing and audits are published and also supplied to Ofwat as input into its assessment of company performance. The DWI also investigates customer complaints and incidents related to water quality.
- 2.26. In addition to its audits and inspections, the DWI issues guidance to companies and agrees with them water quality improvement programmes that form part of asset management plans. The DWI requires companies to produce Distribution Operation and Maintenance Strategies (DOMS) and, following a World Health Organization initiative, is encouraging the preparation of Drinking Water Safety Plans as part of its effort to ensure the supply of wholesome, potable water.

European Union

- 2.27. Since 1973, virtually all United Kingdom environmental legislation has been driven by—or developed in close association with—the European Community (EC) or international bodies. Under the Treaty of Nice, water quality proposals are agreed through the qualified majority voting system whereas the quantitative management of water resources is subject to unanimity.⁸ In practice, this means that EC Directives focus predominantly on water quality issues, although addressing water quantity can be essential in order to meet the required quality standards. Moreover, the impact of high flows on receiving waters is an important component of, for example, the Habitats Directive.
- 2.28. There have been numerous water-related Directives—culminating in the Water Framework Directive in 2000—that have had a profound influence on water policy in the United Kingdom. There are three broad types. The first type deals with setting and meeting quality objectives and includes the Bathing Water and Drinking Water Directives.⁹ The second type seeks to control or eliminate dangerous emissions into the aquatic environment—the Dangerous Substances Directive¹⁰ being a prime example. Both these types are reasonably explicit in their aims and lay down defined parameters or procedures against which compliance can be compared. The third and more recently developed type, exemplified by the Water Framework Directive, aims to protect the water environment against more general risk. Such Directives are of a more qualitative nature and there is consequently a greater challenge in translating their aspirational objectives into practical procedures.

⁸ Treaty of Nice, 26 February 2001, Articles 174–175.

⁹ Directives 76/160/EEC and 98/83/EC respectively.

¹⁰ Directive 67/548/EEC.

Water Companies

2.29. The water industry in the United Kingdom supplies over 20 million properties, has a turnover of more than £7 billion per year and owns assets including 1,000 reservoirs, more than 2,500 water treatment works, 9,000 sewage treatment works and more than 700,000 kilometres of mains and sewers.¹¹ It provides a service that underpins almost every aspect of daily life in a way that is often taken for granted by much of the population. The areas of operation of the water companies are set out in Figure 1.

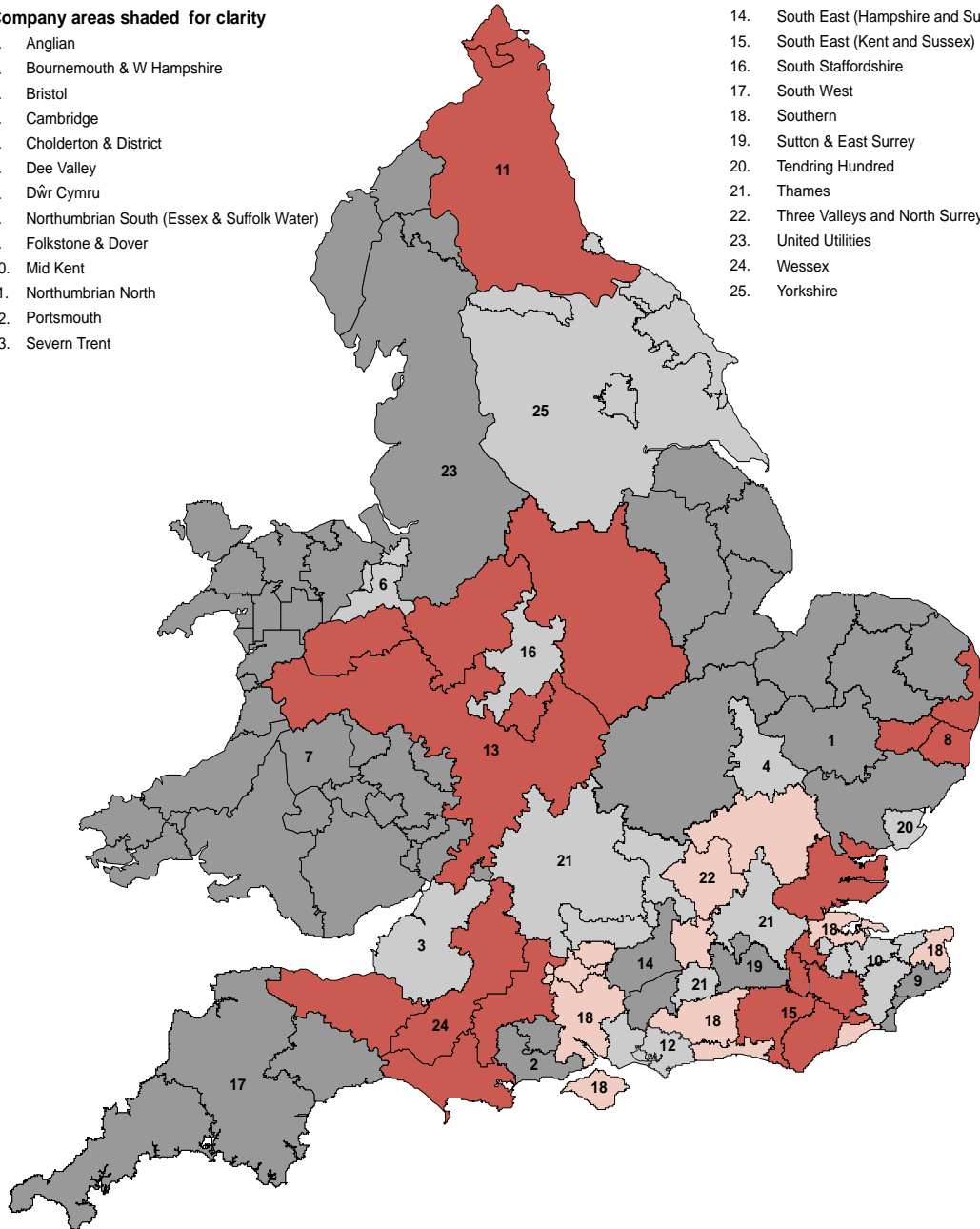
FIGURE 1

Water Company Supply Areas and their Water Resource Zones

Company areas shaded for clarity

1. Anglian
2. Bournemouth & W Hampshire
3. Bristol
4. Cambridge
5. Cholderton & District
6. Dee Valley
7. Dŵr Cymru
8. Northumbrian South (Essex & Suffolk Water)
9. Folkstone & Dover
10. Mid Kent
11. Northumbrian North
12. Portsmouth
13. Severn Trent

14. South East (Hampshire and Surrey)
15. South East (Kent and Sussex)
16. South Staffordshire
17. South West
18. Southern
19. Sutton & East Surrey
20. Tendring Hundred
21. Thames
22. Three Valleys and North Surrey
23. United Utilities
24. Wessex
25. Yorkshire



Source: Ofwat

¹¹ See <http://www.water.org.uk/home/resources-and-links/waterfacts-2005/water-services-in-the-uk>.

- 2.30. Water companies have a duty to develop and maintain efficient and economical systems of water service provision.¹² In doing so they are obliged to ensure that people have access to those services and that the service infrastructure is maintained and improved. These duties are enforceable by the Secretary of State, who has the power by regulation to prescribe the standards of performance with which water companies must comply. Water companies are also obliged to ensure a constant service and a water quality that complies with the regulations.
- 2.31. The way in which the companies charge for these services varies depending on whether a particular property is metered or not. In the case of metered properties, they charge according to the volume of water used. In unmetered properties, their charges are based on the rateable value of the property in question. The penetration of metering is discussed in more detail in Chapter 6.

Consumer Interests

- 2.32. Since 1 October 2005 consumer interests in England and Wales have been represented by the Consumer Council for Water (CCWater), the successor body to WaterVoice. CCWater is a non-departmental public body, independent of the regulators, whereas WaterVoice was part of Ofwat. CCWater has a central Council and ten regional committees, and its general functions are as follows:
- to acquire and review information about consumer matters and the views of consumers on such matters;
 - to provide advice and information to public authorities and represent the views of consumers on such matters;
 - to provide information to consumers about consumer matters; and
 - to publish information and advice about consumer matters.
- 2.33. The regional committees provide advice and information to the Council on consumer matters and there is a general duty to consult with the appropriate bodies as also there is a duty for others to consult with the Council. The Council is also required to contribute to the achievement of sustainable development.

Key Concepts of Water Management

Security of Supply

- 2.34. Each company has a duty to maintain the security of its water supplies and the Security of Supply Index (SOSI) allows Ofwat to assess each company's compliance with this duty (see Box 1).

¹² Water Industry Act 1991, s. 37.

BOX 1

Security of Supply Index

The Security of Supply Index (SOSI) is based on the concept of headroom, which is the difference between the estimated amount of water likely to be available to supply and the estimated volume of water that is likely to be needed to meet demand. “Target headroom” is the headroom thought to be necessary to take account of supply and demand uncertainties—in other words, “achieving target headroom shows that a company can deliver its planned level of service”, whereas “a [target] headroom deficit [means] that a company is operating with a greater than planned likelihood of needing to apply restrictions during a dry year”. SOSI scores reflect the size of any deficit against the company’s estimate of target headroom in each of its resource zones, and the proportion of customers in each resource zone that is exposed to headroom deficits.¹³

- 2.35. The index approach is not without its critics. For example, the EA has suggested that some companies may be “adjusting their target headroom and putting customers at risk of supply shortages in order to improve their security of supply index”.¹⁴ Companies that underestimate target headroom values are likely to need to apply customer restrictions far more frequently than claimed and may be placing the environment at risk as they seek drought permits—which allow them to take water from new sources or to alter restrictions on existing abstractions—in periods that are not exceptionally dry. The way in which the SOSI is used in the Overall Performance Assessment of companies is currently the subject of consultation by Ofwat.¹⁵
- 2.36. Measures such as security of supply indices are necessary in order to ensure that proper planning is undertaken to cover periods of lowest water availability. However, the complexity of SOSI means that it is unlikely ever to be meaningful to consumers.

Water Resources Planning

- 2.37. Water companies take around 45 percent of abstracted water in order to provide the public water supply.¹⁶ They are under a duty to provide a supply of water for domestic and business purposes and therefore must plan to ensure that they are able to meet the demands that are likely to arise in the future. Since 1999 water companies have produced water resources plans, which are scheduled to become compulsory from 2007/08.¹⁷ The EA is fully involved in these plans, which play a central role in the price review process.
- 2.38. Water resources plans show how each company plans to maintain security of supply to customers over the next 25 years in a way that is economically,

¹³ Ofwat, *Security of Supply, leakage and the efficient use of water: 2004-5 report*, October 2005, pp 8-10.

¹⁴ Response to *Ofwat forward programme 2005-06 to 2007-08*. See [http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/fp_res020905ea.doc/\\$FILE/fp_res020905ea.doc](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/fp_res020905ea.doc/$FILE/fp_res020905ea.doc).

¹⁵ Ofwat, *Reflecting security of supply in the overall performance assessment (OPA)—a consultation*, March 2006.

¹⁶ Environment Agency, *Water resources for the future: a strategy for England and Wales*, March 2001, Figure 3.2. The remaining 55 percent is taken by industry, agriculture and others; see paragraph 4.3 for further information.

¹⁷ See <http://www.defra.gov.uk/ENVIRONMENT/water/legislation/default.htm>. The power to make the plans compulsory was set out in the Water Act 2003, s. 62.

socially and environmentally sound. This includes forecasts of demand, taking into account company policies on issues such as leakage control, promoting the efficient use of water and increasing the level of household metering. Where there are potential problems in meeting demand, options both to increase supply and to reduce demand are identified and evaluated. A “final planning” forecast is then produced which shows the predicted results of the chosen options.

2.39. Under the Water Act 2003, the Secretary of State has the power to make regulations specifying the processes that should be used in drawing up water resources plans. The Government are currently consulting on the form that these water resources management plan regulations should take.¹⁸

Sustainable Development

2.40. The United Kingdom Government’s strategy for sustainable development aims to “enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations”.¹⁹

2.41. The Government have identified four “priority areas” for immediate action:

- sustainable consumption and production;
- climate change and energy;
- natural resource protection and environmental enhancement; and
- sustainable communities.

2.42. Changing consumer behaviour is central to the achievement of these priorities, within the five “guiding principles”:

- ensuring a strong, healthy and just society;
- living within environmental limits;
- achieving a sustainable economy;
- promoting good governance; and
- using sound science responsibly.²⁰

2.43. The Government have charged the EA and, more recently, Ofwat and CCWater with a responsibility to promote sustainable development.

2.44. Delivering sustainable water systems is a goal to which all those concerned subscribe. However, sustainability is still an uncertain, elusive and contested concept. At best it is clearer what is likely not to be sustainable rather than what is sustainable. Using fewer resources, including energy, and generating less waste, are clear targets but in some parts of England and Wales there may not be a need to use less water as it is plentiful. Nonetheless, where this water is subject to comprehensive treatment before supply and the arising wastewater treated to European standards, the accompanying resource and energy use may render the use of “plentiful water” unsustainable, especially

¹⁸ Defra, *Consultation on water company water resources management plan regulations*, January 2006, p 10.

¹⁹ See <http://www.defra.gov.uk/corporate/aims/priorities.htm>.

²⁰ Defra, *Securing the future: delivering UK sustainable development strategy*, March 2005.

because of the resulting greenhouse gas emissions. Thus there are difficulties inherent in defining what may or may not be sustainable.

- 2.45. At present neither the water industry nor the regulators have an agreed methodology to include sustainability within the decision processes relating to water management, preferring to concentrate on those aspects of sustainability important to their sectors of activity. Ofwat is, however, currently consulting on its sustainability duty (see paragraph 3.106). Elsewhere in the world, in Australia and Sweden for example, new approaches have been developed with a view to ensuring that sustainability is properly included in water management processes.

Trends towards Integrated Water Resource Management

- 2.46. The concept of Integrated Water Resource Management (IWRM) has in recent times gained increasing currency. IWRM is defined by the Global Water Partnership (a partnership between governments, water suppliers and others)²¹ as “a process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”.²²
- 2.47. Professor Colin Green, in written evidence, elaborated on this concept, arguing that IWRM “is taken to include integration across the different functional aspects of water management (e.g. across water quality and water resource management); between land and water management; and across catchments as coherent hydrological units” (p 318).
- 2.48. The Water Framework Directive’s emphasis on river basins, together with the Water Act 2003, will necessitate the introduction of a more integrated approach to water system management as a whole in England and Wales. Along with the Government’s desire to build “sustainable communities”, this is likely to push sustainability and the integration of all aspects of water management higher up the agenda of the water industry.
- 2.49. Recent Government initiatives, including the Water Act, have begun to recognise the importance of taking an integrated approach. Defra’s policy document for managing water in England and Wales²³ advocates an integrated approach to water management, including other major elements such as land use planning. More recently, the consultation and scoping study “Making Space for Water”²⁴ stated that an integrated approach should be taken to water management as a whole, but in practice seems to have narrowed the focus to concentrate on better integration in urban drainage and specifically flood risk management.

Conclusions

- 2.50. The current institutional arrangements in England and Wales allocate responsibility for different aspects of water management to water companies,

²¹ See <http://www.gwpforum.org/> for further information.

²² See <http://www.gwpforum.org/gwp/library/IWRM%20at%20a%20glance.pdf>.

²³ Defra, *Directing the flow: Priorities for future water policy*, November 2002.

²⁴ Defra, *Making space for water: Taking forward a new Government strategy for flood and coastal erosion risk management in England—First Government response to the autumn 2004 Making space for water consultation exercise*, March 2005.

Ofwat, the EA and the DWI. The boundaries between the respective responsibilities of each organisation are by no means clear and, with successive modifications to the institutional arrangements, the public understanding of who is responsible for what has progressively diminished.

- 2.51. The differing interpretations of responsibility have led to a culture of reluctance to incur costs in the absence of clear funding procedures, particularly for stormwater and urban drainage. It is hard to avoid the conclusion that the institutional framework in England and Wales is inadequate, and insufficiently flexible, to meet the practical and economic challenge of achieving more sustainable and integrated management of our water resources.
- 2.52. **Responsibility for water management is dispersed and unclear. We need clearer lines of responsibility, greater accountability and more effective funding procedures. Water management should be a partnership in which the water companies, the regulators, Government and the consumer can all engage in a constructive dialogue. Stakeholder engagement requires transparency, accountability and a mutual respect for the interests of all participants. Our report seeks to demonstrate how more appropriate water management could be established for England and Wales.**

CHAPTER 3: THE REGULATORY AND LEGISLATIVE FRAMEWORK

Introduction

- 3.1. In this chapter, we look at the way the regulatory and legislative framework governing water management in England and Wales is interpreted by the Government and their regulators, both in terms of their strategic priorities and through the setting of water companies' price limits.
- 3.2. We also address drinking water quality, consumer involvement in water management and affordability, but the substantive issues of environmental regulation—protecting the natural environment from poor quality raw water and water resource shortages—are addressed in more depth in Chapter 7. In Chapter 6, we also look in greater detail at some of the regulatory issues facing the promotion of water efficiency.
- 3.3. We have a number of significant concerns over the regulatory framework governing the water industry in England and Wales, which are set out in detail below. However, it is important to note that elements of the system are widely admired around the world and that, in some ways, the framework operates in a reasonably effective and fair manner.

Successes of the Regulatory Framework

Drinking Water Inspectorate

- 3.4. The Drinking Water Inspectorate's most recent Annual Report²⁵ revealed that in 2004 the Mean Zonal Compliance—essentially the average compliance with drinking water standards—was an impressive 99.94 percent in England (the figure varied from 99.91 to 99.98 percent in different regions) and 99.92 percent in Wales. Although these figures cannot directly be compared to previous figures because of a recent change in methodology, they are highly impressive. Indeed, Dame Yve Buckland, Chair of the Consumer Council for Water (CCWater), commented that “we can be rightly proud in this country of the quality of the tap water that we have got” and added that “we accept that 100 percent of compliance is not obtainable anyway” (Q 367).
- 3.5. Whilst we received little evidence on the DWI *per se*, this silence, together with the figures mentioned above, appear to suggest that the regulator is carrying out its functions in an effective manner and that few stakeholders have serious concerns about the quality of drinking water. Moreover, Dame Yve's comments, on behalf of the organisation tasked with representing the consumer, seem to show that the DWI is also fulfilling one of its other key duties—to maintain consumer confidence in public water supplies.
- 3.6. However, in spite of the DWI's strong performance, Defra is considering merging it with another national regulator—namely the Food Standards Agency, the Health Protection Agency or the Health and Safety Executive. Whilst we do not object to this initiative in principle, we emphasise that it must not be allowed to undermine the DWI's effectiveness. In light of this,

²⁵ DWI, *Drinking Water in England 2004*, July 2005.

we welcome Defra's decision to put the matter out to consultation. It is expected that the consultation will be issued in June 2006.²⁶

- 3.7. **We urge the Government to make certain that the Drinking Water Inspectorate's effectiveness will not be undermined by a merger with a larger national regulator before implementing any such measure.**

Consumer Council for Water

- 3.8. CCWater is the non-departmental public body charged with representing all consumers of water and sewerage services in England and Wales. It is too early to make a meaningful assessment of CCWater's performance since it only took over from WaterVoice at the beginning of October 2005. However, we welcome CCWater's independence—WaterVoice, by contrast, was part of Ofwat—which bodes well for the future.
- 3.9. The evidence presented to us by CCWater increases our confidence that the body will carry out its duties effectively. Its written evidence was some of the most coherent and well-argued that we received, and we draw particular attention to their supplementary written evidence on water affordability. However, if CCWater's performance is to live up to these expectations it must make every effort to engage fully and genuinely with as many consumers as possible.
- 3.10. No matter how successful CCWater proves to be, however, it is still the case that consumers of water and those interested in the water environment in England and Wales have little direct contact with the water service provider—nor do they have any influence on the companies' *modi operandi* or the standards with which the companies must comply. This lack of direct contact risks impairing attempts to engage effectively with the public and influence their behaviour, and contrasts with the strong public involvement in water services in countries such as France and the United States of America. For example, in parts of California, citizens committees are involved in developing the water charge structures, leading to a wider understanding of the true cost of water and increased attention to fairness and equity.
- 3.11. We are optimistic that the independent Consumer Council for Water will be an effective representative of water consumers, but at the same time the Government should examine ways in which there might be more direct consumer involvement in the development of water policy.

Problems with the Regulatory Framework

- 3.12. As we explained in Chapter 2, Ofwat's primary duty is to set limits on the average change that each water company in England and Wales can make to customers' bills each year. These limits are set in five-yearly periodic reviews, with the last review occurring in 2004 (known as PR04) and the next due to take place in 2009 (PR09). Ofwat is also responsible for ensuring that the companies are able to carry out their statutory responsibilities, encouraging them to become more efficient, meeting the principles of sustainable development and promoting competition in the water industry where appropriate.

²⁶ Supplementary evidence (not printed).

- 3.13. The EA is responsible for securing the proper use of water resources in England and Wales—mainly through the abstraction licensing system—and enforcing environmental water quality standards. In addition, as part of the former function, the EA analyses the water companies’ 25-year water resource plans which are submitted as part of the periodic review process, and provides advice on them to ministers. It subsequently reviews the plans on an annual basis. Finally, the EA seeks to promote efficient use of water.
- 3.14. We believe that Ofwat and the EA have performed effectively in achieving certain of their objectives, namely ensuring good value for the consumer, securing greater efficiencies from the companies and protecting the environment. However, we also have a number of serious concerns, which are set out below.

The Periodic Review Process

- 3.15. As previously outlined, Ofwat is responsible for setting price limits for the water companies on a five-yearly basis. We note that the most recent such price review, PR04, was praised by Pamela Taylor of Water UK (the industry association representing water and sewerage service providers) for being “far more transparent” than previous reviews—allowing more consultation with customers in particular. She commented that “each company made an individual decision that it [the price setting] was just about right” (Q 57). The impression that the water companies were content with PR04 is reinforced by the fact that they did not make use of their right to refer the price limits to the Competition Commission. Nonetheless, later in this chapter we address the question of whether companies have been allocated sufficient funding for certain activities to allow for truly sustainable management of water resources and assets.
- 3.16. We have also received numerous representations that the length of the periodic review cycle is not satisfactory. The main problem is the disparity between the five year periodic review cycle and the six-yearly reviews of River Basin Management Plans (RBMPs) under the Water Framework Directive (which is dealt with primarily in Chapter 7).
- 3.17. Before addressing this disparity, however, it is important to note that, should the timetable for delivering the first RBMPs slip so that they are not finalised until after 2009, there is a danger that the required measures will not be funded in PR09—as Thames Water pointed out (p 46). Indeed, Philip Fletcher, Chairman of Ofwat, admitted that “we may not have a fully developed programme of measures by the time we have to set price limits in 2009” (Q 13).
- 3.18. It is therefore essential that every effort is made to adhere to this timetable and, if it is not adhered to, Ofwat should be prepared to revisit the price settlement after 2009. Mr Fletcher noted that “we have a change protocol which enables us to take account of things that happen between price reviews” but, as he admitted, “it is not ideal” (Q 13).
- 3.19. However, even if the first RBMPs are finalised by 2009, the six year cycle for producing subsequent RBMPs will fall outside the five year periodic review process. South East Water pointed out that this may result in “uncertainty, inefficiency and inadequate funding to undertake environmental improvements” (p 40). We therefore welcome Ofwat’s consultation, “Setting

water and sewerage price limits: Is five years right?”²⁷ which was scheduled to close in May 2006. Yet when we questioned Mr Fletcher about this issue, he stated, “there is no exact match between the water price setting and the Framework Directive, nor do I think we can quite get there” (Q 13). In light of the consultation, this is a puzzling response.

- 3.20. Increasing the five year periodic review cycle to six years would appear to be an appropriate solution, ensuring that the process for determining price limits is fully synchronised with the identification of action required under the Water Framework Directive. If it is felt that agreeing both price limits and RBMPs in the same year (including in 2009) is feasible, then PR09 could go ahead as scheduled and these processes would always coincide—in 2015, 2021 etc. It may, however, be more realistic to hold the next periodic review in 2010, so that RBMPs could always be finalised shortly in advance of the price setting process, thus enabling the necessary measures to be funded.
- 3.21. **We recommend that, in order to synchronise the periodic review cycle and the six-yearly reviews of River Basin Management Plans, Ofwat extends the periodic review cycle to six years.**
- 3.22. Another concern expressed about the periodic review mechanism was that it did not facilitate the long-term planning that is fundamental to developing new water resources. As the Institution of Civil Engineers (ICE) pointed out, “it needs to be recognised that the identification, planning, promotion and implementation of water resource developments is a complex and drawn out process that can take 15-20 years to complete and is commonly fraught with uncertainty along the way” (p 245).
- 3.23. This impression was reinforced during our visit to Essex and Suffolk Water and Anglian Water, when the former told us that although planning for its Abberton Trilogly project—a three-part supply development programme essential for meeting the forecast demands for water in the eastern region—had commenced in 1993, the scheme would not be fully operational until 2014-15, not least because the company had been compelled to demonstrate that no other supply option would be more environmentally friendly. Clearly, companies need to be able to see as far into the future as possible when planning such projects, and the five year cycle is unhelpful in this regard.
- 3.24. Furthermore, as Margaret Devlin (Managing Director of South East Water) said on behalf of Water UK, “we are now entering into a situation where we will be faced with building new and big engineering schemes that we have not seen in the history of privatisation” (Q 58). We agree with this assessment. Population and housing growth, and the lack of major resource development by water companies in recent years, will necessitate substantial investment in water resources. The problem with the five year periodic review process is that it provides inadequate recognition of the long-term nature of the funding requirements.
- 3.25. It therefore seems that the current regulatory system does not provide companies with sufficient financial or logistical certainty to undertake the long-term planning necessary for major capital-intensive projects. In the words of the ICE, “Ofwat ... has a tendency for a short term view corresponding to the five year regulatory period, which is too short for the

²⁷ Ofwat, *Setting water and sewerage price limits: Is five years right?*, January 2006.

timescale required to develop new resources” (p 247). There needs to be a measure of realism about the level of risk that is commercially acceptable to the companies.

- 3.26. With this in mind, we note Ofwat’s recent comments²⁸ that “price limits, however long the period, must be able to take account of projects which cover two or more periods”. The regulator continues, “we have also recognised that there may be a need to provide clearer assurances to companies and investors for very long term major projects and that such projects may carry a level of risk which differs from the construction, financial and regulatory risks associated with capital programmes to date”. However, these sentiments translate into a disappointingly vague plan of action which gives little indication of how Ofwat intends to proceed: “we will continue to develop internal thinking with regard to large capital projects that may span regulatory review periods”.²⁹
- 3.27. The Chartered Institution of Water and Environmental Management (CIWEM) suggested that there should be a six year periodic review cycle—which we have already endorsed above—but that further “indicative” prices should be set for the six subsequent years and “prospective” prices should be set for the 12 years beyond that (p 314). In other words, the companies would have some indication as to their funding over the next 24 years, and the figures could be tweaked and altered as necessary at each six-yearly periodic review. We support this proposal, which we believe would enable the companies to plan major capital projects with greater confidence.
- 3.28. Elliot Morley, the Environment Minister until May 2006, appeared to be open to the idea of something along these lines, commenting, “there may well be a case for longer-term planning in relation to the financial side” (Q 819).
- 3.29. **We strongly recommend that, in addition to extending the periodic review cycle to six years, Ofwat commits to agreeing indicative prices for the subsequent six years and prospective prices for the 12 years beyond that, as proposed by CIWEM. This would provide water companies with a greater degree of financial and logistical certainty as they plan major resource development projects. We further recommend that these price indications be appropriately aligned with the water companies’ long-term water resources plans.**

The Twin-Track Approach

- 3.30. Throughout the inquiry, witnesses almost all advocated the “twin-track approach” as the best way to strike an appropriate balance between resource development and demand management in England and Wales. Unfortunately, however, we encountered considerable confusion as to exactly what the twin-track approach means in practice. This is a damaging state of affairs that could endanger security of water supply.
- 3.31. The Government interpret the concept in their written evidence as follows: “the Government’s twin-track approach for water supply requires demand management options, such as fostering behavioural change, use of new

²⁸ See Ofwat’s response to the Independent Steering Group’s *Report into the Conduct of the 2004 Ofwat Periodic Review*, 21 March 2006. (<http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/md214>).

²⁹ *ibid.*

technologies and controlling leakage, to be fully deployed before new supply side measures are adopted” (p 68). According to the footnote, this interpretation is derived from the Secretary of State’s principal guidance to Ofwat as part of PR04.

- 3.32. This position was reiterated by Elliot Morley: “in our submission we were talking consecutively because there are huge costs in new infrastructure for water supply management and there are environmental consequences, particularly for new build” (Q 829).
- 3.33. The problem with the Minister’s interpretation is that there is nothing “twin-track” about it. The Government insists that demand management options should be “fully deployed” before resource development measures can be adopted, so in other words the two strategies are to be used consecutively, one after the other.
- 3.34. In contrast, the more obvious interpretation is that the “twin-track” approach means the simultaneous implementation of demand management initiatives and development of new resources where appropriate. Indeed, given the long timescales involved in developing new sources, as discussed above in the context of the periodic review process, such a simultaneous approach would seem to us absolutely essential. Whilst it is imperative to maximise the use of demand management measures, it is also of the highest importance to make the necessary preparations for developing new resources—either to supplement savings resulting from the demand management measures, or to compensate for any failure to achieve those expected savings. The consequences of failing to make such preparations could be grave, threatening security of supply and causing unacceptable environmental damage to existing water sources.
- 3.35. The EA appeared to take a more appropriate approach, suggesting that the twin-track approach “takes a balanced view, seeking the efficient use of water while bringing forward timely proposals for resources development where appropriate”. Moreover, “we also need to acknowledge the uncertainties that are associated with many of the factors that affect water resources management. This means that we must identify a way forward that is flexible and robust to a range of possible future scenarios” (p 86). We agree.
- 3.36. However, actions speak louder than words, and some witnesses argued that in practice the EA’s interpretation of the “twin-track” approach was not dissimilar to the Government’s. In the words of CCWater, “our experience of the [Environment] Agency’s approach to twin-track resource management is to see if demand management delivers results before proceeding to resource development. Consumers require a more balanced approach than that” (p 138).
- 3.37. Similarly, during our visit to Yorkshire Water it was suggested that nobody, other than Water UK and the companies, was effectively arguing for a twin-track approach which would deal with resource development and demand management simultaneously, rather than consecutively. Although Ofwat’s written evidence described the twin-track approach unambiguously as “employing both demand side and supply side measures” (p 3), the Royal Academy of Engineering was one of several witnesses to point out that “since the EA and Ofwat both tend to resist new development, the twin-track approach has so far focused much more on decreasing demand than on building more resources” (p 345). We will examine below (paragraphs 3.40-

- 3.44) whether Ofwat has in fact allowed companies sufficient funding to implement a truly twin-track approach.
- 3.38. Whilst the importance of ensuring sufficient resource development seems to have been downplayed by Government and regulator, it is far from clear to us that the water companies themselves are doing as much as they could to promote the other half of the twin-track approach, demand management. Indeed, the EA told us that “companies’ plans are predicated almost entirely on resource development of eight new or enlarged reservoirs and very little at all in terms of demand management, water efficiency and metering” (Q 210). They went on to assert that “there is absolutely no point in their coming to us and asking for blessings on new resource development until they show that they have got their house in order in promoting water efficiency” (Q 223).
- 3.39. The companies should realise that finding the balance between resource development and demand management is not purely a matter of economics. Mike Pocock of Water UK told us that “where we are in a situation in certain geographical locations where the water stress is greatest ... then inevitably the economics will shift towards using demand management techniques to find a longer-term solution to managing the supply-demand balance” (Q 731). Whilst it makes sense to place a greater emphasis on demand management in the most water-stressed areas, the utilisation of these techniques should not be driven solely by what makes the most financial sense for the water companies themselves; environmental and social considerations, and the maintenance of security of supply, are also key concerns.

Resource Development

- 3.40. One of our key objectives in this inquiry was to discover who amongst the regulators had responsibility for ensuring that essential resource development was undertaken. When asked who within Government had the responsibility for ensuring security of supply, of which resource development is clearly a crucial part, both Richard Bird of Defra and Baroness Young of Old Scone, of the EA, told us that the answer was Defra (QQ 159, 220). However, Mr Bird added that “if one is looking at the whole structure of water, then the day-to-day statutory responsibility lies with the individual water companies” (Q 176).
- 3.41. The water companies thus appear to have the primary responsibility for ensuring that the necessary resource development is planned and undertaken. However, it is clear to us that they can only carry out this duty in an effective manner if they have appropriate cooperation from the regulatory system. Some witnesses felt that the regulatory system lacked a proponent of necessary resource development. As the Institution of Civil Engineers (ICE) put it, “there is a weakness on the Government side in having no strong advocate for development to ensure that the country’s basic water needs are being met” (p 247). Likewise, United Utilities said, “Defra, the EA and other regulators should more strongly signal their acceptance that supply enhancement schemes will be required ... to ensure adequate water availability in the future” (p 367).
- 3.42. The importance of Ofwat in particular taking a realistic approach to resource development is underlined by the fact that, as Baroness Young of Old Scone pointed out, the Government “cannot instruct the economic regulator”.

Therefore, if Ofwat was unwilling to cooperate, the Government's only option would be to instruct the companies directly—"and then there is the problem of who pays" (Q 212). It would clearly be impossible for the companies to undertake any major capital schemes without the necessary funding being agreed to by Ofwat.

- 3.43. It was apparent to us that the Chairman of Ofwat, Philip Fletcher, took very seriously his responsibility to ensure good value for consumers. This is commendable. However, there is a risk that, in keeping prices down, Ofwat will not allow sufficient funding—or the required long-term financial security—to enable companies to invest in the necessary resource development. As the ICE noted, "Ofwat is strongly motivated to keep water prices down and therefore tends to be anti-development" (p 247). Similarly, the Royal Academy of Engineering said, "there is a need to encourage Ofwat to pay more attention to the adequacy of water supplies, rather than focusing on keeping water prices down" (p 347).
- 3.44. It is probably too soon to take a firm view on Ofwat's attitude towards funding the resource development that will be required over the coming decades, particularly since the switch to the Water Services Regulation Authority only took place in April. However, **we urge Ofwat in the strongest possible terms to ensure that it allows sufficient funding—and the required long-term financial assurances—to enable water companies to undertake necessary resource development, and to demonstrate to the Government that it is doing so. Further, Ofwat should work closely with the Environment Agency to ensure that the companies are indeed planning sufficient resource development to maintain security of supply.**
- 3.45. The difficulty facing the EA is to balance its primary responsibility to protect the environment—a task which is most satisfactorily fulfilled through demand management—with consideration of the adequacy of the companies' water resources plans. Environmental priorities should not cloud a responsible judgement of whether individual resource development plans are necessary, particularly since the EA is responsible for advising ministers.
- 3.46. Some witnesses felt that the EA had not achieved this balance. The ICE, for example, suggested that "the Environment Agency over-emphasises the benefits of demand management and does not adequately recognise the importance of new development to ensure adequate supplies are available" (p 247). Moreover, during our visit to Yorkshire Water we were told in the strongest terms that the EA should be very wary about being a campaigning organisation in this regard, given their statutory advisory function. Sufficient system resilience is essential to cope with the uncertainties of climate change—additional storage of water can provide this resilience, demand management cannot.
- 3.47. Giving oral evidence, Baroness Young of Old Scone failed to reassure us. She said, "we are very mealy-mouthed talking about which reservoirs we think are runners and which we do not because we do not want to take the pressure off the companies to develop the water efficiency side of their business as well" (Q 226). It is quite right that companies should be pressed on water efficiency, but given that new water resources will be needed in the south east over the coming decades, it is not helpful for the EA to be "mealy-mouthed" about reservoirs that take years to plan and construct.

3.48. We urge the Environment Agency to balance its understandable enthusiasm for demand management with a realistic approach towards the need for resource development. Given the Agency’s responsibility for analysing water resources plans, it is imperative that it lends its support to resource development schemes where necessary—particularly through appropriate advice to the Government—and does not allow its environmental priorities to impact adversely upon the need to ensure security of supply.

Water Efficiency

3.49. We have already emphasised the importance of essential resource development. However, it is equally important that the opportunities presented by demand management initiatives are seized by the water companies, which in turn must be prompted and funded adequately by the regulatory system.

3.50. The central paradox of the water companies’ duty—under the Water Industry Act 1991—to promote water efficiency amongst their customers is that they are obliged to attempt to sell less of their product. This is in the companies’ interest in the case of unmetered customers, but in the case of those who are paying by volume, there is less of an incentive for the companies to fulfil their duty unless they are struggling with serious water shortages. In other words, measures to promote water efficiency—themselves costly—are likely to reduce the revenue the companies receive from metered customers. It seems apparent to us, therefore, that the companies should be positively incentivised to step up their water efficiency activities.

3.51. Ofwat said in written evidence that it was “giving further consideration to positive incentives to increase demand management activity”, but also made the following caveat: “however, any effective strategy will require contributions from many key players” (p 4). This may well be true but Ofwat, which controls the purse strings, is in the strongest position to take action on this matter.

3.52. To date, Ofwat’s funding decisions on water efficiency initiatives proposed by the water companies do not indicate that it is minded to provide the necessary incentives. According to Waterwise, the industry-funded non-governmental organisation tasked with promoting water efficiency, “in many cases the financial regulator has rejected proposed increases in demand management work” (p 390). The Veolia Water Group—which operates three water supply companies in south east England—went further, stating that “water companies were disappointed that proposed water efficiency measures submitted as part of the 2004 water price review were (with a few exceptions) excluded from price limits by Ofwat” (p 386).

3.53. We are not in a position to make an assessment of the coherence and likely success of the water efficiency measures proposed by the companies in PR04—although we analyse their performance to date in Chapter 6. However, it seems perverse to deny them the necessary funding to implement such measures, particularly given the absence of incentives discussed above.

- 3.54. **We consider that Ofwat has placed insufficient importance on the promotion of water efficiency by water companies. The new Ofwat board should therefore make it a top priority to provide genuine incentives to encourage water companies to invest more in promoting water efficiency. Equally, during future price reviews, the presumption should be in favour of funding water efficiency initiatives proposed by the companies, unless there is a compelling reason not to do so. We recommend that ministerial guidance to Ofwat be framed accordingly.**
- 3.55. It is also important for a different Government body to take the lead in giving practical advice to water companies about the different ways of promoting water efficiency and the benefits that can accrue from such activities. However, it is not currently clear which body is tasked with this responsibility. We believe that it should be the EA—which already undertakes a number of water efficiency initiatives—and that it should have closer involvement in the price-setting process, as outlined in the final section of this chapter.
- 3.56. **We call on the Environment Agency and Ofwat to work together to ensure that water companies are encouraged to undertake water efficiency initiatives, and that water efficiency is given a higher priority in future price reviews.**

Infrastructure Maintenance and Renewal

- 3.57. England and Wales have an ageing water supply and drainage infrastructure, with significant leakage problems. Leakage levels have dropped significantly since the peaks of 1994-95, when total leakage in England and Wales stood at 5,112 Ml/day; the figure for 2004-05 was 3,608 Ml/day.³⁰ However, this is still a high level of leakage and would be enough to supply some ten million households, according to the EA (p 88). Thames Water is a particularly poor performer, for a number of reasons, losing 915 Ml/day in leakage, which equates to about one-third of all water supplied through its pipes. A full breakdown of leakage by company is provided in Chapter 5.
- 3.58. Significantly, however, it is thought that a sizeable proportion of the water lost in leakage—between one-quarter and one-third—is lost through supply pipes linking individual households to the mains, for which householders are responsible. Whilst most companies offer a free leak detection and repair service the first time a problem arises,³¹ it is unlikely that householders will be aware that there is such a problem unless they have an accessible water meter—or a visible read-out—and check it regularly. There is no easy or short-term solution to this major problem, although responsibility for supply pipes could potentially be transferred to the water companies.
- 3.59. For each water company, Ofwat sets leakage targets based on the so-called economic level of leakage (ELL), which the Government defines succinctly as “the level at which it costs more to reduce leakage further than to produce that water from an alternative source” (p 68). We consider this concept in Chapter 5, in the context of water supply. In this section, we focus on the

³⁰ *Security of Supply, leakage and the efficient use of water: 2004-5 report*, p 29.

³¹ See <http://www.ofwat.gov.uk/apatrix/ofwat/publish.nsf/Content/waterandseweragepipes>.

funding provided by Ofwat for infrastructure improvements and the adequacy of the projected rate of renewal.

- 3.60. Judging from what we have heard during this inquiry, funding for infrastructure maintenance was insufficient prior to PR04. However, there appears to be a widespread welcome for the “Common Framework for Capital Maintenance” for identifying infrastructure investment needs—for example, CCWater (p 141) and South East Water (p 40) were complimentary—and this approach was applied successfully in PR04. In consequence, Ofwat allowed for a total of £8.4 billion of investment in pipes, sewers and treatment works over the next five years—a 22 percent increase on what was allowed at the previous review (Q 14).
- 3.61. However, there is some concern that the use of the concept of serviceability—whereby an asset is judged on its performance rather than its actual condition—is storing up problems for the future; the Chartered Institution of Water and Environmental Management (CIWEM) even suggested that there is a potential “condition deterioration backlog that could lead to more catastrophic failure and to increased repair costs compared to a condition-dependent renewal/replacement programme” (p 316).
- 3.62. This concern was echoed by the EA, which suggested that the replacement rate was not adequate given that assets can only be maintained for a finite period. It was noted that even Thames Water, which would be spending £500 million on replacing 850 miles of water main over the next five years, would only achieve an annual replacement rate of 0.8 percent; at this rate it would take 128 years to replace the network (p 86). The EA was also worried about the declining state of the sewerage infrastructure, with the accompanying environmental implications (p 87).
- 3.63. Moreover, CIWEM warned that recent infrastructure improvements “have involved a higher proportion of short and medium life assets, such as automatic monitoring systems, than in the past”. This meant that “assets have to be replaced more often” (p 316). This may add to the potential condition deterioration backlog, which may in turn impose huge costs on future water consumers.
- 3.64. **We welcome the adoption of the Common Framework for Capital Maintenance and Ofwat’s decision to allow a considerable increase in spending on infrastructure improvement in PR04. However, we are seriously concerned that the network replacement rate may still be far too slow and could be storing up problems for the future. In light of the concerns expressed by CIWEM and the Environment Agency, we strongly recommend that Ofwat gives serious consideration to working with the companies to increase the replacement rate.**

Research and Development

- 3.65. Research and development (R&D) is a vital component in building a more efficient and sustainable water management system in England and Wales. In this section we will consider the funding of R&D by the water industry. There will be further discussion on specific areas of research—notably environmental—in later chapters.
- 3.66. In terms of industry funding for R&D, we welcome the work of UK Water Industry Research (UKWIR)—funded by the water industry and other collaborators—which identifies research priorities, commissions research

competitively and transfers the research outputs to contributors. This helps to maximise the efficiency of research projects and ensures that the results are disseminated relatively widely.

- 3.67. There have also been some undoubted successes resulting from companies' in-house research programmes. For example, there is Yorkshire Water's impressive computer-controlled modelling system, which was developed through in-house R&D and saves £5 million per year on energy costs alone (see Appendix 6).
- 3.68. In general, however, there is still a relatively low level of R&D funding by the industry. According to figures provided by Water UK (p 36), the overall spending by combined water and sewerage companies in England and Wales was just 0.3 percent of turnover in 2004-05. Within this average there is considerable variation: for example, Wessex Water spent £100,000—0.03 percent of its turnover—whereas the somewhat larger Northumbrian Water spent £5 million or 1.03 percent of its turnover. The total R&D spending by combined water and sewerage companies in 2004-05 was £22 million.
- 3.69. Although Ron Chapman, Chief Executive of WRc (formerly the Water Research Centre), told us that industry funding for R&D is roughly the same nowadays as it was prior to privatisation (Q 526), the companies told us that their R&D budgets had been squeezed by Ofwat's method of financial regulation. Ofwat's demand for ever greater levels of operating efficiencies from the companies meant that there was a reluctance to devote much funding to R&D, because R&D was treated as an operating cost. As David Shore of South East Water told us, the efficiency targets were "relentless" and his company was supposed to make a 1.5 percent efficiency saving each year (Q 141); this meant that "many companies' research and developments budgets have all but disappeared" (p 38).
- 3.70. The drive for ever greater efficiency has also had an adverse impact on the type of R&D undertaken, because companies are keen for any money spent on R&D to provide short-term returns—preferably within the same five year funding period. As Mr Shore admitted, "if we fund anything at all it is something that is very practical, very front-end and it is going to produce a short-term saving. The companies' funding of some of the more blue skies type of research is becoming more and more difficult to sustain" (Q 141).
- 3.71. This suggestion was reinforced by Mr Chapman, who told us that "it is much harder today to get long-term funding for long-term programmes of research, and more money is focused on short-term returns" (Q 526). These long-term programmes are precisely those that are needed if we are to overcome the long-term challenges facing our water system.
- 3.72. A further point is that companies' efficiency savings are "clawed back" by Ofwat at the end of each five year funding period. In other words, there is little incentive for companies to innovate because they "lose" efficiency savings resulting from successful new technologies when prices are determined in the following review. Yorkshire Water told us during our visit that they were particularly concerned that investing in renewable energy projects was not cost beneficial; this seems especially counter-productive in light of the Government's drive to cut greenhouse gas emissions.
- 3.73. In Australia, by contrast, the Cooperative Research Centre (CRC) Programme—funded by the federal government—provides solid financial

incentives for industry and the universities to work together, including on long-term and visionary research. Several of the CRCs were dedicated specifically to water-related research and they appeared to be held in high regard (see Appendix 8).

- 3.74. Although efficiency savings by the companies are to be welcomed—indeed, this was one of the anticipated benefits of privatisation—there must be a balance, and Ofwat would do well to bear in mind its mission statement: “to regulate in a way that provides incentives and encourages the water companies to achieve a world-class service, in terms of quality and value for customers in England and Wales” (Q 3). Ofwat is in danger of focusing excessively on the “value”—which it perhaps interprets as “cost”—at the expense of the “quality”; R&D is vital if companies are to continue providing a genuinely world-class service.
- 3.75. Margaret Devlin, Managing Director of South East Water, drew attention to the way in which the Office of Gas and Electricity Markets (Ofgem) has addressed the issue (Q 141). Ofgem has introduced the Innovation Funding Incentive (IFI) for electricity distribution network operators (DNOs), recognising that innovation has a different risk/reward balance compared with a DNO’s core business. Under the IFI, a DNO can spend up to 0.5 percent of its Combined Distribution Network Revenue on eligible IFI projects and then recover a significant—though reducing—proportion of this from their customers. Although DNOs operate under very different circumstances to water companies, this analogy is certainly relevant.
- 3.76. **We call on Ofwat to address the disincentives in the regulatory system that discourage companies from investing in R&D. We recommend that Ofwat allocates to R&D a certain proportion of companies’ turnovers that would be exempt from the efficiency targets, and reconsiders the mandatory return of all efficiency savings resulting from new technology. Any of the money allocated for R&D that is not spent should be returned to customers in the following price review.**

Water Bills and Affordability

- 3.77. The level of household water and sewerage bills in England and Wales is broadly in line with other developed countries around the world.³² However, in light of our findings, we believe that these charges are too low to ensure a truly responsible and sustainable management of water resources. It is clear that some of our recommendations—particularly those on infrastructure and leakage in Chapters 3 and 5—will necessitate an increase in bills in some parts of England and Wales. Whilst price rises will be unwelcome, we believe that they are essential if this increasingly scarce resource is to be managed sustainably. If price rises are to be imposed, though, there will need to be better engagement with the public on water management in future in order to enhance their willingness to pay.
- 3.78. However, there are already serious problems with unpaid bills—and with water affordability amongst certain low income groups. These two separate but related problems could be exacerbated by an increase in water and sewerage charges, so it is essential that they be tackled as a matter of urgency. In this section, we suggest how this might be done.

³² Ofwat, *International comparison of water and sewerage service—2006 report*, February 2006, p 24.

Unpaid Bills

- 3.79. The current level of unpaid bills is completely unacceptable. The 2004-5 figures show that the total amount of outstanding household revenue, including revenue written off, was £962 million—an increase of £38 million on 2003-04.³³ This is an astonishing amount of debt which can only place pressure on companies' finances and hence water bills. Moreover, pursuing non-payers and taking them to court adds further expense.
- 3.80. We discussed this issue with Margaret Devlin, Managing Director of South East Water. She noted that her company's turnover was £100 million and that it had closed the year with £15 million outstanding as debt—a full 15 percent of turnover. Moreover, South East Water had undertaken analysis of its customers and found that around two-thirds of those who owed the company money had a credit rating of over 400—in a range of 0 to 650—which meant that they could afford to pay. Their non-payment added £10 to every other customer's bill (QQ 144, 147).
- 3.81. Disconnections for non-payment of domestic bills were banned by the Water Industry Act 1999 and we are absolutely clear that this reform should not be reversed. However, the sanctions available to companies to tackle non-payment are not having the desired effect, and we believe it is unacceptable that honest, paying customers should have to continue subsidising those who can afford to pay, but do not. It is true that some companies are more effective at recovering debt than others, and best practice should certainly be shared, but further measures are needed if this problem is to be tackled effectively.
- 3.82. The method used by Yarra Valley Water—one of the water companies in Melbourne—was partial disconnection, whereby flow restrictors were used to reduce the water supply to non-paying households to a level sufficient only for basic healthy and safety needs. To effect this, the company had designed and patented a tamper-proof device which was easy to install and remove. Crucially, the device could be installed in non-metered properties as well as metered properties—which was one of the issues raised by the Minister at the time (Q 815)—although it was slightly easier to do so in the latter.
- 3.83. Whilst partial disconnection is also banned in England and Wales under the 1999 Act, we were encouraged that the Minister was willing to consider this option: “I think it is worth looking at these ideas ... I do think we have to look at the range of options which are available” (Q 814).
- 3.84. **It is clear that something concrete has to be done to address the very high level of unpaid bills, and experience in Melbourne suggests that partial disconnection may be both effective and publicly acceptable. We therefore recommend that the Government examine the evidence from Australia, with a view to introducing more effective strategies for reducing the number of people who can afford to pay their water bills but refuse to do so.**

³³ See

[http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/rd1505_annex.doc/\\$FILE/rd1505_a
nnex.doc](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/rd1505_annex.doc/$FILE/rd1505_a
nnex.doc).

Affordability

- 3.85. An equally important issue is the affordability of water bills and the assistance available to low income households. Although water bills form a relatively small part of most consumers' household expenditure, for others expenditure on water and sewerage is unacceptably high. For example, CCWater told us that in the south west, water and sewerage bills may represent up to seven percent of the disposable income of a single pensioner receiving Pension Credit, and that the figure is even worse for those on Job Seekers' Allowance (p 142). Moreover, across England and Wales in 2005-06 an average of 51.7 percent of non-working households without children will spend more than three percent of their disposable income on water and sewerage bills. This is expected to rise to 55 percent in 2009-10.³⁴
- 3.86. The significance of the three percent figure is that it was selected by the Government as a sustainability indicator—known as “Q3”—so that when “ensuring affordable water supplies”, this was deemed to be the threshold of sustainability.³⁵ It is disappointing that, despite such a high level of people paying more than three percent for water and sewerage, the Government has done very little to address the problem.
- 3.87. The main source of help is through the Vulnerable Groups Regulations, which are administered by the water companies. However, this measure only applies to metered households and the qualification criteria are very tightly-drawn: the customer or somebody in their household must be in receipt of one of several benefits and tax credits, and in addition they need to be in charge of three or more people under the age of 19 in full-time education living in the property, or have someone living in the household who suffers from an eligible medical condition which requires significant additional use of water.³⁶ If these conditions are met, then the household pays no more than the average household bill for their region, no matter how much water they use.
- 3.88. The eligibility for these regulations is far too narrow—for example, a pensioner in the south west paying seven percent of their disposable income on water and sewerage charges will only qualify for assistance if they have a water meter and one of the eligible medical conditions, since it is unlikely that they will have three children in full-time education living with them.
- 3.89. In terms of the number of claimants, Ofwat figures show that 9,217 households successfully applied for the assistance in 2004-05.³⁷ Although we do not know what percentage it constitutes of the total number of eligible households, this figure seems very low.
- 3.90. When questioned about the Vulnerable Groups Regulations, Richard Bird—Head of the Water Directorate in Defra—told us, “we are always looking at whether those regulations remain correct and they have recently been amended following a review last year; the coverage has been slightly

³⁴ CCWater derived these figures from Defra's *Cross-Government Review of Water Affordability Report 2004* (December 2004), but for some unknown reason the figures do not quite tally. See <http://www.defra.gov.uk/environment/water/industry/affordability/pdf/wateraffordability.pdf>.

³⁵ See <http://www.sustainable-development.gov.uk/sustainable/quality04/maind/04q03.htm>.

³⁶ See <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/VulnerableGroups270106>.

³⁷ *ibid.*

extended” (Q 178). He then referred us to the charitable arrangements that the companies have in place to help poorer customers.

- 3.91. This answer is alarmingly complacent; although these charitable funds are to be welcomed, it is not acceptable for the Government to duck the growing affordability issues surrounding water—which is, after all, essential for life—by placing the burden almost entirely upon private companies, which are already having to deal with the increasing problem of non-payers.
- 3.92. We are by no means the first Select Committee to raise the issue of water affordability in recent years. For example, the House of Commons Environment, Food and Rural Affairs and Environmental Audit Committees have both called for action. The former suggested, amongst other things, that “people suffering from serious difficulty in paying their bills should be helped through the benefits and tax credits system”.³⁸ This call was repeated by the Environmental Audit Committee in 2004.³⁹
- 3.93. In 2004, the Government published its Cross-Government Review of Water Affordability Report.⁴⁰ This set out a number of initiatives, including extending the eligibility criteria for the Vulnerable Groups Regulations and examining possible changes or extensions to the Department for Work and Pensions’ Third Party Deduction Scheme which helps benefit recipients to spread out the payment of debts. Water companies were also to be encouraged to share best practice.
- 3.94. In addition, a local pilot scheme was set up in the south west, which Elliot Morley told us was providing free advice to low income households, checks to ensure that people are claiming the benefits to which they are entitled, and water efficient fittings (Q 809). He suggested that this scheme “may lead to changes in the regulations that we have nationally” (Q 811). We urge the Government to implement such changes at the first opportunity.
- 3.95. However, we agree with CCWater that further action is still needed to help the poorest households. CCWater referred us to the scheme planned for Northern Ireland, where water and sewerage charges are being introduced for the first time (p 143). Under this scheme, the Government are guaranteeing that those on low incomes will not have to pay more than three percent of their income on water and sewerage charges—with the cost being met from public expenditure rather than water bills. Although the situation is very different in Northern Ireland—not least because the industry has not been privatised—we believe that this approach ties in much better with the Government’s Q3 sustainability indicator and their initiatives to help vulnerable people with their heating bills.
- 3.96. Elliot Morley suggested to us that the three percent cap was only “for a transitional period of three years” (Q 808) but the Northern Ireland Department for Regional Development have assured us that the scheme will be monitored for three years and then reviewed. It will be interesting to see their conclusions.

³⁸ House of Commons Environment, Food and Rural Affairs Committee, First Report, Session 2003-04, *Water Pricing* (HC 121), paragraph 42.

³⁹ House of Commons Environmental Audit Committee, Fourth Report, Session 2003-4, *Water: The Periodic Review 2004 and the Environmental Programme* (HC 416), paragraph 50.

⁴⁰ Defra, *Cross-Government Review of Water Affordability Report 2004*, December 2004.

3.97. **At the same time as non-payment is a growing problem, water affordability is also becoming an increasingly serious issue; the help currently available for low income households is grossly inadequate and at variance with the Government support available for other essential needs such as energy. We urge the Government to heed the repeated calls of CCWater and two House of Commons Select Committees, and to draw up plans to help the most vulnerable households with their water bills through the benefits and tax credits system. Providing even a fraction of the almost £2.5 billion that the Winter Fuel Payment cost in 2004-05 would be welcome.**

Competition

3.98. Although Ofwat has been most vigilant in seeking ever greater efficiencies from the water companies, the fact remains that the companies are, to all intents and purposes, regional monopolies. The exception to this has been the inset appointments regime, whereby the appointed water or sewerage company can be replaced by another for a specific geographic area under certain limited circumstances. This virtual lack of competition is one of the reasons that Ofwat is tasked with ensuring that the companies are run as efficiently as possible.

3.99. The Water Act 2003 introduced the new Water Supply Licensing (WSL) regime with the aim of increasing competition. Under this regime, which has been operational since 1 December 2005, non-household customers who are likely to be supplied with at least 50 Ml of water per year have been entitled to choose an alternative water supplier where available. New water supply companies must obtain one of two licences from Ofwat in order to fill this role. A retail licence enables them to purchase water from an appointed water company and to use their supply systems to supply the water to customers. A combined licence, meanwhile, allows them to introduce their own water supply into an appointed water company's supply system and to supply the water to its own customers.

3.100. Although Ofwat predicts that only around 2,000 customers will be eligible under this regime, we welcome the new provisions as a first step on the road to introducing greater competition into the industry. Indeed, the Chairman of Ofwat, Philip Fletcher, expressed a hope that, if the regime was successful, the Government would reduce the 50 Ml threshold to allow more businesses to benefit (Q 47).

3.101. CCWater suggested that this new element of competition might increase the transparency of the water companies' operating costs and bring about "more efficient practices across the water industry", to the benefit of all consumers (Q 358). Moreover, if (as CCWater suggest) the uptake of combined licences "encourages the trading of unused abstraction licences", this will bring some relief to the increasing pressures on water supplies in certain regions.

3.102. In terms of extending this greater measure of competition to domestic customers, Philip Fletcher made the valid point that the low penetration of metering—as opposed to the very high penetration amongst businesses—presents something of a barrier (Q 47). This may be an additional argument in favour of introducing universal metering in certain areas, a proposition that we consider in Chapter 6.

- 3.103. We sound one note of caution, however. During our visit to Australia, Ross Young of the Water Services Association of Australia (WSAA) expressed some concern about the introduction of third party access rights in Sydney, where competition is currently non-existent. Although these new rights concerned sewerage rather than water supply, we believe that his concerns also apply to the WSL regime here: new entrants must not be permitted simply to “cherry-pick” the easiest or most profitable opportunities, thus unfairly disadvantaging the existing utilities by leaving them with the least profitable parts of the supply system. Ofwat will have to bear this in mind when judging new licence applications—there must be a balance.
- 3.104. However, we also note Ofwat’s recent statement that “progress has been disappointing” and its warning to the water companies that “negotiations with licensees have in general been too slow”. Ofwat concluded that “going forward there must be a significant improvement in the pace of companies’ negotiations”.⁴¹ We agree: companies must not be allowed to erect barriers to the extension of competition.
- 3.105. **We welcome the introduction of greater competition to the water industry and look forward to the extension of the new regime to increasing numbers of customers in future. However, when judging licence applications, Ofwat must guard against “cherry-picking” of the easiest opportunities by new water supply companies.**

The Way Forward

- 3.106. In light of our findings in this chapter, it will be clear that we believe that Ofwat currently focuses too narrowly on keeping water prices down and insufficiently on security of supply in terms of long-term planning, network renewal and the promotion of water efficiency. We note that it is currently consulting on its new duty to contribute to the achievement of sustainable development—set out in the Water Act 2003—but we were less than encouraged by the contents of the consultation paper,⁴² which contains little more than a few passing mentions of water efficiency. Sustainable development should have three components: economic, social and environmental. At present, Ofwat pays insufficient regard to the environmental and social components, as well as to security of supply.
- 3.107. The EA, by contrast, shows a strong regard for environmental issues through its emphasis on demand management. However, it can be unrealistic about the potential of demand management to mitigate the need for resource development, thus again potentially endangering security of supply—which is particularly worrying given the Agency’s responsibility for advising ministers on the companies’ water resources plans. The Agency must not push its environmental agenda without considering the economic or social impacts sufficiently.
- 3.108. The gloss put on this division of regulatory responsibility by those most closely concerned is that Ofwat and the EA each promotes its own objectives, and that out of this tension mutually acceptable compromises emerge. Thus Philip Fletcher said, “Baroness Young and I enjoy a little sparring match sometimes because we are coming at the issues from somewhat different

⁴¹ See <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/md215>.

⁴² Ofwat, *Contributing to sustainable development—a consultation on Ofwat’s approach*, February 2006.

directions, but it should not be exaggerated” (Q 24). Baroness Young of Old Scone was more ambivalent, saying that “there is generally a productive tension between the water regulator [Ofwat] ... and ourselves ... and the tension is reasonably productive in that with a push and a shove we get the right range of schemes at the right sort of price, but on bad days it can be a bit corrosive” (Q 217).

- 3.109. However, the fact remains that Ofwat calls the shots in terms of the funding allowed for the different duties carried out by the water companies, and there is ultimately little that anyone else can do about it. Despite the EA’s role in advising ministers on water resources, we are not convinced that environmental considerations are sufficiently factored in to the price setting process. Better integration between economic and environmental regulation is essential.
- 3.110. In its response to the Independent Steering Group’s report on PR04⁴³, Ofwat responded positively to the recommendation to revive the Regulators’ Group—comprising representatives from Defra, the Welsh Assembly Government, Ofwat, the DWI, the EA and English Nature—which has not met since March 2004. However, Ofwat also argued that the group should only focus on the ministerial guidance rather than the actual determination of price limits.
- 3.111. This proposal is inadequate for two reasons. First, the interests represented on the Regulators’ Group are too narrow: CCWater should be far more closely involved in the regulatory process, since it can represent consumers’ views and take a more realistic and independent approach to the maintenance of security of supply—particularly in terms of the development of new resources. Second, a group with no involvement in the setting of price limits would inevitably fail to bring about the integrated regulatory system that we believe to be essential.
- 3.112. To summarise, a more genuinely holistic approach needs to be taken to water management, ensuring that economic, environmental and social concerns are all properly and transparently factored in to the periodic review process alongside the imperative of maintaining security of supply. Moreover, a way must be found to address the huge differences between the regions—in terms of climate, population growth, infrastructure, geology—by ensuring that local representatives of all the major stakeholders are involved where possible.
- 3.113. In order to achieve these objectives, plans should be drawn up in each region—on the basis of the River Basin Districts identified by the EA—which would look a significant distance into the future, either 24 years (to coincide with, and inform, the indicative price-setting process recommended above), or even longer. These plans would analyse the likely pressures in each individual region over the coming years and set out a comprehensive strategy for the way forward, making recommendations on the optimum mix of resource development, network renewal and demand management. Clearly, these plans would have to be closely linked to the companies’ resource plans.

⁴³ See Ofwat’s response to the Independent Steering Group’s *Report into the Conduct of the 2004 Ofwat Periodic Review*, 21 March 2006. (<http://www.ofwat.gov.uk/apatrix/ofwat/publish.nsf/Content/md214>).

- 3.114. **We recommend that long-term integrated water management plans be drawn up by regional boards—one for each River Basin District—comprised of local representatives of Ofwat, the Environment Agency and CCWater. These boards would have a statutory duty to draw up such plans and to advise Ofwat accordingly at the national level in advance of each periodic review process. They would also have a duty to advise Regional Assemblies on Regional Spatial Strategies.**
- 3.115. **This would enable all three components of sustainable development—economic, environmental and social—to be factored into the price-setting process far more effectively, whilst also ensuring that security of supply is maintained in a way that best suits the needs and pressures of each individual region.**

CHAPTER 4: DEMAND FOR WATER

Introduction

- 4.1. This chapter considers the primary drivers behind demand for water in England and Wales. We do not make predictions on the scale of likely growth in demand over the coming decades in anything other than the broadest terms, although we do examine the possible impact of the Government's plans for a significant growth in house-building in the south and east of England.
- 4.2. The principal purpose of this chapter is to consider the demographic factors affecting growth in domestic demand for water, the role that water plays in the planning process—with particular reference to the Government's growth areas—and the impact of both agriculture and industry on water use. The potential for mitigating long-term increases in demand for water by means of water efficiency will be addressed in Chapter 6.
- 4.3. Before looking at the individual components of demand for water, it will be instructive to give an estimate of the breakdown of water use in England and Wales in order to keep the relative importance of each component in perspective. According to the Environment Agency in a 2001 report, actual abstraction from non-tidal sources in 1997/98 was used as follows: public water supply, 45.4 percent; private water supply, 0.4 percent; spray irrigation, 0.8 percent; other agriculture, 0.3 percent; electricity, 32.1 percent; other industry, 7.7 percent; mineral washing, 0.8 percent; fish/cress farming and amenity ponds, 11.4 percent; other, 1.1 percent.⁴⁴
- 4.4. However, these figures do not reflect the variations between the different regions, nor do they consider non-household use of the public water supply. The table below provides such a breakdown, although it does not take account of the fact that each figure will vary according to the time of year. Although the amount of water used for power generation seems very large in certain regions, it is important to note—as explained in paragraph 4.56—that much or all of this water is subsequently returned to the original source.

TABLE 1
Components of Non-tidal Demand (in MI/d)

| Component | Anglian | Midlands | North East | North West | South West | Southern | Thames | Wales |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Direct Abstraction (MI/d) | | | | | | | | |
| Primary Industry | 170 | 500 | 540 | 620 | 60 | 180 | 130 | 460 |
| Spray Irrigation | 250 | 110 | 20 | 10 | 10 | 30 | 20 | 10 |
| Power Generation | 17 | 3,628 | 257 | 570 | 1,630 | 2 | 105 | 9,771 |
| Public Water Supply (MI/d) | | | | | | | | |
| Household | 950 | 1,210 | 970 | 1,000 | 630 | 660 | 1,930 | 440 |
| Non-household | 490 | 590 | 590 | 540 | 380 | 240 | 860 | 260 |
| Leakage | 340 | 480 | 530 | 580 | 300 | 210 | 1,150 | 340 |
| Total | 2,217 | 6,518 | 2,907 | 3,320 | 3,010 | 1,322 | 4,195 | 11,281 |

Source: *Environment Agency*

⁴⁴ *Water resources for the future*, Figure 3.2.

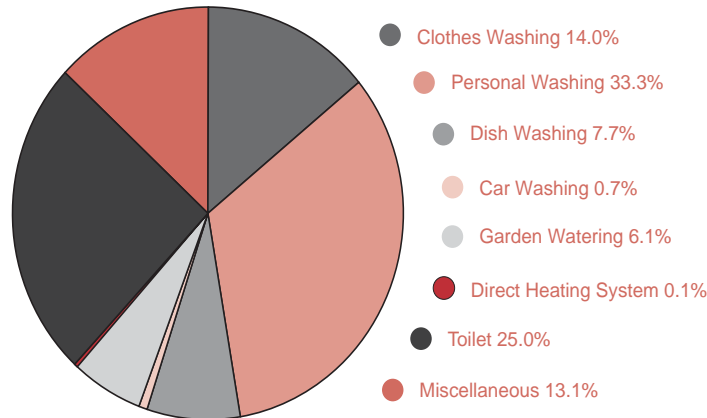
- 4.5. It is widely accepted that household demand will increase over the coming years while non-household demand decreases. The exact figures cannot be predicted with any great accuracy, but by 2009-10 Ofwat expects to see a 1.6 percent increase in demand for water delivered to households and a 5.7 percent reduction for non-households (p 4). The EA predicts that household demand will increase by 1,000 Ml per day (12 percent) over the coming 25 years, with non-household demand reducing by 300 Ml per day over the same period (p 87). Thus the increase in household demand will be partly offset by the decrease in non-household demand, but by no means entirely.
- 4.6. It is difficult to give an accurate breakdown of the uses to which mains water is put within households, because the figures vary on account of several factors such as affluence, region and time of year. However, we reproduce an estimate by the Environment Agency in Figure 2. It is noteworthy that the majority of the water is put to uses that do not necessarily require water of a potable quality.⁴⁵ Indeed, the EA suggested that of the average daily *per capita* consumption of 150 litres (see paragraph 6.4), only around 15 litres is used for drinking and food preparation.⁴⁶

⁴⁵ Potable water is defined by Ofwat as “water for domestic and food production purposes that is required to be wholesome at the time of supply”. See [http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/understanding_ofwat071005.pdf/\\$FILE/understanding_ofwat071005.pdf](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/understanding_ofwat071005.pdf/$FILE/understanding_ofwat071005.pdf)

⁴⁶ Supplementary written evidence (not printed).

FIGURE 2
Breakdown of Household Demand, 1997/8

Micro-components of household demand 1997/98



Household forecast micro-components

| Component | Micro-component |
|-----------------------|----------------------------|
| Toilet use | Toilet use |
| Personal washing | Bath |
| | Standard shower |
| | Power shower |
| | Hand basin |
| Clothes washing | Clothes washing by machine |
| | Clothes washing by hand |
| Dish washing | Dish washing by machine |
| | Dish washing by hand |
| Car washing | Car washing |
| Garden use | Sprinkler use |
| | Other garden use |
| Direct heating system | Combination boilers |
| Miscellaneous | Miscellaneous |

Source: Environment Agency

Demographic and Social Factors

4.7. The key driver behind growth in household demand for water is population growth. According to the Office for National Statistics, the population of England and Wales will grow from approximately 53.046 million in 2004 to 60.088 million in 2031, an increase of 7.042 million.⁴⁷ Clearly this will have a significant impact upon household demand for water. However, it is not possible to calculate the overall increase in demand with any great certainty because there are a number of other variables such as changes in average household size and *per capita* water use.

⁴⁷ See <http://www.statistics.gov.uk/cci/nugget.asp?id=1305>.

- 4.8. With regard to household size, in general it is the case that *per capita* water use is inversely proportionate to the number of people living in a particular household, so the fewer the number of people, the higher the *per capita* water use. According to the Government, the average household size has decreased from 2.86 people in 1971 to 2.34 people in 2001, and is expected to fall further to 2.14 people in 2021 (p 66).
- 4.9. A particularly worrying component of this trend in water use terms is the growth in single-person households, which was highlighted by a number of witnesses. The Government predicted that the number of single-person households would grow by 2.5 million, from 6.2 million in 2001 to 8.7 million by 2021 (p 66). *Per capita* water use in a single-person household is estimated to be 40 percent higher than that in a two-person household (CCWater, p 132).
- 4.10. Such demographic trends underline the need for improved water efficiency in households, but there are some problematic social trends that will make this difficult to achieve. Increasingly heavy water use in the home is seen as just one aspect of rising living standards—a symptom of the public’s desire for the best appliances, whether they be power showers or top-of-the-range dishwashers and washing machines. This is one of the factors that deter housing developers from using water efficient fixtures and fittings, as the Home Builders Federation made clear (Q 773).
- 4.11. There is a view that the increase in *per capita* demand for water might slow over the next few years, as the uptake of these water-intensive appliances may have peaked (CCWater, p 131), but there remains a need to make the general public more aware that water is a precious resource—an issue that is analysed further in Chapter 6. This is also true in relation to external water use, with the EA warning that increased temperatures through climate change will increase usage for garden watering and other outdoor water-based activities (p 87).
- 4.12. **We are concerned by the impact that population growth, decreasing average household size and increasing *per capita* water use will have upon domestic demand for water. The only one of these factors that can be directly addressed by the industry and regulators is the growth in *per capita* water use. It is vital that the growing emphasis on water efficiency amongst the key stakeholders is communicated effectively to the public at large as rapidly as possible.**

Housing and Planning

- 4.13. We now consider the way in which water management has been factored into the Government’s plans to increase housing supply in England, and the impact that these plans might have on demand for water. We do not consider the situation in Wales, where housing and planning are devolved responsibilities.

Background

- 4.14. Meeting the increasing demand for housing in England—which is driven primarily by a growing population, decreasing average household size and a population shift to the south east—is one of the foremost domestic policy challenges of the day, with significant social, economic and environmental implications. As the Government noted, in the past “supply has lagged far

behind demand. Over the last 30 years house building rates have dropped by 50 percent whereas over the same period demand for new homes has increased by 30 percent” (p 66). This has resulted in housing shortages and rising house prices.

- 4.15. In 2003, the Government launched the Sustainable Communities Plan, a £22 billion long-term programme “to tackle housing supply issues in the South East, low demand in other parts of the country, and the quality of our public spaces” and to reform the planning system.⁴⁸ As part of the plan, four “growth areas” in south east England were identified which, together with London, were thought to have the potential to deliver an additional 200,000 homes (by 2016) above the levels proposed in existing guidance. This represented an increase from 154,726 new dwellings per year to 180,000.⁴⁹ The growth areas are:
- Thames Gateway;
 - Milton Keynes and the South Midlands;
 - Ashford, Kent; and
 - London, Stansted, Cambridge, Peterborough.
- 4.16. The Government subsequently commissioned Kate Barker (a member of the Bank of England’s Monetary Policy Committee) to produce a report on the issues facing housing supply.⁵⁰ Her report concluded that up to 120,000 extra new dwellings would be needed each year (on top of the current building rate) to improve housing supply, including an increased number in the four growth areas. This translated into a figure of up to 260,000 new dwellings per year—80,000 more than the Government’s target.⁵¹ The Government’s response to the Barker Review accepted these conclusions, stating that “new housing supply in England will need to increase over the next decade to 200,000 net additions per year, within the range of house building exemplified by Kate Barker”.⁵²
- 4.17. The Regional Planning Bodies (see paragraph 2.15) are responsible for setting regional housing targets and preparing Regional Spatial Strategies (RSSs) which set out where the development should be focused. Draft RSSs are then submitted to the Secretary of State before being subjected to an open “Examination in Public”, where the proposals are scrutinised in detail before an expert panel. The Secretary of State then decides whether any changes are needed before publication. Local authorities are responsible for identifying suitable land for development through Local Development Frameworks.

⁴⁸ See <http://www.odpm.gov.uk/index.asp?id=1163452>.

⁴⁹ House of Commons Environmental Audit Committee, First Report, Session 2004-5, *Housing: Building a Sustainable Future* (HC 135-I), p 8.

⁵⁰ HM Treasury, *Review of Housing Supply: Final Report*, March 2004.

⁵¹ *Housing: Building a Sustainable Future*, p 8.

⁵² *The Government’s Response to Kate Barker’s Review of Housing Supply*, December 2005, p 4.

Sustainable Communities Plan

Consultation

- 4.18. The Government's Sustainable Communities Plan seeks to address an acknowledged shortfall in housing supply in England, focusing development in four geographical growth areas. In water use terms, it is unfortunate that these growth areas are all located in the driest region of the country—the wider south east. This led us to ask how far the Government had considered water demand and supply, as well as the potential environmental implications, when selecting the four areas.
- 4.19. Werner Boettcher, Managing Director of Thames Water, told us that there had been “very little consultation with water companies or the water industry”. He added, “we have a statutory duty to provide [a] supply of water and the question has not really been asked, where is the water actually coming from?” (Q 68). Similarly, the company's written evidence stated that “the issues were not necessarily related to ‘if’ water could be supplied/managed, but ‘when’ ... What appears to be missing is a thorough understanding and explanation as to how ... land-use planning and water resources planning interact and what the Government policy for this is” (p 52).
- 4.20. Waterwise were more concerned about communication within Government, suggesting that “ODPM should have consulted more closely with Defra on the water implications for the Sustainable Homes initiative” (p 390). Similarly, Philip Fletcher said that Ofwat “were not consulted before the initiative was announced” (Q 42).
- 4.21. As for organisations outside the water industry, Lawrence Wragg of the Campaign to Protect Rural England (CPRE) stated that “the Sustainable Communities Plan was developed without any consultation with members of the public or organisations like the CPRE ... we therefore see something of a democratic deficit”. Moreover, “the environmental issues, particularly the issues to do with the supply of water and the treatment of sewage, have come rather later in the sequence than we should have liked” (Q 662).
- 4.22. However, Yvette Cooper, Minister for Housing and Planning at the ODPM, noted that “those areas did not just come out of thin air, they emerged from the ... RPG9 [Regional Planning Guidance 9: South East] work [which] had a whole range of consultations with a wide range of stakeholders, including water companies” (Q 788). A similar point was made by Andrew Wells, Director of Sustainable Communities at the ODPM, who also highlighted the subsequent role of the water companies and the EA at the regional and local level through the Examinations in Public and the Local Development Frameworks (LDFs) (Q 182).
- 4.23. A number of witnesses agreed that communication with stakeholders was improved now that the formation of the RSSs was underway. For example, Baroness Young of Old Scone told us, “I think the process is much improved ... in terms of the involvement of [the EA] and the water companies in things like regional spatial strategies ... there is now a lot of encouragement to the delivery bodies to talk early to the water companies and ask about their proposals for development” (Q 216). Similarly, the Chartered Institution of Water and Environmental Management (CIWEM) commented, “we are pleased that recently, particularly in the south east, there has been greater

engagement between planning bodies and stakeholders from the water sector” (p 317).

- 4.24. However, CIWEM added, “we consider that this [greater engagement] has been due to the efforts on the part of the water industry to make their concerns heard rather than because ... an official arrangement is in place whereby water issues are afforded full consideration within the planning process” (p 317). This analysis appears to ignore the fact that Planning Policy Statement 11 (PPS 11) stipulates that both the EA and the water companies must be consulted on RSSs,⁵³ and that PPS 12 sets out the same requirements for LDFs.⁵⁴ Nevertheless, although there are proposals to grant the EA statutory consultee status on planning applications in flood risk areas under PPS 25, there is no obligation for either water companies or the EA to be consulted on planning applications with regard to water supply issues.
- 4.25. This raises the question of whether the water companies and the EA should be statutory consultees in the planning process, whereby they would have the opportunity to provide a formal response to planning applications. The ODPM appeared to be content with the current arrangements: “the planning system operates on the basis that water supply is a significant material consideration in the location of development ... and is an important consideration in both the development of policy and in decision-making on individual applications” (p 69). However, Margaret Devlin, on behalf of Water UK, noted that “whilst we [the water companies] have a statutory duty to supply [water] we are not statutory consultees in the planning process” and added, “we are asking ... to be a statutory consultee, therefore allowing us to work with the planners to develop water in a more sustainable way” (Q 68). Similarly, CCWater suggested that “planning authorities should be required to consult with water companies ... about planning applications” (p 131).
- 4.26. In our view, it would be impractical for water companies to be consulted on every individual planning application because of the sheer volume of bureaucracy that this would create. As Philip Fletcher of Ofwat said, “there could be a huge load of extra work, for which [the water companies] would not be remunerated” (Q 44). Lester Hicks of the ODPM agreed, noting that the water companies “would be swamped with about half a million applications a year” (Q 190). Nonetheless, water companies could be made statutory consultees on applications for developments that consist of more than a certain number of properties.
- 4.27. Similarly, the EA could be made a statutory consultee on water supply issues in the case of such applications. However, we note the concerns of the House of Commons Environment, Food and Rural Affairs Committee that the EA “lacks adequate resources to respond appropriately to many planning applications”.⁵⁵

⁵³ See http://www.odpm.gov.uk/index.asp?id=1143843#P20_625.

⁵⁴ See http://www.odpm.gov.uk/index.asp?id=1143861#P822_199690.

⁵⁵ House of Commons Environment, Food and Rural Affairs Committee, Seventh Report, Session 2005-06, *The Environment Agency* (HC 780-I), Conclusions and Recommendations, paragraph 19.

- 4.28. **It is regrettable that the ODPM failed sufficiently to consult the water industry directly—or to give due consideration to the water management implications—when formulating the Sustainable Communities Plan and selecting the growth areas. We recommend that, in future, DCLG and Defra work together to ensure that such consultation is held at the earliest possible stage, rather than taking the supply of water for granted.**
- 4.29. **Whilst we welcome the consultative role of water companies and the Environment Agency in the formation of Regional Spatial Strategies and Local Development Frameworks, it is important that they should be involved at the earliest possible stages of planning.**
- 4.30. **We do not believe that it would be practical for water companies to be made statutory consultees on every individual planning application. However, we recommend that the Government consider making water companies statutory consultees on applications for developments comprising a number of properties that exceeds a given threshold. It would also be desirable to make the Environment Agency a statutory consultee on water supply issues in these circumstances. However, the Environment Agency must receive adequate funding if its role in the planning system is to be expanded in this way.**

Impact

- 4.31. We now consider the impact that the Government's plans for housing growth are likely to have upon demand for water. Yvette Cooper referred us to a study that had been published as part of the Government's response to the Barker Review. She said, "the interesting conclusion that it came to was that actually a significant increase in housing growth had a very, very limited impact on water demand, and the reason for that was that one of the greatest drivers is people rather than actual buildings" (Q 789). Moreover, Elliot Morley commented, "the findings of the report suggest that an additional 200,000 homes would produce an additional demand of 12 million litres of water per day by 2015. That sounds quite a lot but that actually would increase demand by 0.1 percent of current water supply" (Q 790). This figure seems very low.
- 4.32. Although the Ministers did not say which study they were referring to, there are three relevant reports in this context: the Government response to the Barker Review; supporting analysis from the ODPM;⁵⁶ and a sustainability impact study commissioned by the ODPM.⁵⁷ In order to obtain an impartial view on the Government's findings about the water use implications of the proposed housing growth, we commissioned Professor Adrian McDonald, of Leeds University, to produce a research paper on these reports. This paper is reprinted in Appendix 4.
- 4.33. The sustainability impact study appears to provide much of the research that underpins the findings of the other two studies. Its main conclusion is that water demand will increase by 728 Ml per day by 2016 (6.1 percent of

⁵⁶ ODPM, *Government Response to Kate Barker's Review of Housing Supply: The Supporting Analysis*, December 2005.

⁵⁷ ODPM, *A sustainability impact study of additional housing scenarios in England*, December 2005.

current demand, which stands at approximately 12,000 Ml per day) and 1,102 Ml per day by 2031 (9.2 percent of current demand) under the “baseline” scenario. This baseline scenario encompasses housing growth targets in existing regional guidance and the Sustainable Communities Plan, but does not take into account the Government’s new target in response to the Barker Review of a building rate of 200,000 new houses per year by 2016.⁵⁸

- 4.34. Professor McDonald was critical of the methodology used in calculating these figures, particularly because of the “errors and worrying assumptions” made when considering the important relationship between household size and water use. He raised a series of concerns about the nature of the data on which the assumptions are based, concluding, “I would judge the analysis to be conceptually flawed and to have used, inappropriately, very dubious data”. Moreover, “policy based on this analysis would not be scientifically secure”.
- 4.35. The figure alluded to by Elliot Morley—a 0.1 percent increase in demand—appears in both the Government’s response to the Barker Review and the supporting analysis. The latter states:
- “the analysis suggests that the additional housing supply needed to reach the Government’s ambition of 200,000 net additions per annum within a decade would result in a marginal increase in water use. It could produce up to an additional 12 million litres per day in 2016 above the 12,728 mega litres/day in the baseline. This represents a 0.1% increase in total water use. This is because water demand is primarily driven by population, which is largely unaffected by housing supply”.⁵⁹
- 4.36. At first sight, it may seem as if the 0.1 percent figure refers to the total increase in water use (over the current figure) required to meet the Government’s housing targets. However, as Professor McDonald noted, “it is very difficult to foresee any plausible scenarios in which a water demand increase as low as 0.1 percent ... is reasonable”. In fact, we believe that the accurate interpretation is as follows: as a result of boosting house building from the annual target of 180,000 (the Government’s target in the Sustainable Communities Plan) to the Government’s most recent annual target of 200,000, there will be an additional 0.1 percent increase in water use over and above the 728 Ml referred to above—in other words, it is an increase on an increase.
- 4.37. However, even if this is the case, the information is not clearly presented; as Professor McDonald said, it is “not addressing the same estimates as in the [sustainability] Impact Study and is not being clear about precisely what is being estimated”. The increase in water use by 2016 is expected to be more than six percent of current levels, so it is misleading for the Government to suggest that meeting their target of 200,000 new houses per year would result in a “marginal” increase in water use.
- 4.38. Furthermore, although there is a level of regional analysis in the reports, the headline figures are national totals which fail to reflect that the increase in water demand will be much higher in south east England than elsewhere. A previous report commissioned by the Government had been more explicit:

⁵⁸ *ibid*, pp 11, 16.

⁵⁹ *Supporting Analysis*, p 9.

“over the next ten years a huge increase in the demand for water in the South East is forecast”.⁶⁰ Paul Woodcock of the EA estimated that water usage in the East of England region would increase “by about 10 percent” by 2021, and this figure had already factored in water efficiency targets for new homes (Q 668).

- 4.39. Even Elliot Morley misinterpreted the figures, claiming that “an additional 200,000 homes would produce an additional demand of 12 million litres of water per day by 2015”. In fact, the “additional 200,000 homes” is a target in the Sustainable Communities Plan and is different from the Government’s subsequent target of 200,000 net additions per year which, as discussed above, would result in an increase in water demand of 728 Ml per day by 2016. However, even if he had interpreted the figures correctly, doubts remain about the methodology employed.
- 4.40. **Whilst we welcome the Government’s belated attempts to consider the likely impact of increased housing growth upon water use, we are completely unconvinced by the figures produced. Not only is the methodology flawed, but the findings are produced in such a way that even the Minister with responsibility for water issues misinterpreted them. The Government must be more transparent about the fact that their housing growth plans will have a very significant impact on water use in south east England, and focus on ensuring that the necessary preparations are made.**
- 4.41. Although it is not possible to forecast the water management implications of the planned housing growth with any great accuracy, it is plain that there will be considerable additional demand for water and sewerage services. CCWater warned that “unless there is a significant increase in targeted infrastructure investment then the existing network provision will be unable to cope with the demands placed upon it” (p 131). Similarly, the EA suggested that “up to 40 sewage treatment works in the south east growth areas do not have the capacity to deal with anticipated pressures from further urban development” (p 87).
- 4.42. However, Baroness Young of Old Scone told us that the projected increases in house building “have not in many cases yet been taken into water companies’ long-term plans because they have emerged faster and later than the water company plans were drawn up”. Moreover, “there will be some places where it simply will not be possible to build more housing or to create more development because we are at the level of capacity of the system” (Q 216). The necessary resource development and the environmental constraints must be considered at the earliest opportunity because the development set out in the RSSs is due to take place within 15 to 20 years—and, as already discussed, long-term planning is essential for the water industry.
- 4.43. Gideon Amos of the Town and Country Planning Association went further, suggesting that it was necessary to look beyond the timescales of the current RSSs, perhaps through the introduction of 50 year “horizon strategies”. He warned, “without ... that longer-term planning we cannot look at the scenarios, we cannot look at the options for development and if we cannot do

⁶⁰ Defra, *Study into the Environmental Impacts of Increasing the Supply of Housing in the UK*, April 2004, p 19.

that we cannot ensure a sustainable pattern of development” (Q 708). We agree.

- 4.44. The required resource development will be expensive and there are significant questions about how it will be financed. Pamela Taylor, Chairman of Water UK, recently stated that the water companies “spend more than we receive from today’s customers [and] rely on the markets to make up the gap”.⁶¹ Therefore, not including the water companies from the start in the planning of new communities makes it especially difficult for them to plan effectively—and to raise the capital to deliver the required services. There are also problems as to how the companies pass on the costs of delivering new services that are costly and challenging to provide, especially in areas where there are inadequate base water resources. In particular, it will be necessary to consider how much existing customers throughout the relevant company’s area should be charged and to what extent the cost should fall on the developers and purchasers of the new properties.
- 4.45. Nonetheless, resource development will not in itself be sufficient. As the Institution of Civil Engineers pointed out, “significantly improved water efficiency is an essential component” of any solution (p 246). Paul Woodcock of the EA agreed with this point when discussing the East of England region, backing both resource development and improved water efficiency in new homes. He explained, “what we are calling for in the [East of England RSS] is ... to have a 25 percent efficiency built into new homes compared with old homes. We see that as quite an important aspect of the plan as it moves forward” (Q 654).
- 4.46. Although we consider water efficiency in Chapter 6, we note at this stage that meeting the 25 percent water efficiency target—which is welcome—will require a significant effort by the Government, the regulators and the construction industry. As Paul Woodcock admitted, “I am not aware of a development where [the 25 percent target] has actually been achieved so far” (Q 681).
- 4.47. **It is worrying that the housing growth plans have not in many cases been factored in to the water companies’ long-term plans, due to the way in which Government have initiated the planning. We recommend that the Environment Agency works closely with the water companies to ensure that this situation is rectified at the earliest opportunity, and further recommend that the companies be encouraged to consider the resource development that might be necessary beyond the timescale of the Regional Spatial Strategies.**
- 4.48. **This process should be overseen by Defra and DCLG, both of which must take responsibility for the problems that their earlier lack of consultation has caused. Moreover, Defra must direct Ofwat to take a constructive and realistic approach towards allowing funding for the measures deemed to be necessary.**

⁶¹ See <http://www.water.org.uk/home/news/chief-executive-speeches/city-speech/city-20-april-06-final-web-2.pdf>.

Industry and Agriculture

Agriculture

- 4.49. As noted above, the EA's figures show that agriculture uses about 1.1 percent of abstracted water in England and Wales—excluding fish and cress farming which are water-intensive by their very nature—with the majority of this being used for spray irrigation. A very small amount of water is taken from the public water supply as well. However, as Professor Joe Morris of Cranfield University pointed out, the abstraction is often focused in water-stressed parts of the country and at times of the year when water is in short supply; in some parts of the eastern counties, abstraction for irrigation can account for as much as 70 percent of total abstraction during the summer months, although this is generally for particularly high-value crops (Q 468).
- 4.50. In addition, Dr Keith Weatherhead of the United Kingdom Irrigation Association told us that in the agricultural sector “water use has been growing at about two to three percent per annum fairly steadily now for 20 years and it seems to be continuing to go up” (Q 439). However, this is mostly due to greater use of existing abstractions rather than the granting of new abstraction licences, which the EA is becoming increasingly reluctant to approve.
- 4.51. Moreover, climate change is likely to result in growing demand for water from agriculture. Dr Chris West of the UK Climate Impacts Programme told us, “the increase in demand, should agriculture continue to try and do the things it does now in the same places, will be up to 30 percent by the middle of this century” (Q 293).
- 4.52. However, even if these predictions are fulfilled, agriculture's use of water will still be a very small percentage of the total. Moreover, as Dr Weatherhead pointed out, this water is increasingly being used on high-value crops such as potatoes, vegetables and soft fruit which add value significantly to the agricultural sector (Q 439). Professor Morris concurred with this view, pointing out the employment benefits—both within agriculture and food processing and supply—and suggesting that this kind of agriculture was a high-value use of the water. Interestingly, this enthusiasm for getting high value returns from water echoed the comments of John Brumby MLA, Treasurer of the State of Victoria, who praised the growing use of water in his state for valuable crops such as grapes and almonds.
- 4.53. We also note the comments of Lindsay Hargreaves of Elveden Farms in Norfolk, who wrote that “the farming system produces high yields of safe, reliable food for the United Kingdom's population. It is a reliable, low-cost producer, close to its markets” (p 324). This is a valid point, because the use of locally-sourced foods reduces so-called “food miles”—in other words, minimising the greenhouse gas emissions caused by transporting food from far-flung parts of the globe. In addition, farmers are far more driven by the demands of the market since the Common Agricultural Policy (CAP) was decoupled from production, so it would be inconsistent for the Government now to insist that they grow low water-using crops that the market does not demand, just in order to save water.
- 4.54. Nevertheless, from an environmental point of view it does not make sense for the most water-intensive crops to be grown in the driest parts of the country.

In common with other industries, the agricultural sector has an obligation to use water as efficiently as possible, an issue that will be addressed in greater detail in Chapter 6. This includes careful assessment of the sustainability of spray irrigation, which makes up a very large part of agriculture's water use.

- 4.55. Finally, there is still a significant amount of water licensed for agricultural abstraction which is not in fact abstracted. The EA informed us that farmers would be able fully or partially to sell unused licences to water companies for public water supply purposes, so long as the resumption of abstraction and the change of use would not be detrimental to the local environment.⁶² We urge the relevant parties to consider the potential for supplementing the public water supply in this way.

Industry

- 4.56. As discussed earlier in this chapter, non-household demand for water has been declining in recent years and is expected to continue doing so. However, industrial and commercial customers still use a significant proportion of water abstracted in England and Wales, particularly for cooling purposes during electricity generation. Nonetheless, with regard to the latter, it is important to note that most of the water is non-potable and many power stations return much of it directly to the original source—almost all of it in the case of non-evaporative cooling.⁶³
- 4.57. Whilst we received little evidence on industrial and commercial water use during the inquiry, we note the EA's comments that most of these water users "can make savings of between a quarter and three-quarters of their water use with simple measures that will pay for themselves within two or three years or more rapidly" but "few organisations implement these measures" (p 89). This lack of action is blamed on a mixture of ignorance and the fact that water often makes up a small proportion of their expenditure on utility bills. There is thus a clear need to increase awareness amongst industrial and commercial consumers of both water-saving measures and the wider importance of water as a resource. These issues are addressed in Chapter 6.

⁶² Supplementary written evidence (not printed).

⁶³ *Water resources for the future*, p 24.

CHAPTER 5: WATER SUPPLY

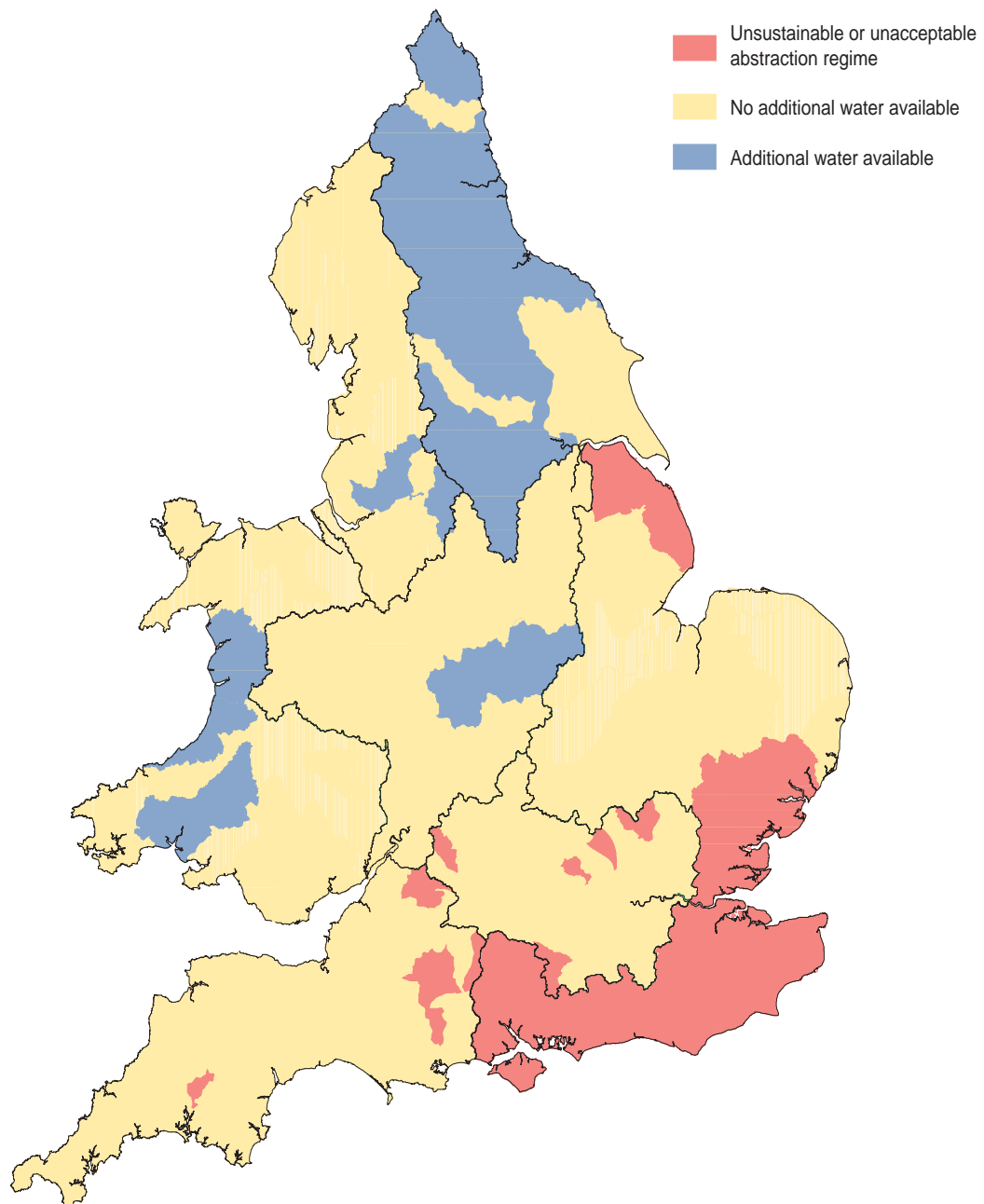
Introduction

- 5.1. The growing water shortages in the south east of England have been receiving increasing media coverage—and therefore public attention—since the start of 2006. In fact, this problem has been building for some time, with a prolonged period of below average rainfall. The period of very low rainfall in the south east started in November 2004 and has continued through the winter of 2005-06, with the EA suggesting, “with a hot, dry summer south east England may face the most severe drought of the last hundred years”.⁶⁴
- 5.2. Although water levels in some reservoirs have risen in recent months, river flows and groundwater levels are very low, and a continuing drought could cause very severe problems. The EA expects “very little further recovery of groundwater levels in the south and east of England” until the autumn,⁶⁵ and in the meantime these levels continue to drop, which is problematic because south east England relies heavily on groundwater for public water supply.
- 5.3. Moreover, the EA warned that “across much of England and Wales ... current abstraction [already] accounts for all the water resources available in summer months”. This means that the EA “cannot permit any further summer abstraction because it would reduce the water available to existing abstractors and the environment” (p 86). The maps on the following two pages highlight the scale of the problem.

⁶⁴ See <http://www.environment-agency.gov.uk/subjects/waterres/1014767/1307023/>.

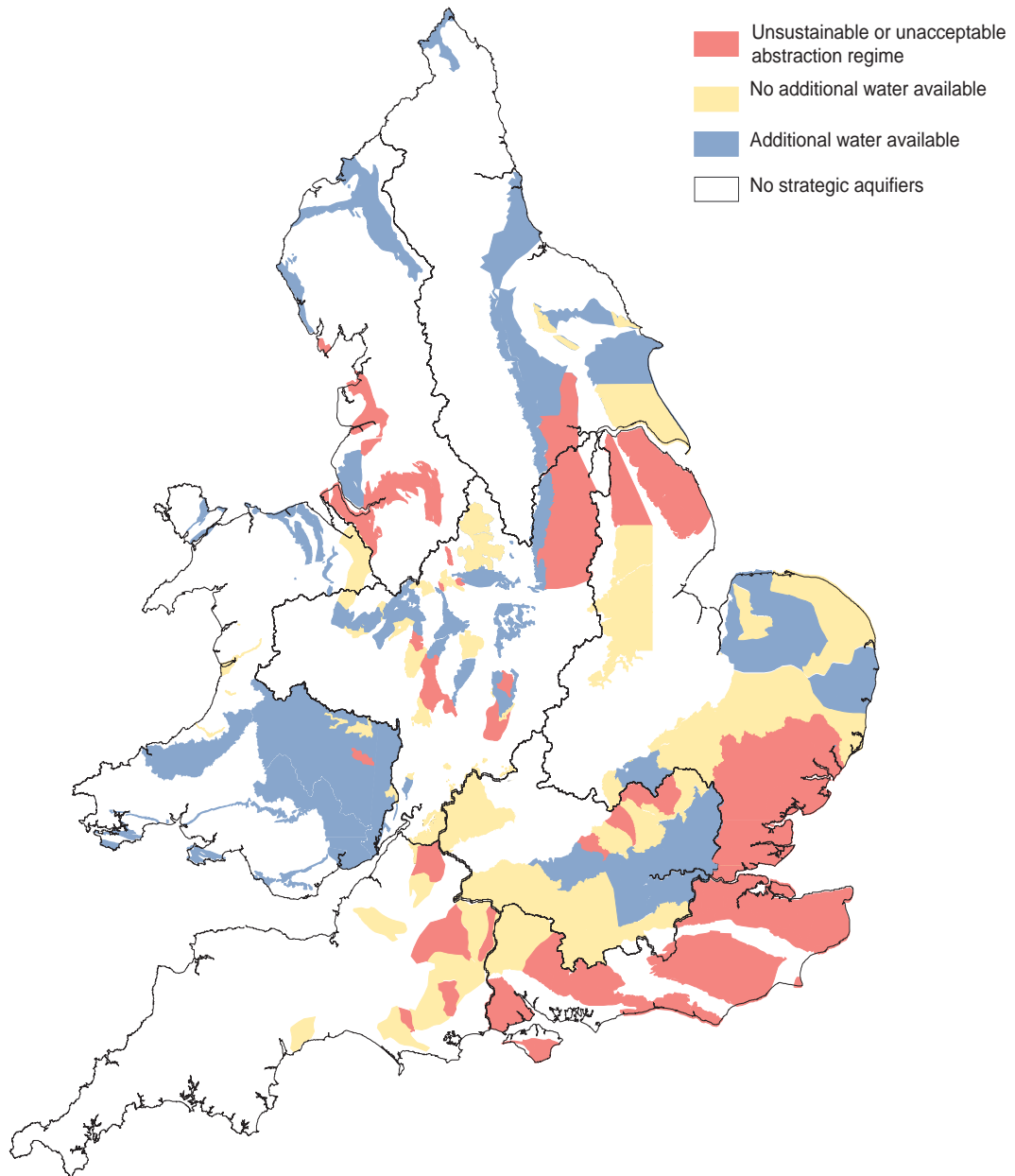
⁶⁵ See http://www.environment-agency.gov.uk/commondata/acrobat/droughtpro_1387597.pdf.

FIGURE 3
Current Indicative Availability: Summer Surface Water



Source: Environment Agency

FIGURE 4
Current Indicative Availability: Groundwater



Source: Environment Agency

- 5.4. It is clear that the water companies in the south east are taking these water shortages seriously. In March 2006, Folkestone and Dover Water became the first water company to apply successfully to the Government for “water scarcity status”, enabling it to compulsorily meter all of its customers. Moreover, at the time of writing eight companies in the south east had imposed hosepipe bans, and Sutton and East Surrey Water had been granted a drought order, enabling the company to limit or prohibit non-essential uses of water. Two other companies, Southern Water and Mid Kent Water, had also applied for drought orders.
- 5.5. In this chapter, we consider the likely impact of climate change upon water resources in the coming years, before looking at the various options for securing new resources. Finally, we investigate the potential contribution of water re-use schemes. The impact of abstraction revocations by the EA will

be considered in Chapter 7, but we note that such revocations are likely to place significant additional pressure on water supply.

Climate Change

- 5.6. Thanks to the latest UK Climate Impacts Programme scenarios (UKCIP02), there is widespread acceptance that one likely impact of climate change will be an increase in the frequency and intensity of precipitation during the winters and a decrease during the summers. Overall, the change in annual rainfall is uncertain: Dr Dave Griggs, of the Hadley Centre, pointed to an “annual change of plus or minus ten percent” (Q 273).
- 5.7. However, it is significant that the biggest seasonal changes in rainfall are expected in the driest regions—eastern and southern England. English Nature suggested that increases in winter precipitation could range from 10 to 35 percent of current levels and decreases in summer precipitation from 35 to 50 percent or more of current levels (p 160). They also warned that soil moisture could decrease by as much as 20 to 40 percent in the south east, thus placing pressure on farmers to step up irrigation levels.
- 5.8. As CCWater said, the implication of these changing rainfall patterns is that “greater headroom will be needed to maintain supplies in the extended summer peaks but more water should be available to replenish resources during the winters”—and that therefore, the construction or extension of reservoirs would be desirable (p 132). We agree, and note that this underlines the importance of long-term planning.
- 5.9. However, we also acknowledge English Nature’s point that “an increased frequency of intense downpours will result in increased runoff towards rivers without replenishing groundwater reserves” (p 160), although Dr Nick Reynard, of the Centre for Ecology and Hydrology (CEH), noted that the level of run-off would depend upon the geological characteristics of each catchment (Q 292). Any reduction in the amount of run-off reaching groundwater reserves would be worrying, given that certain areas of the country rely very heavily on groundwater for supply.
- 5.10. There is still much uncertainty in these predictions, however, because different models show different rainfall patterns in the United Kingdom. We therefore welcome the assurances by Dr Griggs that the 2008 UKCIP scenarios “will not just use the Hadley Centre models but will ... apply the results that the other leading modelling centres ... have” (Q 288). This will enable the application of probabilities to individual predictions within the scenarios (Q 273). It will also be important to make progress in producing smaller-scale, catchment-specific models that will allow a better understanding of climate change impacts at the local level, thus allowing water companies and others to plan with more confidence.
- 5.11. Unfortunately, the scenarios do not take account of decisions that may or may not be taken by governments and others in the future. As Dr Chris West of UKCIP said, “they are not rooted in real decisions ... It is a real problem that ... [the] human sciences are not as advanced as the natural sciences in being able to plot a central tendency” (Q 288). It is obviously very difficult to factor in decisions that stakeholders may make in the future but, as a minimum, we believe it makes sense to work on the basis of the worst-case scenario. Long-term action is going to be necessary, whatever the rate and scale of climate change turns out to be.

- 5.12. It is therefore essential that the likely impact of climate change should be factored into long-term planning during the periodic review process. It is not possible for us to judge whether this has been the case thus far, but we note Water UK's comment that "we do not believe that sufficient attention was given to impacts of climate change within the recent Periodic Review" (p 20).
- 5.13. **We have seen insufficient evidence to convince us that the potential consequences of climate change are being adequately factored into long-term planning for water management, with due regard being paid to the inherent uncertainties. We therefore recommend that both Ofwat and the Environment Agency take steps to make the process whereby such issues are addressed within long-term planning more transparent and open to scrutiny.**

New Resources

- 5.14. Thanks to the combination of climate change, increasing demand (as set out in Chapter 4) and abstraction restrictions or revocations by the EA, it is clear to us that significant additional water resources will need to be developed alongside the energetic promotion of water efficiency. In other words, a genuinely "twin-track" approach needs to be adopted. Realistically, we believe that the options for increasing the amount of water available for supply are as follows: construction or extension of reservoirs; increased use of desalination; further reduction in leakage; and water transfer. In this section, we consider each of these in turn.

Reservoirs

- 5.15. For the reasons outlined above, the predicted impact of climate change is likely to make the construction of new reservoirs, and the enlargement of existing ones, increasingly appealing options. This is clearly the view of the water companies, which have put forward three schemes to extend existing reservoirs before 2015, and proposals for five new reservoirs between 2015 and 2025. However, reservoirs are not a panacea and we note the comment by Margaret Devlin, on behalf of Water UK, that "we do not see reservoirs as the easy answer. We see them as very much being part of the twin-track approach, looking at tackling leakage, tackling [demand] management, tackling metering" (Q 100).
- 5.16. The planning and construction of new reservoirs bring with them a number of problems. The timescales are significant, with 15 to 20 years elapsing between the initial planning phase and completion. Moreover, as the EA pointed out, suitable sites can be hard to find—often requiring compulsory purchase—and "in many locations planning inquiries [can] be prolonged and difficult" with substantial local opposition (p 91). However, once completed, reservoirs tend to provide a reliable yield.
- 5.17. Whilst the required capital investment for a new reservoir is significant, the operating costs are relatively low. We note CCWater's view that reservoirs were an attractive cost option from the consumer point of view, because they were very long-term assets and "the cost ... can be spread over several generations of consumer, so that the value is spread not just to today's consumer but tomorrow's—and tomorrow's consumer pays a fair share of the cost" (Q 369).

- 5.18. The main issues surrounding new reservoirs are environmental and social. In lowland England—where reservoirs will be most needed—they have to be filled with water pumped from rivers, but the EA noted that “there are few rivers with substantial volumes of water that [are] readily available even in winter, so the opportunities for significant new reservoirs are rare” (p 91). The pumping also results in increased greenhouse gas emissions, although it is possible to pump water in a more environmentally friendly way, for example through the use of windmills.
- 5.19. Moreover, reservoir construction affects the surrounding environment with increased traffic, noise and other general disruption. Ian Barker, Head of Water Resources at the EA, summed up his objections as follows: “reservoirs are environmentally damaging in terms of their immediate impact, disrupting flows, ecology, fisheries, and so on, and they also have a big impact on the land” (Q 224).
- 5.20. Yet reservoirs can also bring environmental benefits. Once completed, they tend to provide a pleasant amenity and thus become popular with both wildlife and the general public. As the Institution of Civil Engineers noted, “many have acquired protected environmental status, for example becoming Sites of Special Scientific Interest (SSSIs) or Ramsar sites” (p 248). Likewise, Margaret Devlin told us that South East Water’s two reservoirs—one of which was an SSSI and the other a nature reserve—were “packed almost every day of the week with people sailing on them, walking round them, bird watching, local schools coming to visit” (Q 100).
- 5.21. Another option is to extend the capacity of existing reservoirs. This avoids, or reduces the impact of, many of the disadvantages of constructing new reservoirs that we have considered. Furthermore, reservoir enlargement can produce a very large amount of additional water; for example, as part of its Abberton Trilogy, Essex and Suffolk Water is raising the dam at Abberton Reservoir by 3.2 metres, resulting in a 40 percent increase in storage capacity (see Appendix 9).
- 5.22. Nonetheless, as with the construction of new reservoirs, it is essential that the additional water required should be provided sustainably. If nearby rivers are already suffering from low flows, reservoir enlargement may not be environmentally feasible. The Abberton Trilogy will avoid this problem by pumping water from north Norfolk via a pipeline. However, whilst we support this particular project, it is not clear that the widespread long-distance piping of water to supplement reservoir supplies is an environmentally sustainable measure except in the driest areas.
- 5.23. **We believe that the construction of new reservoirs, and the enlargement of existing ones, for the purposes of public water supply are likely to be necessary in order to meet long-term water demand. However, the development of such new resources should be treated as only one part of the twin-track approach, and the required water must be supplied as sustainably as possible.**
- 5.24. The use of winter storage reservoirs by farmers may also become increasingly necessary as climate change progresses, enabling greater storage of winter rainfall for summer irrigation. The construction of such reservoirs is highly expensive, and currently grants are available under the Rural Enterprise Scheme (RES—part of the England Rural Development Programme). However, the RES is scheduled to close to new applications on 30 June 2006

and it is not clear what alternative funding options will be available in the future. Whilst we do not accept the Broadland Agricultural Water Abstractors Group's (BAWAG) calls for 100 percent subsidy for winter storage reservoirs, we do believe that a level of financial assistance is justifiable for farmers agreeing to reduce levels of summer abstraction.

- 5.25. **We recommend that the Government ensure that subsidies for the construction of winter storage reservoirs continue to be made available after the abolition of the Rural Enterprise Scheme.**

Desalination

- 5.26. Another option attracting increasing attention is desalination, which in some respects appears to be an attractive long-term solution, given the sheer volume of seawater that is available to any country with a coastline. However, desalination is very energy-intensive. As a result, it is costly and—depending on the energy source—a significant source of greenhouse gas emissions. There are, though, numerous studies underway on osmotic distillation and advanced membrane technology, which might provide a less energy intensive method of removing salt from water. Clearly, new technologies that would enable a cheaper and more environmentally sustainable form of desalination would be welcome.
- 5.27. We also note the views of Colin Creighton of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) that desalination sends the wrong message to consumers. He argued that it risked creating the impression of an everlasting supply of water, impairing attempts to establish a long-lasting community conservation ethic (see Appendix 8).
- 5.28. Three water companies in England and Wales are currently planning desalination plants: Thames Water, South East Water and Folkestone and Dover Water. Clearly these water companies are in particular need of additional supplies in order to bolster security of supply and, whatever the disadvantages of desalination, there may in certain circumstances be no better option. Indeed, we note that the EA has reluctantly accepted the Thames Water proposal at Beckton (Q 224). Significantly, though, this scheme concerns brackish water, which has a lower salt content than seawater, making the process somewhat less energy-intensive.
- 5.29. CCWater's approach is that, provided the use of desalination plants "is restricted to supplementing supplies at peak times, we see no objection to their deployment" (p 134). This seems to be an appealing argument, but there is an obvious risk that the water companies, once they have built desalination plants, will increase their reliance on the resource over time.
- 5.30. **We believe that, until better desalination technologies become available, desalination plants should not be the preferred option for general resource development. We recommend that the Government consider whether additional funding is needed to boost research into desalination in the United Kingdom, particularly since more efficient technologies will become increasingly marketable around the world.**

Leakage Reduction

- 5.31. We consider leakage levels in the context of supply, because cutting leakage levels is equivalent to the development of new water supply. Leakage levels in England and Wales have decreased markedly since the mid-1990s and, as

Ofwat pointed out, all companies have now reached the “economic level of leakage” apart from Thames Water and United Utilities. Total leakage is expected to fall by an additional eight percent (315 Ml per day) by 2010 (p 3). The following two tables set out the leakage levels by company in each year between 2000 and 2005, and the leakage targets for each year up to 2009-10.

TABLE 2
Company Estimates of total leakage (Ml/d)¹

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 |
|--|--------------|--------------|--------------|--------------|--------------|
| Water and sewerage companies | | | | | |
| Anglian | 194 | 224 | 192 | 216 | 214 |
| Dwr Cymru | 260 | 245 | 234 | 231 | 226 |
| Northumbrian North | 164 | 161 | 153 | 160 | 155 |
| Northumbrian South (Essex and Suffolk Water) | 72 | 73 | 67 | 70 | 67 |
| Severn Trent | 340 | 340 | 514 | 512 | 502 |
| South West | 84 | 83 | 84 | 84 | 83 |
| Southern | 92 | 92 | 92 | 92 | 92 |
| Thames | 688 | 865 | 943 | 946 | 915 |
| United Utilities | 463 | 452 | 465 | 479 | 500 |
| Wessex | 84 | 79 | 75 | 75 | 73 |
| Yorkshire | 304 | 297 | 296 | 295 | 293 |
| WaSC total | 2,746 | 2,913 | 3,114 | 3,160 | 3,118 |
| Water only companies | | | | | |
| Bournemouth & W Hampshire | 23 | 22 | 22 | 22 | 22 |
| Bristol | 55 | 55 | 53 | 53 | 53 |
| Cambridge | 13 | 14 | 14 | 14 | 14 |
| Dee Valley | 12 | 11 | 11 | 10 | 11 |
| Folkestone & Dover | 9 | 8 | 8 | 8 | 8 |
| Mid Kent | 29 | 29 | 28 | 30 | 29 |
| Portsmouth | 30 | 30 | 30 | 30 | 30 |
| South East | 85 | 75 | 72 | 69 | 69 |
| South Staffordshire | 72 | 71 | 71 | 71 | 74 |
| Sutton & East Surrey | 24 | 24 | 24 | 24 | 24 |
| Tendring Hundred | 6 | 5 | 5 | 5 | 5 |
| Three Valleys | 140 | 157 | 152 | 152 | 149 |
| WoC total | 497 | 502 | 492 | 489 | 489 |
| Industry total | 3,243 | 3,414 | 3,605 | 3,649 | 3,608 |

Notes:

Numbers may not add due to rounding.
1. 12 month rolling averages.

Source: Ofwat

TABLE 3
Leakage Targets (MI/d)¹

| | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|--|---------|---------|---------|---------|---------|---------|
| Water and sewerage companies | | | | | | |
| Anglian | 215 | 215 | 215 | 210 | 210 | 210 |
| Dwr Cymru | 230 | 225 | 210 | 205 | 195 | 195 |
| Northumbrian North | 160 | 160 | 155 | 155 | 150 | 150 |
| Northumbrian South (Essex and Suffolk Water) | 70 | 69 | 68 | 68 | 67 | 66 |
| Severn Trent | 505 | 505 | 505 | 505 | 500 | 500 |
| South West | 84 | 84 | 84 | 84 | 84 | 84 |
| Southern | 92 | 92 | 92 | 92 | 92 | 92 |
| Thames | 905 | 860 | 805 | 770 | 745 | 725 |
| United Utilities | 470 | 470 | 470 | 465 | 465 | 465 |
| Wessex | 74 | 74 | 74 | 74 | 74 | 74 |
| Yorkshire | 300 | 295 | 295 | 295 | 295 | 295 |
| Water only companies | | | | | | |
| Bournemouth & W Hampshire | 22 | 22 | 22 | 22 | 22 | 22 |
| Bristol | 54 | 54 | 54 | 54 | 54 | 54 |
| Cambridge | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| Dee Valley | 11.5 | 11.3 | 11.2 | 11.2 | 11.1 | 11.0 |
| Folkstone & Dover | 8.4 | 8.4 | 8.3 | 8.2 | 8.1 | 8.0 |
| Mid Kent | 29 | 28 | 28 | 27 | 27 | 27 |
| Portsmouth | 30 | 30 | 30 | 30 | 30 | 30 |
| South East | 69 | 69 | 69 | 69 | 69 | 69 |
| South Staffordshire | 75 | 75 | 75 | 75 | 75 | 75 |
| Sutton & East Surrey | 25 | 25 | 25 | 25 | 25 | 25 |
| Tendring Hundred | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 |
| Three Valleys | 150 | 150 | 145 | 145 | 145 | 140 |

Note:

1. With regards to rounding, the following rules apply: performance and targets less than 20 MI/d are given to one decimal place; less than 100 MI/d are given to zero places; and greater than 100 MI/d are rounded to the nearest 5 MI/d.

Source: Ofwat

5.32. However, as the EA commented, nearly a quarter of water—some 3,608 MI per day or enough to supply ten million homes—still leaks from water companies' supply networks (p 88). Table 4 compares the latest leakage figures for each company with the amount of water that it puts into the system, thus showing what percentage of water is lost through leakage. We note Ofwat's concerns that expressing leakage in percentage terms can be misleading, since the size of the denominator (i.e. the distribution input) varies according to water use habits, making leakage levels seem lower in countries which use more water than England and Wales.⁶⁶ However, we believe that using percentages is the only way of expressing leakage in a way which can be clearly understood by the public. By contrast, Ofwat's preferred measure—litres per property per day—is meaningless for most people except as a means of comparing the relative performance of the water companies.

⁶⁶ Supplementary written evidence (not printed).

TABLE 4
Leakage as a proportion of water supplied

| 2004-05 | Total Leakage (MI/d) ¹ | Distribution Input (MI/d) | Leakage in litres per property per day | Leakage (to nearest percent) |
|--------------------------------|-----------------------------------|---------------------------|--|------------------------------|
| Water Service Companies | | | | |
| Anglian & HPL | 214 | 1163 | 110 | 18 |
| Dwr Cymru | 226 | 869 | 170 | 26 |
| Essex & Suffolk | 67 | 464 | 87 | 14 |
| Northumbrian | 155 | 719 | 134 | 22 |
| United Utilities | 500 | 1953 | 159 | 26 |
| Severn Trent | 502 | 1925 | 151 | 26 |
| South West | 83 | 456 | 112 | 18 |
| Southern | 92 | 586 | 89 | 16 |
| Thames | 915 | 2809 | 261 | 33 |
| Wessex | 73 | 372 | 132 | 20 |
| Yorkshire & York | 293 | 1287 | 137 | 23 |
| Water Supply Companies | | | | |
| Bournemouth & West Hampshire | 22 | 164 | 116 | 13 |
| Bristol | 53 | 287 | 109 | 18 |
| Cambridge | 14 | 75 | 115 | 19 |
| Dee Valley | 11 | 68 | 90 | 16 |
| Folkestone | 8 | 46 | 114 | 17 |
| Mid Kent | 29 | 163 | 116 | 18 |
| Portsmouth | 30 | 180 | 102 | 17 |
| South East Water | 69 | 391 | 116 | 18 |
| South Staffs | 74 | 332 | 134 | 22 |
| Sutton & East Surrey | 24 | 161 | 90 | 15 |
| Tendring Hundred | 5 | 30 | 71 | 17 |
| Three Valleys/North Surrey | 149 | 877 | 120 | 17 |
| INDUSTRY TOTAL | 3608 | 15378 | 2835 | 23 |

¹ Total leakage includes water leakage on the companies' distribution network and on customers' underground supply pipes.

Source: Ofwat

- 5.33. Although a significant proportion of leakage occurs from household supply pipes—for which the companies are not responsible, as discussed in paragraph 3.58—these figures are still very high. This problem is compounded by the often poor quality of leakage data, and we fully endorse the sentiments of Ofwat's letter to the water companies' managing directors (MD 209)⁶⁷ emphasising the crucial importance of them providing reliable regulatory data to the authorities.
- 5.34. We have already mentioned Ofwat's view that all but two of the water companies have reached an "economic level of leakage". This begs the question of whether the economic level of leakage (ELL) is the most appropriate concept to apply. ELL is defined by Ofwat as "the level of leakage at which it would cost more to make further reductions in leakage than to produce the water from another source".⁶⁸ The argument in favour of ELL was summed up by United Utilities as follows: "further leakage reduction, beyond economic levels, is achievable to a limited degree, but only at significant additional cost. Reducing leakage beyond the economic level would result in significantly higher water prices than would otherwise be needed, together with increased disruption to road users" (p 374).
- 5.35. These are valid points and it is clearly not desirable to increase bills and disrupt traffic simply for the sake of it. In addition, we acknowledge the point made by the British Geological Survey that "the possible benefit as recharge to groundwater from leaking distribution systems in urban areas should not be overlooked when considering improvements to the system" (p 304)—although, of course, there will always be some level of leakage to groundwater supplies.

⁶⁷ See <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/md209>.

⁶⁸ See [http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/understanding_ofwat071005.pdf/\\$FILE/understanding_ofwat071005.pdf](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/understanding_ofwat071005.pdf/$FILE/understanding_ofwat071005.pdf).

- 5.36. However, ELL still leaves leakage at a high enough level to impinge significantly upon the public's consciousness. As Martin Shouler of Arup noted, "a high level of leakage will adversely affect the response from consumers to calls to moderate their consumption" (p 338)—and this is particularly true if such calls are pitched alongside hosepipe bans and dire warnings about the shortage of water. Controversy over the hosepipe bans in place at the time of writing underlines this point.
- 5.37. Christine Sefton of Bradford University explained the consumer viewpoint in the following terms: "the really big problem ... is if I am saving water in my little house and there is all this leakage coming out of the water company that is apparently due to mismanagement then what is the point? I can save all I like but I am not going to save anywhere near what is needed. The perception is there are leaks so why are you penalising me?" (Q 732). We agree. If consumers see their water savings as "a drop in the ocean", then it is clearly going to be difficult to make any significant progress. We also endorse Yorkshire Water's policy of ensuring that visible leaks are given top priority and mended as quickly as possible; this can only have a beneficial impact on the public's perception of the company.
- 5.38. A further problem with ELL is inherent within the concept itself. It focuses exclusively on the relative economic cost of cutting leakage further as compared to the cost of providing that water from another source, and appears to pay insufficient attention to the environmental impact that the development of additional resources might have. As a case in point, although significant work is now taking place on Thames Water's infrastructure, which presents particular challenges, it still seems insensitive that the company is proposing a desalination plant whilst allowing leakage of around one-third of its water and failing to meet the targets set by Ofwat.
- 5.39. New technology can provide better solutions for identifying and repairing leakage. Water UK informed us that much of the progress of the last few years has been due to the development of new pipe materials—plastics, generally—which are less susceptible to leakage, the increased use of valves and remote sensors to manage pressures proactively, and improvements in leak detection technology using microprocessors and wireless communications (p 22). Moreover, as WRc told us: "technologies for leak detection and location are developing all the time; examples of some of the latest technologies include the Sahara system for trunk mains leak location, digital leak noise correlators, multi-correlator systems and acoustic logging. As these systems are developed they are evaluated by the industry to identify their strengths and weaknesses and added to the leakage tool kit as appropriate" (p 228).

- 5.40. **Given that the development of technologies for leakage detection and repair continues unabated, we believe that leakage levels in England and Wales should be reduced further. We recommend that Ofwat replaces ELL with a broader concept of “sustainable level of leakage”. This would encompass economic impacts, but would also take greater account of the environmental and social implications—in each water company’s area—of providing additional supply instead of reducing leakage further. The sustainable level of leakage for each company should be determined in conjunction with the regional boards, as outlined in Chapter 3, taking full account of environmental impact assessments and agreed social priorities, balanced with the cost-effectiveness of resource development.**
- 5.41. **Setting a “sustainable level of leakage” would, by factoring in environmental considerations, lead to more stringent leakage targets for companies and therefore offset some of the need for new resource development. We believe that it would also help to increase consumers’ trust in the water companies and reduce their resentment at being told to save water when so many water utilities are still losing such a large amount through leakage.**

Water Transfer

- 5.42. There is a huge variation in average rainfall between the different regions of the United Kingdom. For example, Snowdonia receives over 4,000mm per year, whereas parts of East Anglia receive only 550mm per year. This naturally leads people to question why water cannot simply be transported from areas of abundance to areas of shortage. It has even been suggested that a “national grid” should be constructed to transport water to where it is needed. Indeed, in the mid-twentieth century, J. F. Pownall proposed a “Grand Contour Canal” that would (together with the existing canals) have become the primary water distributor of the country.⁶⁹
- 5.43. However, the transfer of raw (as opposed to treated) water between different regions—less so within regions—brings environmental implications. As noted by Martin Shouler of Arup, “there are issues related to regional differences in water quality parameters and the impact on the aquatic environment” (p 338). Similarly, Professor Adrian McDonald of Leeds University suggested that there was a risk of “changing the diversity of habitats and species” (p 298).
- 5.44. Moreover, the Royal Academy of Engineering noted that a national grid would be “unfeasible” because of high capital costs and high operational costs (pp 346, 349). The high operational costs reflect the significant amount of energy required to pump such a heavy substance as water, whether raw or treated, which could result in substantial emissions of greenhouse gases. Reflecting these concerns, Philip Fletcher, Chairman of Ofwat, also opposed a national water grid because of “the very significant drawbacks, both economic and environmental, which would attend trying to develop such a grid” (Q 10).
- 5.45. A more modest option is to encourage greater connectivity between neighbouring water companies and within regions. Although there may be

⁶⁹ See *Engineering*, Volume 156 (1943), p 281.

reluctance amongst separate (and competing, to an extent) water companies to cooperate, it would clearly be desirable for neighbouring utilities to support each other and share water where necessary, on a commercial basis. This already happens to an extent through bulk supply agreements, but CCWater noted that “the structure of the water supply network is fragmented” and “there is little scope to transfer water on a regional basis” (p 135). CCWater’s conclusion was, “there is a strong case to look at integrating of supplies across company borders in water stretched areas such as the south-east”.

- 5.46. We have concluded that a national water grid is not currently feasible. However, we recommend that both Ofwat and the Environment Agency encourage and support greater connectivity between neighbouring water companies, particularly in the south and east of England. This would allow a more rapid and flexible response to localised supply/demand deficits.**

Water Re-use

- 5.47. In this section we consider the potential of the different types of water re-use: the re-use of treated wastewater on a large scale by the water companies; the treatment and re-use of greywater (water from baths, showers and wash basins) and blackwater (wastewater from toilets) at a local level; and the harvesting of rainwater at the individual household or development level.

Large-scale Re-use of Treated Wastewater

- 5.48. In practice, the indirect re-use of effluent from wastewater treatment works already occurs in England and Wales because effluent is often used to replenish rivers, and water is then abstracted further downstream for public water supply. Indeed, in some rivers, such as the Gipping in East Anglia, “minimum water levels are only maintained as a result of the quantity of treated sewage effluent that is discharged into them” (WWF-UK, p 201).
- 5.49. However, in many cases treated effluent is discharged into river estuaries or the sea, which means that it is lost to the public water supply. Essex and Suffolk Water has addressed this issue through the Langford wastewater recycling scheme, which received a Special Commendation in the EA’s 2005 Water Efficiency Awards.⁷⁰ Under this scheme, up to 40 Ml per day of treated wastewater—all of which would otherwise be piped to the Blackwater Estuary—is sent for further treatment, including nutrient removal and UV disinfection, before being discharged into the River Chelmer four kilometres upstream of the water treatment works. Therefore, up to 40 Ml of additional water is now made available each day for water supply and environmental flows.
- 5.50. During our visit to Essex and Suffolk Water, we were informed that the treated water put back into the River Chelmer is in fact of such a high quality—higher than that already in the river—that it could be piped directly to Hanningfield Reservoir. Indeed, if the treatment processes are sufficiently robust, recycled wastewater can be piped directly to water treatment works; for example, CIWEM pointed out that this occurred in Windhoek, Namibia

⁷⁰ See http://www.environment-agency.gov.uk/subjects/waterres/286587/746671/996784/?version=1&lang=_e.

(p 317). However, Essex and Suffolk Water had decided that the water should join the river first in recognition of public misgivings about drinking recycled wastewater.

- 5.51. Blair Nancarrow of CSIRO in Australia attributed these misgivings to the “yuk” factor, an emotion brought about by attitudes to human waste products that was impervious to additional information and education. Whilst this reaction may be irrational, given the level to which the wastewater can be treated, it is deep-seated and unlikely to change in the near future. However, Ms Nancarrow went on to say that people were more willing to drink recycled wastewater if it first went into a short length of river, as at Essex and Suffolk Water, or through a managed aquifer recharge process, as was happening in Perth, Australia. This approach seems to us to be the most pragmatic way of re-using treated wastewater. In particular, the use of managed aquifer recharge may be appropriate in south east England, where groundwater is a highly important source.
- 5.52. We agree strongly with CIWEM, who argued that “returning appropriately treated wastewater from treatment works located near the tidal limit of rivers to upstream reaches of the same river is an idea whose time has surely arrived” (p 315). It was therefore disappointing that, despite their water resource problems, Southern Water was recently granted permission—under the Margate/Broadstairs wastewater treatment scheme—to dispose of up to 20 Ml per day of treated wastewater in the sea. Indeed, CPRE Kent’s provisional estimates suggested that re-using this wastewater would have required no more capital expenditure than the sea disposal scheme—and would have been more cost-effective than the Bewl and Broad Oak reservoir developments (p 309). However, we acknowledge the EA’s comments that an assessment of large-scale re-use might have taken too long given the urgent need for compliance with the Urban Waste Water Treatment Directive,⁷¹ and that there were concerns about the inadequate dilution of effluent in the River Stour.⁷²
- 5.53. On the other hand, we are encouraged that Thames Water is undertaking an internal research project on the potential for planned indirect potable re-use in the future (p 46). We await the outcome with interest.
- 5.54. It is also worth mentioning the potential for industry to make use of treated—but non-potable—wastewater. A good example of this is Flag Fen gas-fired power station in Cambridgeshire, which is supplied by Anglian Water with high-quality treated wastewater for flue gas injection and boiler feed make-up. This saves 1.2 megalitres of potable mains water each day. Similarly, in Australia the Treasurer of Victoria, John Brumby MLA, told us that there was a proposal to send recycled wastewater from Melbourne to Gippsland (a region east of Melbourne) for use in industrial cooling in place of fresh potable water, which would in turn be sent to Melbourne or put back into river flows (see Appendix 8). We believe that the use of such schemes should be maximised, where environmentally sustainable.

⁷¹ Directive 91/271/EEC.

⁷² Supplementary written evidence (not published).

5.55. We recommend that the Government, the Environment Agency and Ofwat encourage and support schemes for the planned indirect re-use of treated wastewater by water companies, especially in the driest areas. We also believe that there is scope for greater industrial use of wastewater that has been treated to a sub-potable standard, and we recommend that the Government explore means by which such schemes could also be encouraged.

Local Treatment and Re-use of Wastewater

5.56. The treatment and re-use of wastewater has to be undertaken on a relatively large scale if it is to stand any chance of being economically viable; as the Government suggested, these systems are “generally more appropriate for hotels, public buildings or estate-sized schemes” (p 69). We saw an example of such a system in Melbourne, where the municipal “Council House 2”⁷³ development recycles sewage from the building through a membrane filtration process in the basement. Moreover, the system can extract sewage from a mains sewer running in the street adjacent to the building and treat this for re-use.

5.57. Although “sewer mining” does not seem to be necessary at the present time in England and Wales, there are two distinct options that do merit further consideration: the local recycling of greywater, and the local recycling of both greywater and blackwater. In addition, recycled wastewater can be mixed with harvested rainwater. The resulting water can in principle be used for garden irrigation, car-washing and for non-potable internal uses—such as toilet-flushing—via a separate supply pipe. This can save significant amounts of mains water.

5.58. There are several problems with these systems, however. The most obvious is the health risk associated with pathogens, in particular, in water that has not been treated to a potable standard. For example, if storage is required, the quality of the water can deteriorate rapidly as the bacteria multiply⁷⁴—a particular risk with greywater that has been subjected to minimal treatment. The health issues are of additional concern if such water is to be used for internal purposes such as toilet-flushing, since there is a risk of children and pets ingesting it.

5.59. Nonetheless, the risks of using recycled water can be effectively managed if the standard of treatment is high enough and the water is not stored for an excessive period of time—as the “Living Machine” at Beddington Zero Energy Development (BedZED), which was designed to provide recycled water from sewage, had demonstrated (see Appendix 7). However, there is still a risk of misconnections of recycled water streams with the potable water system, in spite of the fact that the plumbing fixings are very different. This risk was pointed out to us in Australia and is also evident in some applications in the United Kingdom and the Netherlands. Clearly, therefore, tradesmen and professional designers need to be properly trained in installation.

⁷³ Council House 2 is a sizeable building, comprising offices for Council staff and space for six shops. See <http://www.melbourne.vic.gov.au/info.cfm?top=171&pg=1933> for further information.

⁷⁴ See http://www.environment-agency.gov.uk/subjects/waterres/286587/286599/286911/548861/565687/?version=1&lang=_e.

- 5.60. Strict and well-defined standards and guidelines will also be needed if local water recycling is to be taken up on a wider basis. In particular, as Dr Paul Jeffrey of Cranfield University pointed out, “the one thing that is holding back water recycling in the UK is the lack of any legally enforceable sub-potable water quality standards. We have several sets of guidelines but we do not have anything that you could point to in court and say we have treated water to that level” (Q 748). Similarly, Peter Wright—a consultant to the Peabody Trust which developed BedZED—felt that there should be a universal statutory standard for sub-potable water, in contrast to the current situation where site-specific standards have to be agreed (see Appendix 7). This would help to regularise the process of re-use, establishing a universally-accepted standard and thus putting the minds of developers and residents at rest.
- 5.61. Another point is the importance of ensuring that these systems are properly maintained, since problems can be caused by sediments, fats, oils and greases, discolouration and sliming, as Milo Purcell of the Drinking Water Inspectorate warned (Q 341). This was a serious problem during Essex and Suffolk Water’s trial of greywater recycling at the Heybridge social housing development, where the experiment was abandoned because the filters had become blocked and the pumps had failed (see Appendix 9). Similarly, operation and maintenance difficulties were the main cause behind the ultimate decommissioning of the Living Machine at BedZED. Although Professor David Triggs had successfully redesigned the Living Machine, the activated sludge system required regular maintenance and operational adjustment, and no financial provision had been made to employ somebody to carry out these tasks (see Appendix 7). Regular maintenance is therefore absolutely essential, but this in turn brings a cost which can be a deterrent for developers and residents.
- 5.62. A final problem is the public attitude towards water re-use. Primarily, there is the “yuk” factor—mentioned above—which applies to the recycling of blackwater but can also be a factor with greywater if people think too much about what goes down the plughole. As Mr Purcell asked, “who amongst us, by choice, would wash our car with greywater?” (Q 341) The public also has very high expectations because of the sheer quality of mains water; as Dr Paul Jeffrey of Cranfield University noted, “any sub-potable quality water is viewed with suspicion by the public” (Q 747).
- 5.63. Therefore a comprehensive programme of public education is needed if such schemes are to become anything more than an occasional novelty. We note, for example, that a large development is being constructed at Mawson Lakes near Adelaide (South Australia) that re-uses both greywater and blackwater, which reflects the Australian public’s advanced awareness of water shortage issues. But altering public opinion in England and Wales will not be a rapid process. As Christine Sefton said: “you are talking about changing society norms, which usually does not happen overnight. There needs to be support for the change to happen in a wide enough way so that it is not seen as a weird activity to get into, that it is actually seen as a socially normal thing to do and then it ceases to be that dirty” (Q 751).
- 5.64. It may be that fiscal incentives or regulatory requirements could encourage the greater adoption of these systems, but as a preliminary step it makes obvious sense for the Government to focus on providing financial and logistical support for a development that could act as an exemplar. We

therefore welcome the recently announced Northstowe development on public sector land which will deploy greywater recycling systems.⁷⁵ A number of state governments and municipal authorities in Australia—such as the South Australian Government and the City of Melbourne—have already demonstrated how this kind of project can be planned and rolled out successfully. In addition, Melbourne Water, for example, has underwritten innovative approaches by developers in case they prove to be ineffective.

- 5.65. **We believe that the largely untapped potential for local re-use of wastewater should be explored, and we therefore welcome the Government's intention to use greywater recycling at the Northstowe development. However, the current wariness of the public should be treated sensitively and, initially at least, this kind of recycled water should only be used for external purposes, not internal ones. We also recommend that the Government consider, as a priority, the feasibility of introducing a universal statutory standard for sub-potable water intended for re-use.**

Rainwater Harvesting

- 5.66. Currently, the great bulk of rainwater falling on roofs in this country is not harvested for direct use. However, it can be so harvested either on an individual household basis or at the development level. At the household level, the harvesting of rainwater via water butts for garden irrigation is relatively widespread, and we welcome the discounts that many of the water companies offer to customers wanting to purchase one.
- 5.67. There is greater scope for harvesting rainwater at the development level, as at the BedZED development in Sutton, at Mawson Lakes in Australia and at many sites in Germany. Similarly, the Northstowe development is expected to make use of rainwater collection systems, although it is not yet clear for what purposes this water will be utilised.⁷⁶ However, using harvested rainwater for internal purposes raises similar concerns to the recycling of wastewater: regular system maintenance is just as important and there are also health risks. As Professor Bryan Ellis of Middlesex University pointed out, roof rainwater can be rich in sulphur dioxide, oxides of nitrogen, bacteria, metals and solids, which makes it desirable to divert the “first flush”—the first batch of roof water—away from the later, cleaner water that is to be utilised (p 199). BedZED also encountered discolouration and contamination problems with their rainwater harvesting system—primarily because of the way in which the green roofs were managed—which had caused considerable concern amongst residents (see Appendix 7).
- 5.68. We believe that community rainwater harvesting can be of value but, until solutions to the health and safety issues have been proved beyond reasonable doubt to work effectively, the scope for using such water internally may be limited. However, harvested rainwater, whether at household or development level, can clearly make a useful contribution to meeting demand for external water use and can provide additional benefits in terms of flood prevention. It is likely that with climate change leading to increasing demand for water in many parts of the country, rainwater harvesting systems will become a major source of water for external use. In view of the long lead-in times, it is

⁷⁵ See <http://www.odpm.gov.uk/index.asp?id=1165041>.

⁷⁶ *ibid.*

therefore important that steps are taken now to develop the right standards and techniques—and the necessary willingness—to use these systems.

- 5.69. **We recommend that the Government make every effort to promote the development of rainwater harvesting techniques and to encourage the use of such systems in new developments for the provision of water for external purposes.**

CHAPTER 6: WATER EFFICIENCY

Introduction

- 6.1. It has become increasingly clear during our inquiry that what is normally known as “water efficiency” has an absolutely central role to play if demand and supply are to be balanced in an environmentally sustainable way in the face of a growing population, a shrinking average household size and the pressures resulting from climate change.
- 6.2. For the purposes of this report, water efficiency is taken to mean the use of less water, whether through alterations in human behaviour—such as turning off the tap when brushing teeth or spending less time in the shower—or through the use of more efficient fixtures and appliances. This definition, though vague in itself, is generally understood and uncontroversial. In marked contrast, in our report on Energy Efficiency, we examined a concept where there was a very precise technical definition, but enormous uncertainty as to its practical and policy application.⁷⁷ In the present case, the term “water efficiency” corresponds to what, perhaps more accurately, is known in Australia as “water conservation”. Nevertheless, “water efficiency” is the commonly used term in this country, and is used in this report.
- 6.3. This chapter looks at domestic, industrial and agricultural consumption. However, industrial consumption is already declining (as with industrial energy consumption, this is in part a symptom of the general decline in manufacturing), while agricultural consumption accounts for a very small proportion of overall water use. The primary focus of the chapter is therefore on reducing domestic consumption.
- 6.4. It is difficult to make a reliable estimate of average *per capita* domestic water consumption due to the low penetration of metering, which highlights one of the key challenges in this field—the lack of precise data on water use. According to water company estimates, the figure in England and Wales ranges from a low of 125 litres per person per day (customers of Tendring Hundred Water in north east Essex) to a high of 178 litres (customers of Three Valleys Water in the Home Counties), with an overall average of 150 litres.⁷⁸
- 6.5. International comparison reveals that domestic water consumption in England and Wales is much lower than in the United States and Australia, for example, but significantly higher than in a number of other northern European countries with comparable climates, such as Denmark (where average *per capita* consumption has fallen from 170 litres per day to 125 litres) and the Czech Republic (where the figure has fallen from 171 litres to 116 litres).⁷⁹ This suggests that there is significant scope for reducing *per capita* domestic consumption in this country.
- 6.6. Baroness Young of Old Scone, Chief Executive of the Environment Agency, asserted that the average figure needed to be reduced to 110 litres per person per day in order to be sustainable (Q 226). This figure assumes the deployment of water efficient toilets, showers, washing machines,

⁷⁷ Second Report of Session 2005-06, *Energy Efficiency* (HL Paper 21-I), paragraph 2.1 ff.

⁷⁸ *Security of Supply, leakage and the efficient use of water: 2004-05 report*, p 49.

⁷⁹ *International comparison of water and sewerage service: 2006 report*, p 43.

dishwashers and taps as well as consumers using such appliances “wisely”. The EA noted that “the expectation is that such consumption is achievable without resorting to recycling of water”.⁸⁰ Although this aspirational figure appears to ignore the varying availability of water in different regions, there is undoubtedly a need to reduce average *per capita* consumption.

Promotion of Water Efficiency

- 6.7. If water efficiency is to be improved, it needs to be promoted effectively. This raises a fundamental problem. As the Royal Society for the Protection of Birds said, “water efficiency promotion to customers is currently unfocused, fractured among a number of organisations (many with little public recognition and awareness) and ad-hoc” (p 356).
- 6.8. Defra’s recent establishment of the Water Saving Group aims to create a more coherent approach to water efficiency by bringing together the key organisations involved in water management⁸¹ every six months. An action plan has been formulated and implementation work is underway.⁸² However, whilst the Water Saving Group will undoubtedly carry out useful work, it cannot itself promote water efficiency to individual consumers day-to-day.
- 6.9. Water companies, as discussed in Chapter 3, are under a general obligation to promote efficient use of water amongst their customers under the Water Industry Act 1991, although they have little genuine incentive to do so in the case of metered households unless they are struggling with water shortages. However, some companies are doing valuable research on water efficiency—Essex and Suffolk Water, for example—and we welcome the UKWIR-commissioned project to bring together relevant research findings into a single database (Q 559). Many water companies also offer free or subsidised water-saving products such as cistern displacement devices, “DIY” water audit packs and water butts, alongside water-saving tips. In addition, free or subsidised repair of leakage in supply pipes is generally available.
- 6.10. However, the work of water companies in this area is relatively small-scale and piecemeal. In contrast, we were impressed by the proactive and innovative approach of some of the Australian water companies such as Yarra Valley Water and Sydney Water. The former is developing new schemes such as the Ecosaver retrofit programme, whereby banks would offer discounts on loans to members of the public on the condition that the saving be spent on water efficient devices—so the customer would pay the same amount overall and no subsidies would be needed.
- 6.11. Sydney Water, meanwhile, has retrofitted 300,000 properties with water efficient devices, charging a heavily subsidised price of A\$22 per household or waiving the charge for certain low income groups. This has resulted in an impressive average annual saving of 20,900 litres per household, equating to approximately 12 percent of average indoor water use in Sydney. As we mentioned in Chapter 3, it is important that Ofwat should look favourably upon such initiatives as and when they are proposed by the water companies.

⁸⁰ Supplementary written evidence (not printed).

⁸¹ The EA, Ofwat, CCWater, Water UK, Defra, DCLG and Waterwise.

⁸² See <http://www.defra.gov.uk/environment/water/conserv/wsg/pdf/wsg-actionplan.pdf> for further information.

- 6.12. Whatever the water companies do, though, there will always be a need for other bodies to promote the efficient use of water—not least because of consumers’ suspicion of water companies’ motives in encouraging them to cut water use. As Christine Sefton argued, “I think it would be useful for water companies not to be the sole promoters of water efficiency information because people find that quite confusing. Why would someone selling you something ask you to use less of it? They are deeply suspicious of that” (Q 720).
- 6.13. We therefore welcome the establishment of Waterwise, an independent NGO that receives its core funding from the water industry. Whilst it appears to be focused primarily on “research and development and large-scale trials”, as the EA pointed out (Q 257), it has also teamed up with the EA on developing the “beat the drought” information resource, which provides up-to-date and practical advice to consumers via the internet. However, we note that Waterwise is only intended to remain in existence for five years.
- 6.14. This prompts the question of whether it would be desirable to establish some kind of independent water saving trust (analogous to the Energy Saving Trust) to take a lead in promoting water efficiency. This option was supported by the EA, which argued that such an organisation should provide advice, practical assistance and even grants at an estimated cost of “£10 million to £15 million each year ... [funded] from general taxation” (p 91). WWF-UK also supported the proposal (p 202).
- 6.15. On the other side of the argument, CCWater opposed a water saving trust on the grounds that it would be “very confusing for consumers” to have another body talking to them about water use (Q 396). Philip Fletcher was also opposed on the grounds that it would create yet another quango—which, he claimed, “would cost rather more than Ofwat and the Consumer Council for Water combined” (Q 35).
- 6.16. Richard Bird of Defra said that “there are no proposals for going in that direction at the moment” (Q 171). Similarly, Elliot Morley played down the prospect of a water saving trust. However, we are not convinced by his claim that “at the moment the Water Saving Group is really providing all the kinds of things that a water saving trust would do” (Q 826). As we noted above (paragraph 6.8), it is hard to imagine how such an organisation can work directly with consumers, providing practical advice and assistance in the way that a water saving trust would.
- 6.17. On balance, we believe that the role of a water saving trust can be performed by existing bodies. One option would be to extend the remit of the Energy Saving Trust to cover water efficiency amongst domestic customers. The Carbon Trust’s remit could also be widened to include promotion of water efficiency amongst businesses. This would be a cost-effective way to make genuine progress on water efficiency amongst both domestic and business consumers. It makes sense to link the prudent use of energy and water, which are intrinsically connected—energy production generally involves water use, and the provision of potable water requires energy use. We also draw attention to our recommendation in an earlier report that the Energy Saving Trust and the Carbon Trust should be merged. This was not heeded by the

Government,⁸³ but we reiterate that there is scope to rationalise the organisation of the different agencies working in this field.

- 6.18. We also welcome the Government's proposals for an Environment Direct service. This internet-based service would provide one point of contact for members of the public wanting information on issues such as energy and water efficiency, both offering advice and acting as a portal to guide users to other relevant websites. As Elliot Morley told us, "we do not want people to be confused about the range of measures and bodies that there are ... and the idea of Environment Direct is to have that one point of access and then people can be directed through it" (Q 825).
- 6.19. **Water companies need to be more energetic and imaginative in promoting water efficiency, and we urge Ofwat to look favourably upon the funding of such activities. However, there also needs to be an alternative, independent source of advice and support to both domestic and business consumers.**
- 6.20. **We agree with the Government that a water saving trust is not on balance desirable at this time—as long as other bodies are mandated to take responsibility for promoting water efficiency. We therefore strongly recommend that the Government extend the remits of both the Energy Saving Trust and the Carbon Trust to cover water efficiency. We welcome the proposed establishment of Environment Direct, which will help to address the institutional fragmentation in the promotion of water efficiency, and look forward to rapid progress on this initiative.**

Domestic Water Efficiency

- 6.21. In this section, we consider the factors affecting domestic water efficiency: public awareness; metering; water efficient fittings and appliances; building regulations; and the Code for Sustainable Homes.

Public Awareness

- 6.22. There is a lack of general awareness amongst the public about the water resources situation and the importance of water efficiency. There is also limited awareness of the financial benefits of using less water. The financial benefits only apply to those customers with water meters (just over one quarter) and we therefore discuss this issue in the next section on metering. However, whilst all consumers—metered and unmetered—should be made aware of issues of security of supply and the environment, and the general costs associated with supplying and using drinking water, we note that the fact that economic incentives are currently irrelevant to almost three quarters of domestic customers considerably weakens the hand of all those promoting water efficiency.
- 6.23. One of the key problems is the ingrained perception that this is a wet country with an abundance of rain and water. However, in reality the average annual rainfall is very low in the south and east of England—far lower than around Melbourne and Sydney, for example. Moreover, as the EA noted, the high population density in England and Wales means that the amount of water

⁸³ House of Lords Science and Technology Committee, Third Report of Session 2005-06, *Renewable Energy: Practicalities, and Energy Efficiency: Government Responses* (HL Paper 69), p 26.

per person (1,334 cubic metres per year) is lower than in many Mediterranean countries such as Spain (2,775 cubic metres) and Portugal (3,878 cubic metres). This effect is still more marked in particular regions: in the Thames Basin, for example, there is only 266 cubic metres per person per year (p 86).

- 6.24. There is thus much work to be done in changing the mindset of the public. As the Chartered Institution of Water and Environmental Management (CIWEM) commented: “a major shift in the nation’s attitude to water is required, particularly with regard to a re-evaluation of its preciousness as an environmental asset, and not merely as an exploitable, on-tap resource” (p 312). We agree, and trust that one of the side-effects of the recent spate of media stories regarding the water shortages in south east England will be to increase public awareness of water issues. The more public debate there is on water-related issues, the better.
- 6.25. Given the current shortage of water, we accept the need for the water restrictions imposed by a number of companies in southern England—and their appeals for sensible water use. First, as CIWEM noted, this is an important part of the water companies’ “operating machinery” for managing droughts; and second, it helps to implant the idea in people’s minds that they cannot expect to use as much water as they want for non-essential uses when the rivers, reservoirs and aquifers are at a low level or when there is an imminent risk of their reaching such a level (p 311). This in no way diminishes the duty of water companies to play their own part by reducing leakage levels.
- 6.26. However, news stories come and go. As Dr Paul Jeffrey noted, people’s “awareness and interest goes up and down yearly and seasonally” (Q 717). It is imperative for our long-term security of supply that there be a permanent shift in people’s perceptions, so that they change old habits and start to behave in a more water efficient manner. This will take time.
- 6.27. The education system will play a key role. We welcome the educational activities undertaken by some of the companies with schools—for example, Thames Water provides information and activity packs for children and teachers and dedicated websites (p 48). Equally important is ensuring that water efficient practices are adopted in schools to set a good example. The process could be formalised so that all children are guaranteed at least one lesson on why water efficiency is so important—for example as part of the citizenship syllabus.
- 6.28. In terms of the wider population, it is instructive to look at the situation in Australia, where public awareness of the need to conserve water was impressive. In Melbourne, for example, there were electronic billboards around the city updating people on the latest reservoir levels. Similarly, the Deputy Premier of Victoria had become a champion of water issues and there was full media backing. There appeared to be a unified approach and a shared determination.
- 6.29. **In the long-term the educational system will be crucial in ingraining water efficient behaviour patterns in the minds of consumers. We urge the water companies to maximise their collaboration with schools in this regard. We also recommend that the Government make water efficiency—and the rationale behind it—a compulsory part of the citizenship syllabus.**

- 6.30. **The Government should also seek to use all forms of media to promote and nurture water efficient behaviour amongst the general public. We recommend that the Government study the ways in which the Government of Victoria has achieved such impressive results, with a view to emulating such a strategy in this country.**

Metering

- 6.31. Currently, 28.1 percent of households are metered in England and Wales,⁸⁴ although this figure varies between the different water companies' areas of operation, with the highest penetration generally being in the south and east of England. This is very low when compared to the near universality of metering across Europe, the United States of America and Australia.⁸⁵ The penetration of meters amongst non-households in England and Wales is already very high, although it would be desirable to get that figure as close as possible to 100 percent.
- 6.32. Before looking at the feasibility of increasing the penetration of household metering, it is necessary to consider the effect that the installation of a meter has upon water use—an issue on which most witnesses were in broad agreement. For example, Richard Bird of Defra suggested that water use would be reduced by “round about 10 percent” (Q 177); UKWIR's latest research suggested between 10 and 12 percent (Q 567); and Philip Fletcher referred to the universal metering trial on the Isle of Wight which had pointed to a reduction of around 11 percent (Q 37).
- 6.33. Equally crucial, however, is the extent to which these reductions in water use are sustained over the long-term. Mr Bird felt that they were “generally sustained over time” (Q 177) but CCWater suggested that customers might revert to their previous patterns of usage over the longer-term (p 137). This view was echoed by Professor John Langford at the University of Melbourne, who told us that this reversion tended to happen after four to five years. CIWEM, meanwhile, claimed that some metered customers took the view that, since they paid *pro rata* for the water they consumed, “it should be made available to them in whatever volumes they require” (p 315). Christine Sefton warned of the risk that metering would only educate the bill payer, with the other people in the household—particularly teenagers—having “no regard whatsoever for how much [water] is being used” (Q 741).
- 6.34. **The general consensus amongst experts is that household metering is of value in reducing consumption, and we endorse this view. However, if metering is to make a long-term difference, it must be accompanied by a programme of awareness-raising about the importance of water efficiency.**
- 6.35. However, metering is insufficient in itself unless the information derived from the meter is made available to the consumer in a clear and useful way. It is therefore desirable for water meters to have a visible read-out inside the house—which also helps customers to ascertain whether they have a leak in their supply pipe (see paragraph 3.58)—and for the information collected by the meter to be presented clearly on the water bill.

⁸⁴ Ofwat, *Tariff structure and charges: 2005-06 report*, May 2005, p 43.

⁸⁵ Ofwat, *International comparison of water and sewerage service: 2005 report*, March 2005, p 20.

6.36. In Australia, Yarra Valley Water showed us their extremely impressive new water bill format (pictured below) which not only showed each household its consumption over the last quarter and compared this to its usage in each quarter over the last year, but also enabled comparisons against the average for households of a similar size and against best practice levels. This kind of bill would help consumers in England and Wales to put their level of usage in perspective and adjust their behaviour accordingly. Clearly the presentation of information in this format could only be applied to metered customers, but we see no technical barrier to water companies producing a different format of bill for metered and unmetered households.

FIGURE 5
Yarra Valley Smart Water Bill

Quarterly Account
Enquiries Phone: 13 1721
Emergency Phone: 13 2762
Customer Number: a000 000
Invoice Number: 824 0000 0000
Total Due: \$235.10
Due Date: 8 August 2005
If eligible for a concession the amount due is: \$197.60

Account Summary
1 SAMPLE STREET, SAMPLETOWN
Property Number 1111 1111, Lot 0 Plan 000 000, 00.00 HA
Product/Service Description Amount
Water Usage 1 July 05 to 17 September 05 \$77.29
Block 1 @ \$0.78 per kilolitre \$10.59
Block 2 @ \$0.91 per kilolitre \$12.00
Block 3 @ \$1.35 per kilolitre \$ 5.00
Sewage Disposal 16 April 05 to 30 June 05 \$45.64
1 July 05 to 17 July 05 \$45.64
Service Charges 01 July 05 to 31 Sept 05 \$47.85
Drainage Charge On behalf of Melbourne Water \$14.34
Annual Parks Charge On behalf of Parks Victoria \$50.00
TOTAL (GST does not apply) \$235.12
See reverse for details

Payment Summary
Last Account \$174.80
Paid/Adjusted -\$174.80
Balance \$0.00
Total This Account \$235.10
Amount Due \$235.10

Compare your usage
Your average usage in litres per day
AUG 04 NOV 04 FEB 05 APRIL 05 JULY 05
Block 3
Block 2
Block 1
Same time last year 998
This Account 878

Payment Slip
Customer Number: a000 000
Invoice Number: 824 0000 0000
Total Due: \$235.10
Due Date: 8 August 2005
If eligible for a concession the amount due is: \$197.60

How does your household water use compare?
Your average daily water use for this account is: 878 litres
Compare your average daily water use with the table below to see if you are a water efficient household.

| Number of occupants | Garden size | Typical water use (litres per day) | Efficient water use (litres per day) |
|---------------------|-------------|------------------------------------|--------------------------------------|
| 1 | None | 208 | 156 |
| | Small | 244 | 183 |
| | Medium | 293 | 220 |
| | Large | 351 | 268 |
| 2 | None | 373 | 280 |
| | Small | 408 | 306 |
| | Medium | 457 | 343 |
| | Large | 515 | 386 |
| 3 | None | 482 | 362 |
| | Small | 518 | 389 |
| | Medium | 567 | 425 |
| | Large | 625 | 469 |
| 4 | None | 581 | 436 |
| | Small | 616 | 461 |
| | Medium | 666 | 500 |
| | Large | 723 | 542 |
| 5 | None | 690 | 518 |
| | Small | 726 | 544 |
| | Medium | 775 | 581 |
| | Large | 833 | 624 |
| 6 | None | 822 | 617 |
| | Small | 858 | 644 |
| | Medium | 907 | 680 |
| | Large | 964 | 723 |

It's easy to make your home more water efficient. Visit www.yvw.com.au for more information.

Did you know...
The Victorian Government's Water Smart Gardens and Homes Rebate Scheme is currently offering a \$10 rebate on the purchase of a new AAA showerhead. See overleaf for more information on eligible products.

Source: Yarra Valley Water

6.37. The clearer presentation of information on bills—which we also endorsed during our inquiry into energy efficiency⁸⁶—was backed by Baroness Young of Old Scone: “we would quite like bills to say what people are using and what they can do about using it if it has gone up or down, smart bills that tell

⁸⁶ Energy Efficiency, p 47.

people what is open to them to reduce their costs as well as helping the environment” (Q 229).

- 6.38. **We draw the attention of the Government and Ofwat to the smart water bill reproduced in this report, and recommend that they consider the adoption of a design modelled on it for metered customers in England and Wales.**
- 6.39. Another way to ensure that metered households continue to use water in an efficient manner is to use more sophisticated tariffs—indeed, Dr Mike Farrimond of UK Water Industry Research (UKWIR) referred us to studies in the United States which suggested that effective tariff management can reduce usage by as much as a further ten percent (Q 567). We therefore welcome Defra’s current study of tariff structures (Q 802).
- 6.40. One example is the rising block tariff—used by Yarra Valley Water—whereby some water is available at a low unit price and additional water at progressively higher prices. This means that the water needed for essentials is provided at a relatively low price but that there is a cost deterrent for extravagant water use. Baroness Young of Old Scone supported this approach, suggesting that it would be beneficial for poorer households because “you can give a big slug of water ... at a very low cost and then ramp up to fairly fast rising prices for ... luxury items” (Q 228). Such tariffs can only be introduced fairly in universally metered areas. Conventional meters can be used to provide readings—as is the case in Cyprus—as long as they are read regularly.
- 6.41. We note that an analogous recommendation in our report on energy efficiency, where we proposed the adoption of the “lifeline tariff” model by energy suppliers, was rejected on the grounds that it went against the Government’s policy of “not intervening in energy markets”.⁸⁷ We do not believe that this response was adequate in the context of energy, and urge the Government not to respond in similar fashion to the recommendation below. Non-intervention is not a sufficient excuse for inaction in the case of a limited resource such as water.
- 6.42. **We urge the Government to consider rising block tariffs as part of their current study of tariff structures. We recommend that the use of such tariffs be made obligatory for companies granted permission to impose universal metering under the water scarcity status provisions.**
- 6.43. Smart meter technology is still evolving but its main advantages are that it allows the use of more sophisticated tariffs (taking into account factors such as the season), it enables meter readings to be taken remotely—making the job easier for the householder and cheaper for the company—and it provides a visible display to allow consumers to see how much water they are using at any particular time. This would mean that consumers could observe the link between their behaviour, including time of use, and their water consumption.
- 6.44. Given the potential advantages of smart metering, we welcome the gas and electricity smart metering trial recently launched by Defra in conjunction with EDF Energy and National Energy Action, which will see up to 3,000 electricity and gas smart meters being installed in homes over two years. We look forward to seeing the results of the trial.⁸⁸

⁸⁷ *Renewable Energy: Practicalities, and Energy Efficiency: Government Responses*, p. 30.

⁸⁸ See <http://www.defra.gov.uk/news/2006/060426a.htm> for further information.

- 6.45. With regard to smart metering of water, we were pleased to hear that Defra has “a very open and enquiring mind on these possibilities” (Q 180). Similarly, we welcome the research into smart meters being conducted by a consortium of water companies (United Utilities, p 377) and the project that UKWIR is proposing to conduct with a research foundation in the United States (Q 567). Such work is an essential pre-condition to the introduction of smart meters on anything other than an experimental scale.
- 6.46. The potential barrier to smart meters is cost. The unit price cannot be determined with any certainty at this stage—whilst CCWater estimated that a smart meter would cost “about twice the price” of a normal meter (Q 388), United Utilities believed that the cost would be only “modestly higher” (p 377). Whatever the eventual price of smart meters, we endorse United Utilities’ observation that the additional cost would have to be taken into account by Ofwat during the periodic review process.
- 6.47. **We strongly recommend that the Government give priority to the consideration of smart meters by the Water Saving Group. More research is still needed, but we are sympathetic towards the idea of a gradual roll-out of smart meters as conventional meters reach the end of their useful life.**
- 6.48. Finally, we turn to the central issue of how the number of households with meters can be increased. In the absence of water scarcity status, which we address below, households can be metered in several circumstances:
- all new properties must be metered;
 - companies can insist upon installing a meter upon change of occupancy or in the case of very heavy water users; and
 - consumers can opt to have a meter installed.
- 6.49. Some companies show more alacrity than others in making the most of their right to insist upon metering in certain circumstances, with the result that, in the words of the EA, the current system is “a slow and expensive way” of proceeding (p 90). Philip Fletcher agreed, suggesting that “pepper-potted optional metering is very inefficient as a means of installation” (Q 37). Such a piecemeal approach is particularly unsatisfactory given that, as Elliot Morley told us, the Government expect “to see the majority of the country on water meters in due course” anyway (Q 805).
- 6.50. The EA argued instead that, in the drier parts of the south and east of England, metering needs to be seen as “a major weapon in reducing demand” and should be deployed as rapidly as possible (Q 227). This would make a significant contribution to balancing supply and demand, but would also make the process cheaper through economies of scale.
- 6.51. As things stand, the only way in which water companies can impose meters upon the vast majority of existing households is through a successful application to the Secretary of State for Environment, Food and Rural Affairs for “water scarcity status”, which permits them to undertake universal metering. Folkestone and Dover Water recently became the first company to seek and obtain water scarcity status. Mike Pocock of Water UK told us that the company expects to cut average household demand by “about 12.5 percent” through metering (Q 736).

- 6.52. However, it remains extremely difficult for companies to get permission to impose universal metering, both because the circumstances under which water scarcity status can be achieved appear to be very tightly drawn⁸⁹ and because the Secretary of State has such a significant measure of discretion. The EA said that the regulations should be changed “to make it easier for water companies to meter all customers in areas where water is scarce” (p 90). We agree.
- 6.53. There is little doubt that the wider adoption of universal metering in water stressed areas will carry a cost, because of the need to fund the supply and installation of the meters. In addition, some households will have to pay extra because they use a lot of water and have not previously had to pay by volume although, as Elliot Morley pointed out, Folkestone and Dover Water estimate that 70 percent of households will pay the same or less with a metered supply (Q 807). We therefore underline our recommendations on affordability in Chapter 3, which we believe will help to avert any potentially adverse impact on low income households.
- 6.54. **We recommend that the Government make it easier for water companies in water stressed areas to obtain water scarcity status and therefore impose compulsory metering, thus improving the current piecemeal approach and giving a significant boost to demand management efforts in the south and east of England. We suggest that this be achieved through revision of the Water Industry (Prescribed Conditions) Regulations 1999.**

Water Efficient Fittings and Appliances

- 6.55. In this section we consider the contribution that water efficient fittings and appliances can make to water efficiency,⁹⁰ and the different ways of encouraging consumers and developers to make greater use of them.
- 6.56. Items that can potentially help to reduce household water consumption include water efficient showerheads, toilets (low or dual flush), taps, washing machines and dishwashers. Elliot Morley estimated that such devices can save “between 20 and 30 percent” of household water consumption (Q 795), and the Government’s written evidence pointed to the 20 percent savings achieved at the Greenwich Millennium Community (part of English Partnerships’ Millennium Communities Programme for sustainable living)⁹¹ by way of example (p 68). The EA claimed that water efficient fittings and appliances could reduce *per capita* consumption from 150 litres per day—the average in new houses—to as little as 105 litres (p 90).
- 6.57. We have already referred to Essex and Suffolk Water’s research project at Heybridge (paragraph 5.61), in which 12 houses had been made more water efficient through the installation of smaller baths, spray taps and various other fittings—though not water efficient washing machines or dishwashers—at a cost of £50 per house, with another 12 houses being used for control purposes. This had resulted in savings of around 100 litres per day per household, which equated to a 13 percent saving per person (as compared to

⁸⁹ A look at Defra’s approval letter to Folkestone and Dover Water makes this abundantly clear: <http://www.defra.gov.uk/environment/water/resources/water-scarcity/waterscarcity050301-docb.pdf>.

⁹⁰ The diagram following paragraph 4.6 shows a breakdown of the uses to which water is put in households.

⁹¹ See <http://www.englishpartnerships.co.uk/millcomms.htm> for further information.

the amount that was used through the equivalent non-water efficient devices in the control houses) or a five percent saving per person as a proportion of total water use. This demonstrates what can be achieved with even the most basic changes.

- 6.58. However, it was also notable that some consumers taking part in the Heybridge project were not happy about the smaller baths or the spray taps. This leads to the key point regarding water efficient fittings and appliances: if consumers—and therefore developers—are to be persuaded to adopt them voluntarily, it is essential that they do not offer a significantly inferior experience. As Mike Pocock of Water UK commented, “I think it is important that the customers do not see a water efficient device as one that provides a lower level of comfort and serviceability” (Q 744). The truth of this point was clear to see at BedZED, where a number of residents had replaced water efficient dishwashers with more desirable but less water efficient models.
- 6.59. Whilst we were assured that it is possible to design devices that perform as well as conventional devices whilst using less water, we believe that this is the *sine qua non* of ensuring their widespread adoption. Similarly, so long as the performance of water efficient devices is as good as conventional devices, consumers will have few reasons to reject them. Research is therefore essential to improve the performance of water efficient devices.
- 6.60. **We recommend that the Government’s Water Saving Group consider as a matter of urgency how higher-performance water efficient fittings and appliances can be developed, in order to increase their appeal to consumers and developers alike.**
- 6.61. Another important issue is the way in which people use water efficient fittings and appliances. Andrew Wells, of the ODPM, suggested that “you can put in all the fixtures and fittings you like, but if [people] use them not quite in the way intended, then you lose the benefit” (Q 171). This brings us back to the importance of a widespread educational campaign, helping people to become more familiar with water efficient devices. Clear instructions should also be provided with such items.
- 6.62. A related issue is the attitude of developers towards installing water efficient devices in new homes. Developers argue that water efficiency is not a selling point for a home—not least because water bills form such a low proportion of most people’s household expenditure. Worse still, water efficiency can actually deter home-buyers because of people’s desire for power showers and other luxurious devices. Either way, as John Slaughter, Director of External Affairs at the Home Builders Federation, told us: water efficiency comes “fairly low down the list” of priorities (Q 767). Thus, even if water efficient fittings do not cost any more than the regular kind, developers are unlikely to install them unless they are either compelled by regulations or tempted by incentives.
- 6.63. Such regulations would not help to increase the take-up of water efficient fittings in the much larger number of existing homes, however. Tightening up the water fittings regulations, by contrast, could help to improve the water efficiency of fittings in both new homes and existing ones. With this in mind, we welcome the Government’s proposed review of the water fittings regulations (Q 787) and agree that they should be considered alongside the treatment of water efficiency in the building regulations (QQ 795, 796), in

order to determine which combination of changes could have the optimal outcome.

- 6.64. Another option is to offer subsidies for retrofitting of water efficient devices—as is happening as part of the Government’s pilot scheme in the south west—or a reduction in VAT on such products (Waterwise, p 392). We also take note of Thames Water’s suggestion that there could be a reduction in Stamp Duty on water efficient homes, or even some kind of Council Tax rebate (p 49). Similar incentives have been proposed in relation to energy efficiency, and it is clearly desirable that if such fiscal incentives are to be provided both energy and water should be included in a co-ordinated package.
- 6.65. **We look forward to seeing the findings of the review of the water fittings regulations and urge the Government not to delay in the implementation of appropriate changes.**
- 6.66. **We recommend that the Government consider what role reduced levels of Stamp Duty or Council Tax could play in making water and energy efficient homes more appealing to buyers.**
- 6.67. The final issue in this section is the possibility of a labelling scheme to provide consumers with better information on the water efficiency performance of fittings and appliances, an initiative which the Water Saving Group is considering.⁹² Given the success of the EU energy labelling scheme,⁹³ we believe that an analogous scheme for water could offer significant benefits. The EA (p 85) and CCWater (Q 384) took a similar view. Moreover, a labelling scheme which heightened public awareness of water efficiency could also influence manufacturers to develop increasingly water efficient devices.
- 6.68. A labelling scheme could emulate the new Water Efficiency Labelling and Standards (WELS) programme in Australia, whereby water-using appliances and fittings will carry a “star” rating indicating their comparative water efficiency alongside an estimate of their water consumption. However, we note that the Australian scheme will be mandatory whereas any scheme in England and Wales would have to be voluntary unless it was agreed at the EU level. We do not believe that a voluntary scheme would be effective because it would reduce the ability of consumers to make a meaningful comparison between all products.
- 6.69. **We recommend that the Government press for a mandatory EU labelling scheme for all household water-using products.**

Building Regulations

- 6.70. We have already noted that the Government’s review of water fittings regulations will run alongside consideration of ways in which water efficiency can be factored in to Part G of the Building Regulations, which apply to new buildings and existing buildings undergoing notified building work. Part G covers the types of fittings mentioned above—and could be extended to cover rainwater recycling systems and other such installations—but it does not currently establish minimum water efficiency standards. WRc has been

⁹² See

[http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/650f3eec0dfb990fca25692100069854/074d41c1ea8764058025710d0036a055/\\$FILE/disc_log_foi92_15.doc](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/650f3eec0dfb990fca25692100069854/074d41c1ea8764058025710d0036a055/$FILE/disc_log_foi92_15.doc).

⁹³ See *Energy Efficiency*, p 80.

undertaking research for the Government on the options for including water conservation in Part G and has formulated proposals (p 227).

- 6.71. The Government's consultation on the review of Part G will not be launched until later this year, and we therefore do not yet know exactly what changes will be proposed. In their response to Kate Barker's Review of Housing Supply, the Government said that they would "propose the fitting of dual-flush toilets, or low flush toilets, as standard", adding that "Government estimates that this reform will save around 10 per cent consumption of water for the average household".⁹⁴ This would be a welcome change, but a very modest one—the revised regulations must be more ambitious than this. We therefore welcome ODPM's recent suggestion that the review will also cover "improvements to taps, showers and washing machines".⁹⁵
- 6.72. In Victoria, Australia all new homes have to meet a "five star" rating for energy and water efficiency. This can be met in one of several ways—for example, the provision of a rainwater tank attached to the toilet—in order to allow maximum flexibility. Similarly, in New South Wales all new houses have to reduce mains water consumption by 40 percent compared to the current average for similar sized homes. Again, the means of meeting this target are up to the developer. The options available under these schemes will not necessarily be appropriate to England and Wales, but we support the concept of setting challenging water efficiency standards for new homes whilst allowing maximum flexibility for developers.
- 6.73. However, one of the problems with Building Regulations—and indeed water fittings regulations—is that they do not make any allowance for the differing challenges facing water supply in different parts of England and Wales. In other words, raising the standards would require consumers in Northumbria to meet the same water efficiency standards as consumers in Essex. John Canton, of the Institution of Civil Engineers, therefore argued that "some sort of measure needs to be introduced whereby regulations can be region specific" (Q 706). Similar points were made by Water UK (Q 90) and CCWater (p 132).
- 6.74. On the other hand, regional variations could threaten economies of scale. As John Slaughter of the Home Builders Federation warned, "if you have differential standards in different parts of the country you are potentially fragmenting the supply chain nationally for particular innovations or products, so I think we would want to look very carefully at those kind of issues" (Q 769).
- 6.75. Yvette Cooper, Minister for Housing and Planning at the ODPM, told us that she was "open to representations and views" and suggested that the issue of regional variation would be considered as part of the wider consultation (Q 800). We welcome this openness to consideration of what could become a major issue in coming decades.

⁹⁴ *The Government's Response to Kate Barker's Review of Housing Supply*, p 41.

⁹⁵ See <http://www.odpm.gov.uk/index.asp?id=1002882&PressNoticeID=2120>.

- 6.76. **We welcome the decision to review Part G of the Building Regulations, but are concerned that the Government may be setting their sights too low. We recommend that they examine the ambitious water efficiency requirements established in Victoria and New South Wales and consider whether an analogous scheme could be introduced in England and Wales. We also recommend that the Government explore fully the advantages and potential problems in introducing some degree of regional variation in this area.**

Code for Sustainable Homes

- 6.77. Alongside their response to the Barker Review of Housing Supply in December 2005, the Government published a draft Code for Sustainable Homes that was intended to “improve the resource efficiency of new buildings, saving water and energy”⁹⁶ by rating new homes on a scale from one star (representing compliance with the Code’s minimum standards) to five stars (the highest level). The draft Code, which had been drawn up with advice from a Steering Group, was subject to a consultation which ended on 6 March 2006.
- 6.78. The development of the Code has not been without its difficulties. WWF-UK had sat on the Steering Group but resigned when the draft Code was published “in objection to both the process with which the Government drew up that Code and objecting to the actual draft Code itself” (Q 516). In particular, they were concerned that the water efficiency standards were not ambitious enough and that there was too much reliance on voluntary measures—particularly in the absence of incentives through either the tax or planning systems. CCWater (Q 379), the East of England Regional Assembly (Q 684) and South East Water (p 60) were also concerned about the voluntary nature of the Code.
- 6.79. Whilst we share some of WWF-UK’s concerns about the water efficiency requirements of the Code, we are reassured by the Government’s recently stated intention “to set minimum standards of energy and water efficiency for every level of the Code” and—crucially—their assurance that “the lowest levels of the Code will also be raised above the level of mandatory building regulations”.⁹⁷ This position was confirmed by Yvette Cooper (Q 798). The Government thus appear to have responded to concerns expressed during the consultation—although the importance of exceeding existing statutory requirements should perhaps have been obvious from the beginning. They must follow through on these pledges and set genuinely challenging minimum standards for water efficiency.
- 6.80. On the question of whether the Code should be voluntary or mandatory, the Government’s view is that “the revised Code will form the basis for the next wave of improvements to building regulations”,⁹⁸ another pledge that was reaffirmed by Ms Cooper (Q 798). Thus whilst the Code itself will be voluntary, it will point the way to future mandatory requirements. Given the need for the construction industry to adapt to higher standards, this appears to be a pragmatic approach.

⁹⁶ *The Government’s Response to Kate Barker’s Review of Housing Supply*, p 40.

⁹⁷ See <http://www.odpm.gov.uk/index.asp?id=1002882&PressNoticeID=2093>.

⁹⁸ *ibid.*

- 6.81. In the meantime, we believe that there need to be incentives to encourage builders to take up the challenges set by the voluntary Code. The Government suggest that they will consider incentives in the planning system⁹⁹ but we would like to see property tax incentives similar to those we have recommended above in the context of water efficient fittings, which would in turn increase demand for more water efficient homes. The House of Commons Environmental Audit Committee made a similar recommendation recently, suggesting that “HM Treasury should consider reducing both Stamp Duty and Council Tax for those homes built to high environmental standards”.¹⁰⁰
- 6.82. **We welcome the Government’s intention to strengthen the Code for Sustainable Homes and urge them to establish genuinely challenging standards for water efficiency. We recommend that the Government set a timetable for the Code’s incorporation into Building Regulations and give serious consideration to providing fiscal incentives to encourage maximum take-up of the Code in the meantime.**
- 6.83. The Home Builders Federation suggested that ratings under the Code should extend from one star to ten stars, rather than five stars. Existing homes could then be included—the assumption being that most would fall somewhere between one and five stars—whilst new homes would have to meet a standard of between six and ten stars to comply with the Code. This would contextualise the water efficiency of all homes, helping people living in existing homes “to realise just how inefficient they are with water” and perhaps prompting them to take action (Q 781).
- 6.84. If this suggestion were to be adopted, the question arises as to how and when existing homes would be assessed. Since an energy efficiency assessment is to be a required component of Home Information Packs—which homeowners will need to have from 1 June 2007 before putting their homes up for sale—it would be possible for the Government to include an additional requirement for a water efficiency assessment. The water efficiency of an ever growing number of homes would thereby be measured against the Code, as and when they were sold.
- 6.85. **We recommend that the Government consider altering the Code so as to include existing homes. We further recommend that they look at making water efficiency assessments—on the basis of the Code star rating—a mandatory component of Home Information Packs.**

Industrial and Agricultural Water Efficiency

Industry

- 6.86. Industrial use of water has been declining for some years and will probably continue to do so but, as noted in Chapter 4, many industrial and commercial consumers do not make use of the opportunity to save water—either through ignorance or because water makes up a small proportion of their expenditure. Indeed, Professor Colin Green suggests that there is scope for a 15 to 25 percent reduction in current water usage by industry (p 322).

⁹⁹ *ibid.*

¹⁰⁰ House of Commons Environmental Audit Committee, Fifth Report, Session 2005-06, *Sustainable Housing: A Follow-up Report* (HC 779), Conclusions and recommendations, paragraph 26.

The question is how to make these consumers more aware of how easy it can be to save water without detriment to performance, thus helping the environment and cutting utility bills.

- 6.87. The EA has suggested that water audits, whereby the local water company offers site-specific advice on how to minimise water use, should be made compulsory for commercial consumers over a certain size.¹⁰¹ This proposal is attractive but the cost should be met by those companies receiving water audits, either through a one-off charge or through their water bills.
- 6.88. Envirowise, a programme run by Defra and the Department of Trade and Industry, provides practical advice to business on a range of environmental issues, including water efficiency. This is welcome, but we endorse the EA's suggestion that Envirowise should reach a wider audience (Q 261) and note that it could be merged with the Carbon Trust if the latter's remit is extended to cover water use (as recommended earlier in this chapter).
- 6.89. **We recommend that the Government make water audits compulsory for industrial and commercial consumers above a certain size, with those consumers meeting the cost through a direct charge or through their water bills. We also urge the Government to consider how Envirowise could reach out to a greater number of businesses—including small and medium sized enterprises—in a broader range of sectors.**

Agriculture

- 6.90. In Chapter 4 we noted that agricultural use of water is expected to increase over the coming decades, not least because of climate change. This underlines the importance of maximising the efficient use of water by farmers. The National Farmers' Union (NFU) told us that there are few problems "in terms of loss in the transmission of water ... from the point of abstraction to the point of application" (Q 448). However, whilst important, this is a separate issue from the effectiveness and efficiency of the way in which the water is used.
- 6.91. We note the NFU's promotion of on-farm water audits (p 176) and their stated determination to "engage our membership to talk effectively and much more meaningfully to other members about ways that they can improve their water efficiency and water effectiveness" (Q 448). The promotion of greater communication amongst farmers—and with the EA, as is already happening—is highly desirable, particularly if it involves the kind of catchment-level cooperation that will be essential in meeting the requirements of the Water Framework Directive.
- 6.92. We also considered the provision of incentives for farmers to use more water efficient equipment for irrigation. Broadland Agricultural Water Abstractors Group's (BAWAG) suggested that "the addition of efficient irrigation to the Water Technology List for Enhanced Capital Allowances would further promote efficiency" (p 306). This could be particularly valuable in areas where irrigation uses a large proportion of available water in the summer months, such as East Anglia.

¹⁰¹ Environment Agency, *Ashford's Future: IWMS*, August 2005, p 9.7.

6.93. We recommend that the Government consider adding water efficient agricultural equipment to the Enhanced Capital Allowance Scheme.

CHAPTER 7: WATER AND THE ENVIRONMENT

Introduction

- 7.1. In this chapter we consider the relationship between water and the natural environment, encompassing the dangers of over-abstraction, the challenges posed by climate change, and water pollution. Reflecting the fact that the majority of legislation in this area emanates from Europe, as discussed in Chapter 2, our primary focus is on the Water Framework Directive¹⁰² (along with its “daughter” Directives) and the Habitats Directive.¹⁰³
- 7.2. Water is of central importance to a healthy and thriving natural environment. As English Nature noted, “water—seen and unseen—is a critically important component of landscapes, be it open water such as rivers, lakes and ponds or supporting wet grasslands, fens and bogs ... [Water] is critical for conserving and enhancing the quality of landscapes, and is equally important for the amenity value of those landscapes for people taking recreation within them” (p 158).
- 7.3. In this context, both the quantity and the quality of water in the environment are significant. Water resources can be threatened by over-abstraction and climate change. Water quality can be compromised by both point source and diffuse pollution, the impact of which can be exacerbated by an insufficiency of water.
- 7.4. Within England and Wales, the Environment Agency (EA) is responsible for ensuring that both quality and quantity are satisfactorily maintained. With regard to water resources, the EA’s duty is “to conserve, augment, redistribute and secure the proper use of water resources”, which is achieved primarily through the abstraction licensing system. In exercising this role, the EA must contribute to sustainable development and “promote the conservation and enhancement of the natural environment”.¹⁰⁴ On water quality, the EA has responsibility for “maintaining or improving the quality of fresh, marine, surface and underground water”.¹⁰⁵
- 7.5. In addition, English Nature (the Government’s statutory adviser on nature conservation, shortly to become part of the newly-formed Natural England) works closely with the EA on the protection of Sites of Special Scientific Interest (SSSIs)¹⁰⁶ and Natura 2000 sites¹⁰⁷. It is also closely involved in the implementation of the Water Framework Directive.

¹⁰² Directive 2000/60/EC.

¹⁰³ Directive 92/43/EEC.

¹⁰⁴ *Water resources for the future*, p 16.

¹⁰⁵ See http://www.environment-agency.gov.uk/subjects/waterquality/?lang=_e.

¹⁰⁶ Areas notified as being of special interest under the Wildlife and Countryside Act 1981.

¹⁰⁷ Natura 2000 sites consist of Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Wild Birds Directive (79/409/EEC).

Water Quality in the Environment

Background

- 7.6. Environmental water quality can be compromised by both point source pollution and diffuse pollution. Contamination of the water environment can have grave ecological consequences and can make sources unsuitable for public water supply, or at least necessitate a higher level of treatment.
- 7.7. Point source pollution is caused by the discharge or spillage of a contaminant that can be traced to a particular point. There has been considerable progress in reducing point source pollution in the past decade, with more than 95 percent of effluent from sewage works now complying with discharge consent standards. The compliance rate of industrial effluents with such standards is lower, though increasing.¹⁰⁸ The greatest challenges are therefore presented by diffuse pollution.
- 7.8. Diffuse pollution cannot be attributed to a particular incident but comes from a variety of sources over a large area—and is particularly difficult to control. Groundwater is vulnerable to diffuse pollution through the leaching of pollutants from the land surface, whilst surface water is affected primarily by run-off. Diffuse pollution can originate from a range of sources including agriculture (fertilisers, pesticides and soil loss),¹⁰⁹ roads, verge maintenance, contaminated land, leaking sewers, accidental spills and misconnections.
- 7.9. The impact of pollution—whether point source or diffuse—can be increased by an insufficiency of water, because there is less dilution of pollutants. The issue of over-abstraction of water is considered in the next section, but water resources are also threatened by climate change; as Milo Purcell of the DWI told us, “we are concerned about the impact of climate change—that it is going to lead to a deterioration of water quality” (Q 339).

Water Framework Directive

- 7.10. Most legislation on water quality emanates from the European Community (EC). Over the years, there has been a series of discrete Directives relating to different aspects of water quality, including the Urban Waste Water Treatment Directive¹¹⁰ and the Nitrates Directive.¹¹¹ The culmination of EC water policy, however, was the Water Framework Directive (WFD), adopted in December 2000. Peter Gammeltoft—of the European Commission—told us that the WFD arose partly from a desire to consolidate the existing legislation, where possible, “into one single Directive” (Q 613).
- 7.11. The WFD, unlike previous Directives, introduces broad ecological objectives rather than focusing on one particular element of water quality. These objectives are to “to protect and enhance our water environment, promote sustainable water consumption, reduce water pollution and lessen the effects of floods and droughts”.¹¹² The aim is for most inland and coastal waters to attain “good ecological status” by 2015.

¹⁰⁸ See <http://www.environment-agency.gov.uk/commondata/103196/1183214?referrer=/yourenv/eff/1190084/water/1182267/1182655/>.

¹⁰⁹ See Defra, *Mapping the Problem: Risks of Diffuse Water Pollution from Agriculture*, June 2004.

¹¹⁰ Directive 91/271/EEC.

¹¹¹ Directive 91/676/EEC.

¹¹² See <http://www.environment-agency.gov.uk/business/444217/444663/955573/>.

- 7.12. The WFD also introduces a more integrated system of water management based on river basins—the natural hydrological unit—rather than administrative boundaries, involving greater stakeholder participation. A River Basin Management Plan (RBMP) must be produced by 2009 for each River Basin District—an area made up of river basins, groundwaters and coastal waters where appropriate—and each RBMP will be reviewed every six years starting from 2015. Peter Gammeltoft said that river basin planning should lead to a more coordinated approach with fewer stakeholders at cross-purposes, resulting in “a more coherent and more economic approach to the management of water quality” (Q 623).
- 7.13. The WFD was welcomed by most of our witnesses. For example, Pamela Taylor of Water UK felt that its focus on water quality in the environment would allow for less end-of-pipe treatment by water companies, so that “customers are not forever paying the bill at the end in order to clean up what society is doing to its water” (Q 110). WWF-UK went further, calling the WFD “a unique opportunity to introduce a modern approach to the management of waters ... and [to] address the inter-related pressures facing the water environment in an integrated, strategic way” (p 201).
- 7.14. There was also recognition that the WFD took greater account of cost than previous Directives. As Philip Fletcher said, “those old Directives ... do not take any account of value”, whereas “the Water Framework Directive ... allows governments to take account of disproportionate costs in arriving at an appropriate programme of measures” (Q 18). This point was echoed by Richard Bird of Defra, who said, “on new Directives ... we should like to see the Water Framework Directive approach applied where possible because it does allow for a more effective balance ... between the environmental benefits of improving water quality and the costs to users” (Q 198). Nonetheless, it remains to be seen how the cost effectiveness test will be applied in practice.
- 7.15. Turning to the implementation of the WFD, we encountered considerable confusion amongst witnesses as to the exact meaning of “good ecological status”, a concept that is central to the Directive’s aims. For example, Professor Joe Morris of Cranfield University told us, “the jury is still out at the moment in terms of how to define ecological standards ... it is yet to be determined what these standards will be” (Q 482). Similarly, we were told during our visit to Yorkshire Water that the concept urgently needed clarification if the WFD was to be effectively implemented within the proposed timetable (see Appendix 6).
- 7.16. Dr Tom Le Quesne of WWF-UK also accepted that there was some uncertainty in the meaning of good ecological status, but his view was that “we know what the problems are and I do not think the precise definition should hold us back from taking the measures which we need to take” (Q 509). He added that it was important “to start thinking about what we can do to start to move ourselves in the right direction because I think it is very, very unlikely that any time in the near future we are going to overshoot it [good ecological status]” (Q 514).
- 7.17. In marked contrast, Peter Gammeltoft insisted that “there is a concept, and it is a peer-reviewed concept ... For each of these regions [of Europe] you have essentially a concrete definition of what ‘good’ ecological water quality means” (Q 623). Nonetheless, it will be the EA—as the sole competent

authority for implementing the WFD in England and Wales—that will have responsibility for identifying what good ecological status means in practice.

- 7.18. Dr David King, Director of Water Management at the EA, gave the following explanation: “good ecological status is made up of two components, biological and physical-chemical status, and individual water courses ... will be defined against the ability to support a reference set of biological indicator species and also the physical-chemical parameters to support those species”. However, he admitted that “it is a subject of significant debate still across Europe in an attempt to provide a method and consistency of approach” (Q 236). He concluded, “we would certainly be advocating that the definition has to be based on sound science” although “what eventually emerges ... might be something different” (Q 238).
- 7.19. Assuming that a definition of good ecological status can be agreed by stakeholders, another key question is whether the requirements of the WFD can realistically be met by the target date of 2015. WWF-UK noted that “93 per cent of rivers, 84 per cent of lakes and 99 per cent of estuaries are at risk of failing to meet good ecological status” (p 201), and the Royal Society for the Protection of Birds made a similar claim (p 352). This highlights the scale of the challenge to be overcome.
- 7.20. Nevertheless, Elliot Morley believed that “most of our watercourses, lakes, rivers and coasts” would reach good ecological status “within the timeframe of 2015” (Q 837). Richard Bird, Head of the Defra Water Directorate, was more reticent, suggesting that “a polite way of describing it” would be “the timetable is exacting”; he felt that “a great deal needs to be done between now and then [2015]” and “it is clearly going to be an extremely testing process for all concerned” (Q 197).
- 7.21. If the timetable is to be met, it is clear that the EA must bring together relevant stakeholders as rapidly and effectively as possible. In December 2005, the EA published *Water for Life and Livelihoods: A Framework for River Basin Planning* which set out how it plans to engage with stakeholders in the formation of RBMPs. The key initiative is the formation of “Liaison Panels” in each River Basin District, consisting of representatives of “all major interests”, and there will also be engagement with existing groups at the catchment and local levels.¹¹³
- 7.22. It is especially important that the EA should engage fully with the agricultural industry since farming is one of the biggest causes of diffuse pollution, particularly in terms of nitrogen and phosphorus. Professor Louise Heathwaite of the Lancaster Environment Centre felt that these problems could only be tackled through holistic catchment management (Q 475). It is noteworthy, therefore, that Baroness Young of Old Scone told us that the EA was already running “four pilots [for agricultural catchment management] ... with the NFU and English Nature”. She added, “I think the important thing is that we find a way of getting groups of farmers together in pilots and then roll it out to the highest priority catchments fairly swiftly” (Q 265). We agree.
- 7.23. In addition, Defra recently launched a £25 million “Catchment Sensitive Farming Delivery Initiative”, which will target 40 priority catchments and

¹¹³ See http://www.environment-agency.gov.uk/commondata/acrobat/rbp_sum_framework_doc_1255683.pdf.

“help farmers tackle the causes of harmful water pollution”.¹¹⁴ Specifically, “advisers will work on a one to one basis with farmers, as well as leading a series of initiatives including workshops and farm demonstrations to encourage best practice”. However, there is a danger that this scheme could be hampered by what, in the words of Dr Tom Le Quesne, is “often a relationship of suspicion” between farmers and the regulatory authorities (Q 520).

- 7.24. Baroness Young of Old Scone suggested that the WFD would “require fairly heroic changes in farming practice” and in certain catchments “we may need to see farming alter quite dramatically” (Q 263). This situation is analogous to the introduction of Nitrate Vulnerable Zones, which have had a significant impact on farming practices and will continue to do so. As Professor Joe Morris noted, “at existing levels of agro-chemical usage in the agricultural sector it is unlikely that [the WFD’s] requirements would be met” (Q 477). With this in mind, he pointed to a new “traffic light system” that had been developed at Cranfield University to offer guidance to farmers on complying with the new standards (Q 478).
- 7.25. However, Pamela Taylor of Water UK warned that “farmers have a major role to play in terms of our society, in terms of managing land” and it was therefore essential “to work in partnership with them ... and not to impose inappropriate solutions centrally” (Q 120). As Richard Bird of Defra pointed out, there may be an opportunity to use the Common Agricultural Policy (CAP) “to meet our obligations in the Water Framework Directive through helping farmers raise their game on good water management and practice” (Q 203). This could encourage farmers to address diffuse pollution in a way that allows maximum flexibility and scope for innovation.
- 7.26. **We welcome the Water Framework Directive, particularly its emphasis on river basin planning. However, it is essential that the Environment Agency should clarify the precise meaning of “good ecological status” as soon as possible if there is to be any hope of complying with the proposed timescales. In addition, the Agency must ensure that the new Liaison Panels represent a true cross-section of all stakeholders in each River Basin District.**
- 7.27. **It is apparent that the biggest challenge in terms of tackling diffuse pollution comes from agriculture. We welcome Defra’s Catchment Sensitive Farming Delivery Initiative to help farmers tackle water pollution, but it will only be successful if farmers and advisers work together in an open and positive spirit. Moreover, the Environment Agency must not place unrealistic or excessively rigid demands on farmers when formulating River Basin Management Plans. However, at the same time, the water industry must not be seen as a soft target for tackling diffuse pollution when compared to agriculture. We recommend that the Government give further consideration to how the Single Payment Scheme and cross compliance requirements could be used to help tackle agricultural diffuse pollution in a flexible manner.**

¹¹⁴ See <http://www.defra.gov.uk/news/2005/051219a.htm>.

Priority Substances Directive

- 7.28. Under the WFD, there are two “daughter” Directives: one relating to priority substances and the other relating to groundwater. We received considerable amounts of evidence on the first of these.
- 7.29. The Priority Substances Directive will contain a list of priority and priority hazardous substances, which are substances that pose a risk to, or via, the aquatic environment. The initial list was agreed in 2001.¹¹⁵ The Directive will propose “the progressive reduction of discharges, emissions and losses of priority substances” and “the cessation or phasing-out of discharges, emissions and losses of priority hazardous substances”, with these goals to be achieved within 20 years of the Directive being agreed.¹¹⁶
- 7.30. However, the Directive has not yet been published. In the words of Baroness Young of Old Scone, “the Priority Substances Directive is in a bit of a shambles at the moment” and “is two years behind schedule”. Moreover, “there is a sunset clause ... that says if Member States cannot agree at Commission level they eventually have the right to set their own standards for priority substances” (QQ 253, 254). The deadline for agreeing a European standard is December 2006. Peter Gammeltoft, of the European Commission, told us in February 2006 that the proposal was “on the way and we hope to have it out in the next few months” (Q 632). At the end of March, Elliot Morley said that he expected a proposal in “two to three months” (Q 839). Nonetheless, there is a real possibility that the Directive will not be agreed by the deadline.
- 7.31. There were divergent views amongst witnesses as to how desirable or realistic the Directive would be. Gwynne Lyons, Toxics Adviser at WWF-UK, felt that it was important to clamp down on the discharge of priority substances because it was “very difficult to predict the long-term effects of continuous exposure to such substances”. They were “persistent” and could “bio-accumulate in the bodies of us or wildlife” (Q 512). Indeed, “these are the sort of chemicals that have blindsided us in the past” (Q 513). She also said that, since the target date is 20 years away, she did not think that the requirements of the Directive were “too much to ask” (Q 512).
- 7.32. In contrast, Peter Gammeltoft, though speaking on behalf of the Commission, was notably less enthusiastic about the Directive. He said that “it was not the Commission that proposed to put this into the [Water Framework] Directive; it was the European Parliament”. Moreover, he continued, “we considered this to be a political objective [that] should not be transformed directly into law”—although he accepted that “now it is in the law and ... we will have to find a way of managing it” (Q 627).
- 7.33. Similarly, Baroness Young of Old Scone had some significant concerns. She was troubled that there were no plans for appropriate, science-based *de minimis* levels of priority substances—in other words, low levels at which the presence of a certain amount of a given substance is permissible, with due regard to background levels in water bodies. Because modern analytical methods allow the detection of the smallest traces of most substances, this meant that “it is about not letting them into rivers and water bodies at all rather than not letting them in at a level that we do not believe would have

¹¹⁵ See http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_331/l_33120011215en00010005.pdf.

¹¹⁶ See <http://www.defra.gov.uk/Environment/water/wfd/daughter-dirs.htm>.

an impact on human health or the environment, and that is a very, very difficult thing to control” (Q 254). Moreover, the EA had “very few levers to be able to influence all of those discharges into water” (Q 256).

- 7.34. Professor Bryan Ellis was also doubtful about how practical the Directive would be, noting that the situation was “extremely challenging” and suggesting that “it will be very difficult to meet the requirements ... of the Directive within the timescales envisaged”. Moreover, he warned that there was a growing number of substances, notably Pharmaceuticals and Personal Care Products (PPCPs), which were “highly likely to join the PHS [priority hazardous substances] listing”, thus making the task even more challenging (p 196).
- 7.35. However, Professor Ellis felt that progress could be made in reducing discharges of priority substances through “control technologies and ... product substitution and control” as well as non-statutory codes of practice (QQ 483, 484). Nevertheless, even if a reduction or cessation of all discharges was achieved, Ron Chapman of WRc warned that there was insufficient recognition of “intrinsic background levels of certain priority substances”, and suggested that some substances might be trapped in sediments and would emerge over time (Q 589).
- 7.36. There was also concern from the water companies about the cost of complying with the Directive in terms of treating wastewater to the required standard, particularly if there was too much reliance on end-of-pipe treatment instead of effective control measures. During our visit to Yorkshire Water, Tony Harrington cited research showing that the capital and operational costs to the company could be £880 million over 25 years. Moreover, it was felt that the level of treatment required could result in as much as a two-thirds increase in the company’s greenhouse gas emissions (see Appendix 6). Water UK has made similar comments.¹¹⁷
- 7.37. When these concerns were put to Richard Bird of Defra, he stated that “we have certainly been making the Commission fully aware in pre-publication discussions of our concerns that the Directive should strike the right balance and ... there has been some progress [but] we shall continue to work hard at this and we are pushing for the maximum degree of flexibility on the same lines as the Water Framework Directive” (Q 198).
- 7.38. **The lack of *de minimis* levels in the proposed Priority Substances Directive is extremely worrying, making it difficult—if not impossible—to comply with the Directive’s requirements. Moreover, it is most unlikely that a Directive without realistic target levels—taking into account background levels of these substances—could be justified in terms of the potential costs. We strongly recommend that the Government work towards the inclusion of appropriate, science-based *de minimis* levels in the Directive.**

Sewage Sludge

- 7.39. Sewage sludge is the residual solid material resulting from water treatment processes. The more intensive the treatment, the more sludge is produced. Sludge typically contains pathogenic bacteria, heavy metals and a number of

¹¹⁷ See <http://www.water.org.uk/home/policy/water-framework-directive/documents-and-resources/wfd-update/update-26oct05>.

other problematic residual substances. Following the implementation in the 1990s of the Urban Waste Water Treatment Directive, more sewage has been treated and to a higher standard; hence a lot more sludge is now produced. Currently this is in excess of one million tonnes of dry solids per annum in the United Kingdom as a whole.

- 7.40. Sludge disposal and utilisation is not straightforward and costs typically about 50 percent of the total cost of sewage management. Following treatment, according to Water UK, some 62 percent of sludge is used in agriculture (as treated biosolids), with 19 percent being incinerated, 11 percent being used in land reclamation, one percent going to landfill, and the rest being used for non-food agriculture.¹¹⁸
- 7.41. Professor Louise Heathwaite suggested that sewage sludge should be seen as “just ... another type of fertiliser” and noted that, since it is closely regulated, it is safer than a number of alternatives. She felt that recycling sludge to land was “the best environmental option” (Q 489). Professor Joe Morris agreed but told us that supermarkets have “distanced themselves” from crops grown using sewage sludge fertilisers (Q 490). He also suggested that there is scope for using bio-solids “as a fuel for co-combustion with coal, municipal solid waste, wood, and for cement manufacture”, noting that “thermodynamic modelling showed that all of these scenarios could provide a net energy gain”.¹¹⁹ These options clearly merit further investigation, but we have received insufficient evidence to make a firm recommendation on this issue.

Sustainable Drainage Systems

- 7.42. A key factor in water quality is stormwater drainage. Generally, stormwater is either conveyed directly to a water course, water body or ocean, or to a treatment works combined with foul sewage. Both methods reduce the infiltration of water into the ground—thus potentially depleting groundwater and reducing flows in other water courses—and each method also has other distinct disadvantages.
- 7.43. Draining stormwater directly into the nearest water course can compromise the water quality of the aquatic environment—particularly if misconnections cause foul sewage to enter the stormwater system—and cause flooding problems. Accordingly, there is increasing use in the United Kingdom of some form of treatment for separate stormwater discharges, usually via a storage system such as a pond.
- 7.44. Putting stormwater into a combined sewer can lead to combined sewer overflows at times of high flow, resulting in discharges of untreated sewage to the natural environment. The flows that reach the treatment works are a mixture of stormwater and sewage. This means that some stormwater is treated with the foul sewage, and the changes in flow characteristics when it rains mean that the treatment plant does not operate as effectively as when treating foul sewage alone.
- 7.45. Over the last decade, the water industry has invested heavily in reducing the frequency, and improving the quality, of the sewage spilled from combined sewer overflows. Cleaning up these “Unsatisfactory Intermittent Discharges” (UIDs) is a requirement of the Urban Wastewater Treatment Directive and,

¹¹⁸ See <http://www.water.org.uk/home/news/press-releases/wastewater-pamphlet/wastewater-web--2-.pdf>.

¹¹⁹ Supplementary written evidence (not printed).

since the AMP2 planning period, company plans agreed with Ofwat have resulted in significant improvements to receiving water bodies in England and Wales.¹²⁰ It is intended that within the current five year Asset Management Planning period,¹²¹ all of the remaining UIDs will be dealt with, except in London, where there are special proposals for a longer-term approach due to the high cost.

- 7.46. Worldwide there are alternative approaches to stormwater management using systems that attempt to utilise more “natural” processes than piped or sewer systems. In Australia, France, Germany, Scandinavia, the United States of America and elsewhere, such systems have been in use for more than half a decade. In the United Kingdom these systems are only just beginning to be used and are known as “Sustainable Drainage Systems” (SUDS). These manage stormwater by simultaneously dealing with quantity, quality and amenity issues.
- 7.47. SUDS utilise a variety of structures—including filter strips, swales,¹²² permeable surfaces and filter drains—to attenuate stormwater run-off and clean up the water, as well as basins and ponds to store run-off, allowing further treatment and the release of the water to watercourses at an appropriate rate. The basins, ponds and wetlands can also provide an amenity for residents.¹²³ These techniques can therefore avoid the damaging impacts mentioned above, as well as bringing water into the public domain and ingraining in people’s minds that water is a precious natural resource.
- 7.48. In Australia, SUDS are part of a planning approach known as “Water Sensitive Urban Design” (WSUD), which makes water (supply and disposal) a major consideration in all new developments. The main driver for this is water stress, which increases the importance of ensuring that water is used effectively and to maximum benefit. In the United Kingdom, this type of approach is being used in Bradford, where regeneration plans include a city lake and new canal. More effective and integrated water management is a major part of the proposals for the revised guidance on flood risk management in PPS25, which is intended to make water management more of a material consideration within the planning process, to better control flood risks from new developments.
- 7.49. SUDS are becoming increasingly popular in the United Kingdom, especially in Scotland. A good example is the 550 hectare Dumfermline Eastern Expansion site where, with the support of the Scottish Environment Protection Agency, SUDS are being used to improve the quality of run-off and to mitigate existing flooding problems downstream of the site. Treatment of stormwater run-off from the development is achieved through a system of ponds and wetlands, from which the water joins the local water courses. Filter drains and swales are also used to convey run-off from the roads to detention basins and wetlands.
- 7.50. If SUDS are to be used more widely, the institutional arrangements for long-term maintenance must be favourable—as they are in Victoria, Australia, for

¹²⁰ Each water company produces an Asset Management Plan to outline its investment plans for its underground assets. AMP2 was the Asset Management Planning period covering the years 1995 to 2000.

¹²¹ AMP4.

¹²² Swales are grassland depressions which lead water overland from the drained surface to a storage or discharge system.

¹²³ See <http://www.ciria.org.uk/suds/index.html> for further information on SUDS techniques.

example, where WSUD is an integral part of the planning process. During our visit to the Caroline Springs development outside Melbourne—where the use of ponds and wetlands provides a significant public amenity—we discovered that the ponds were maintained by Melbourne Water, which had a statutory duty to do so if the relevant asset had a catchment of more than 60 hectares. If the catchment was less than 60 hectares, this responsibility fell to the local authority (see Appendix 8).

- 7.51. By contrast, the institutional arrangements are less clear in England and Wales. Although the Building Regulations and various codes of practice state that such systems should be used unless it can be demonstrated that they are unfeasible, John Slaughter of the Home Builders Federation felt that there was a problem in terms of the adoption of SUDS by sewage treatment companies (Q 773), arising from the fact that a drainage system must have a recognised outfall to be classified as a sewer under the current definition.
- 7.52. If a traditional sewered system is constructed, provided it conforms with the requirements of the water industry standard “Sewers for Adoption”, ownership and future maintenance will be taken up by the sewerage undertaker. SUDS systems, not complying with the definition of a sewer, must be maintained either by the landowner or housing association, or by an agent appointed on their behalf. In some instances, local authorities have assumed responsibility for maintenance, typically where the SUDS have comprised part of a public amenity area. Currently, the Government assume that householders will be willing to become more responsible for their own local stormwater drainage systems if SUDS are installed instead of sewer connections. However, the benefits to householders of so doing are small—typically a £50 per year reduction in water charges—and, under the Water Industry Act 1991, they have the right to reconnect to a sewer system at any time.¹²⁴
- 7.53. In many of the countries using SUDS or their equivalent, such as Australia and the United States of America, these systems are either owned and operated by local authorities, water service providers or by specifically designated “stormwater utilities”. There is significant evidence that leaving their operation and maintenance to local or individual property landowners is ineffective and can lead to downstream pollution or flooding.
- 7.54. Some of these problems have been recognised in a recent study prepared for Defra, which noted that “the existing legislation that governs urban drainage has resulted (unintentionally) in an over complex system with diverse responsible bodies”, and called on the Government to “recognise and consider the necessary legislative change”.¹²⁵ Defra is currently planning a number of pilots “to examine a range of different approaches to develop more integrated urban drainage management”.¹²⁶ This is welcome, but does not remove the need for regulatory change.

¹²⁴ Water Industry Act 1991, s. 106.

¹²⁵ See <http://www.defra.gov.uk/environ/fcd/policy/strategy/scoperev.pdf>.

¹²⁶ See <http://www.defra.gov.uk/environ/fcd/policy/strategy/ha2.htm>.

- 7.55. **We strongly recommend that the Government give urgent consideration to ways in which the financial, legislative and regulatory barriers to the wider use and adoption of sustainable drainage systems can be removed. However, we are of the opinion that operational and maintenance responsibilities should not be entrusted to individual property owners due to the high risk that they will not be carried out satisfactorily. We suggest that the Government consider alternative arrangements such as those in Victoria, Australia and in the United States of America, which have facilitated the widespread utilisation of sustainable drainage systems.**
- 7.56. One of the schemes that we saw in Melbourne illustrated the WSUD concept by re-using the collected stormwater for irrigation of parks. The Docklands site is being developed by VicUrban, the Victorian Government's urban development agency. Using the National Australia Bank building as an example, Mark Haycox of VicUrban explained how the basic WSUD system operated: roofwater was channelled through an attractive bio-swale system, whilst stormwater landing on the streets was drained away to trees which acted as "mini bio-filters" by removing nitrogen and phosphorus, and thrived on the nutrient-rich irrigation.
- 7.57. The collected water was then piped to open wetlands in the nearby park, which removed further impurities, before being put into underground storage tanks. The treated stormwater in the tanks was then used for irrigation of the parks in the surrounding area. Up to 10 million litres of stormwater was treated each year, with each storage tank holding up to 550,000 litres at any one time. In addition, the park and the wetlands provided a pleasant open space for residents (see Appendix 8).
- 7.58. **We were highly impressed by the use of Water Sensitive Urban Design in Melbourne. We commend such projects to the attention of the Government, and recommend that they give active consideration to ways in which the re-use of stormwater for irrigation of urban parks might be facilitated in England and Wales.**
- 7.59. The use of SUDS is being planned as part of the development of the Ashford growth area where, with substantial financial backing from the Government, significant attempts are being made to ensure that water management for the planned 31,000 new homes is holistic and effective. This is one of the first examples of Integrated Water Management in England, considering water resources, sewage, stormwater drainage and flood management in an integrated way. The initial study, led by English Partnerships, showed that the most important impact of the development would be on water quality in the River Stour. Three initiatives are therefore being developed: a local stormwater management plan using strategically located SUDS to improve water quality; the direct use of treated sewage effluent to irrigate coppices for biofuel production; and a "River Health Toolkit" to manage the river basin and balance the various diffuse pollutant inputs.¹²⁷
- 7.60. However, in general water quality has not hitherto been a significant material consideration in planning for new development. This has led to water companies having to make difficult choices when faced with the statutory obligation to provide the necessary infrastructure to meet demand for

¹²⁷ See <http://www.ashfordfuture.org/> for further information.

sewerage and treatment. In Basingstoke, for example, where housing growth is planned to expand the town by more than ten percent in the next decade, Thames Water is faced with the need to service this expansion and at the same time to provide the highest levels of sewage treatment, in terms of ammonia removal, anywhere in the country. This is to preserve the unique ecology of the River Loddon, downstream of the town, and does not include any additional obligations under the Water Framework Directive. The expansion of the town will mean very heavy capital and operational expenditure on new or enhanced sewage treatment, with significant charges being passed on to customers.

- 7.61. **We welcome the integrated approach to water management being pursued in Ashford, which is a positive step forward. In order to mitigate the need for significant expenditure to meet the requirements of environmental legislation in the water environment around new developments, we recommend that an integrated approach be taken—together with appropriate funding for supporting studies—wherever a large new development is planned.**

Water Resources

- 7.62. Adequate water resources are also essential to ensure a healthy natural environment. As English Nature noted, “water dependent ecosystems rely heavily on a natural supply of water, in the right quality and quantity, both in terms of absolute level and the variations in supply within and between seasons, and between years” (p 159). The implications of this, in the words of WWF-UK, are that “where water levels fall below a certain critical level due to abstraction, significant and unacceptable damage and mortality can occur” (p 202).
- 7.63. According to the EA, “there are some 600 sites ... where we believe that current licensed abstraction may be causing environmental degradation, or has the potential to do so” across England and Wales (p 86). This is a particular problem in the south east of England during the summer months.¹²⁸ Similarly, English Nature believed that “drainage and water abstraction are drying out many of the wetland habitats of lowland England” and suggested that “abstraction is considered a cause of unfavourable condition in around 7 percent of the area of standing water [SSSIs] and 14 percent of that of river SSSIs” (p 157).
- 7.64. A further threat is the likely impact of climate change upon water resources (discussed in Chapter 4), which can in turn render previously sustainable abstractions unsustainable. Although there is still uncertainty about the precise impact of climate change—and the variations between regions and individual catchments—Dr Chris West of the UK Climate Impacts Programme (UKCIP), told us that “a number of soil types and water body types are vulnerable to increased drying, particularly peat and bog based waters which are high in biodiversity. Some of the low nutrient upland streams also depend on low temperatures and low nutrients for maintaining their biodiversity”. Moreover, “those water bodies are vulnerable because clearly a water animal cannot shift from one river to another in the way that birds can fly and take up another habitat” (Q 295).

¹²⁸ *Water resources for the future*, p 29.

- 7.65. Significantly, though, English Nature admitted that “understanding of the detailed water resource requirements of freshwater ecosystems is poor, and the breadth of sound knowledge is limited” (p 157). Indeed, they called for a “long-term research programme ... that generates and collates field data, furthers our conceptual understanding of the functioning of the particular ecosystems, and derives impact assessment and management criteria” (p 160), and suggested in oral evidence that this was a task for the research councils (QQ 419, 421, 422). The urgency of carrying out this research is heightened by the potentially significant impact of the Review of Consents under the Habitats Directive, which is discussed in greater detail below.
- 7.66. In light of the need for additional research, the Natural Environment Research Council’s (NERC) proposal in December 2005 to downsize the Centre for Ecology and Hydrology (CEH)—which conducts important research in this area—was an unfortunate piece of timing. Specifically, the intention was to close four research sites and make up to 200 staff redundant. However, following consultation, NERC gave an assurance that the CEH’s research into freshwater ecology and the impact of climate change upon biodiversity would in fact “be strengthened” by the plans. Moreover, “none of [the] key data sets will be lost and extra resources will ensure good management and availability of the information”.¹²⁹
- 7.67. We recommend that the Office of Science and Innovation and the Research Councils give urgent consideration to ways in which the need for additional research into the water resource requirements of freshwater ecosystems can be met. We also call on the Natural Environment Research Council to fulfil its commitment to maintain and strengthen the research in key areas at the Centre for Ecology and Hydrology, particularly with regard to freshwater ecology research. We shall keep this issue under review.**
- 7.68. The EA addresses unsustainable abstraction through the Restoring Sustainable Abstraction Programme (RSA). This umbrella programme encompasses the National Environment Programme (NEP) (the name given to water companies’ five year plans for environmental improvement) as well as potentially unsustainable abstractions at protected sites (including those designated by EC Directives) or sites of concern to local communities.
- 7.69. As part of the abstraction licensing regime, the EA has introduced Catchment Abstraction Management Strategies (CAMS) to bring about more integrated management of water resources at the catchment level. Under this programme, the EA is currently drawing up strategies—which will be reviewed approximately every six years—for the effective management of water resources in each catchment, which includes flagging up potentially unsustainable abstractions for consideration under the RSA. The aims of CAMS are as follows:
- to inform the public on water resources and licensing practice;
 - to provide a consistent approach to local water resources management;
 - to help to balance the needs of water users and the environment; and
 - to involve the public in managing the water resources in their area.¹³⁰

¹²⁹ See <http://www.nerc.ac.uk/secretariat-council/ceh/decision.asp>.

¹³⁰ See http://www.environment-agency.gov.uk/subjects/waterres/564321/309477/?version=1&lang=_e.

- 7.70. We did not receive a large amount of evidence on the CAMS scheme, and it is too soon to make a full assessment of its effectiveness, but it appears to have been welcomed in principle by most stakeholders. For example, WWF-UK stated that “there are a number of aspects of CAMS which should be welcomed, including the attempt to specify hands-off level flows and the moves towards stakeholder engagement in the CAMS process” (p 203). Lindsay Hargreaves of the United Kingdom Irrigation Association told us, “I think most farmers and abstractors would like to see the CAMS process as an opportunity. It ought to be a mechanism by which we can ... learn about our environment [and] see that environmental needs for water are established in an objective way and [in] a way that we can all buy into” (Q 460).
- 7.71. However, there were also concerns about the way in which the CAMS process was being implemented in practice. WWF-UK warned that “there are concerns that [it] often appears biased in favour of abstraction: the ecological reserve¹³¹ is crudely and inappropriately set; climate change is not taken into account, a particularly acute threat in rain-fed rivers; wider freshwater needs such as wetlands are often not sufficiently accounted for; and sensible use of the precautionary principle is not made” (p 203).
- 7.72. Professor Louise Heathwaite highlighted the risk that CAMS “deal only with water resources and do not view that water resource issue in terms of water quality implications” (Q 502). This meant that the process of assessing abstraction levels might have to be repeated during river basin planning under the Water Framework Directive. Accordingly, she felt that “there needs to be some very careful thought about how resources are used and how our different Directives are linked together”.
- 7.73. **We welcome the introduction of Catchment Abstraction Management Strategies, but the Environment Agency must ensure that an appropriate balance is struck between the needs of water users and those of the environment, factoring in the potential change in climate. We also recommend that the Agency consider the water quality implications of each CAMS plan and assess how this might tie in with the requirements of the Water Framework Directive.**
- 7.74. A major part of the EA’s drive to restore sustainable abstraction is the Review of Consents under the Habitats Directive, which considers the impact of existing abstractions upon protected Natura 2000 sites (see footnote 107). If it cannot be ascertained that a particular abstraction will not have an adverse effect on the integrity of the site in question, the EA must consider what action is needed—including restriction or revocation of the abstraction licence. Applications for new abstraction licences which may affect Natura 2000 sites are judged in the same way.
- 7.75. There was some concern from water companies that the restriction of abstraction licences under the Review of Consents could threaten security of supply, especially when combined with growing demand and the effects of climate change. Southern Water warned us that restrictions or revocations of abstraction rights could put areas “into a supply demand deficit”, yet “the outcome of sustainability investigations driven by the Habitats Directive has not featured in our current resources plan, due to the uncertainty of the issues” (p 359). In other words, it is difficult or impossible for companies to

¹³¹ The ecological reserve is defined by WWF-UK as “the minimum quantity of water that is necessary to safeguard against ... unacceptable damage” to the natural environment (p 202).

factor the Review of Consents into their water resources plans because the likely outcomes are so unclear.

- 7.76. Ian Barker, Head of Water Resources at the EA, addressed such concerns by insisting that “we will not destabilise public water supply and ... where it is necessary to take action against a water company licence we will help them develop a new source” (Q 240). Even so, the EA must judge licences appropriately in the first place because there is very little scope in south east England for placing unnecessary or unjustified restrictions on abstraction.
- 7.77. The criteria laid down by the Habitats Directive require that any plan or project likely to affect a Natura 2000 site (i.e. water abstraction in this case) should only be allowed to proceed if it can be ascertained that “it will not adversely affect the integrity of the site concerned”.¹³² English Nature stated that “this is clearly a precautionary test” which, according to a ruling by the European Court of Justice, meant that a plan or project could only proceed “where no reasonable scientific doubt remains as to the absence of [adverse] effects” (p 172).
- 7.78. English Nature felt that such an approach was essential because “action to tackle over-abstraction needs to be taken before damage becomes visible” (p 157). A failure to do so could result in permanent damage because “the recovery or rehabilitation of wetlands ... is not necessarily achieved simply by returning to the right hydrological conditions” (p 173). English Nature highlighted this point by referring to Redgrave and Lopham Fen (a SSSI), where the lowering of the water table due to aquifer abstraction had caused the peat soil to dry and oxidise, which had resulted in “a severe delay in recovery and in certain cases a complete inability to return to the pre-impacted fen community”.
- 7.79. By contrast, Dr Richard Sturt told us that CCWater had considerable reservations about this precautionary approach: “the problem with the Habitats Directive ... is that there is a negative burden of proof which we as consumers find very difficult indeed. If an abstraction cannot be shown not to be damaging a habitat then the abstraction must be curtailed. The consequences for the south east ... are horrendous” (Q 365). Similarly, during our visit to Essex and Suffolk Water and Anglian Water, concern was expressed about abstractors having to prove a negative in order to retain their abstraction rights (see Appendix 9).
- 7.80. However, there is in practice no avoiding the Directive’s explicit requirement that the EA should ensure that any activity “will not adversely affect the integrity of the site concerned”. The key issue, therefore, is how the EA carries out this duty in practice. English Nature told us that “generic water quantity and quality requirements” had been drawn up for the different types of wetland, and that “there is agreement with the Environment Agency for these criteria to be used in impact assessment and management, and modified to portray local conditions where robust, more site-specific evidence is available” (p 173). The implication of this is that decisions on abstraction licences can be taken on the basis of generic criteria without consideration of any site-specific information.
- 7.81. During our visit to Essex and Suffolk Water and Anglian Water, though, Graham Wilson of the EA told us that the review was taking place on a site-

¹³² Habitats Directive, Article 6.3.

by-site basis, so decisions would not be taken merely on the strength of generic criteria. Similarly, Lord Bach, Parliamentary Under-Secretary of State in Defra at that time, wrote in a Parliamentary written answer, “any necessary changes to existing permissions for water abstraction which pose a risk to Natura 2000 sites will be based upon a site/permission specific assessment”.¹³³

7.82. The use of site-specific assessments was backed by Peter Gammeltoft, representing the European Commission, who suggested that “in the Habitats Directive generic assessments may not be appropriate because the particularities of a site are the determining factors” (Q 638).

7.83. The Environment Agency is required to take a precautionary approach to reviewing abstraction licences under the Habitats Directive, but at the same time adequate consideration must be given to security of supply. Moreover, abstraction licences must be judged on the basis of site-specific information, not generic data alone, and we welcome the Government’s assurance to this effect.

¹³³ Written answer, 9 March 2006, WA 161.

CHAPTER 8: SUMMARY OF RECOMMENDATIONS

- 8.1. We outlined the key themes of our report in the Executive Summary. In this chapter we set out our conclusions and recommendations in full. The numbers in the brackets refer to the relevant paragraphs in the text.

Background

- 8.2. Responsibility for water management is dispersed and unclear. We need clearer lines of responsibility, greater accountability and more effective funding procedures. Water management should be a partnership in which the water companies, the regulators, Government and the consumer can all engage in a constructive dialogue. Stakeholder engagement requires transparency, accountability and a mutual respect for the interests of all participants. Our report seeks to demonstrate how more appropriate water management could be established for England and Wales. (2.52)

The Regulatory and Legislative Framework

Successes of the Regulatory Framework

- 8.3. We urge the Government to make certain that the Drinking Water Inspectorate's effectiveness will not be undermined by a merger with a larger national regulator before implementing any such measure. (3.7)

Problems with the Regulatory Framework

The Periodic Review Process

- 8.4. We recommend that, in order to synchronise the periodic review cycle and the six-yearly reviews of River Basin Management Plans, Ofwat extends the periodic review cycle to six years. (3.21)
- 8.5. We strongly recommend that, in addition to extending the periodic review cycle to six years, Ofwat commits to agreeing indicative prices for the subsequent six years and prospective prices for the 12 years beyond that, as proposed by CIWEM. This would provide water companies with a greater degree of financial and logistical certainty as they plan major resource development projects. We further recommend that these price indications be appropriately aligned with the water companies' long-term water resources plans. (3.29)

Resource Development

- 8.6. We urge Ofwat in the strongest possible terms to ensure that it allows sufficient funding—and the required long-term financial assurances—to enable water companies to undertake necessary resource development, and to demonstrate to the Government that it is doing so. Further, Ofwat should work closely with the Environment Agency to ensure that the companies are indeed planning sufficient resource development to maintain security of supply. (3.44)
- 8.7. We urge the Environment Agency to balance its understandable enthusiasm for demand management with a realistic approach towards the need for resource development. Given the Agency's responsibility for analysing water

resources plans, it is imperative that it lends its support to resource development schemes where necessary—particularly through appropriate advice to the Government—and does not allow its environmental priorities to impact adversely upon the need to ensure security of supply. (3.48)

Water Efficiency

- 8.8. We consider that Ofwat has placed insufficient importance on the promotion of water efficiency by water companies. The new Ofwat board should therefore make it a top priority to provide genuine incentives to encourage water companies to invest more in promoting water efficiency. Equally, during future price reviews, the presumption should be in favour of funding water efficiency initiatives proposed by the companies, unless there is a compelling reason not to do so. We recommend that ministerial guidance to Ofwat be framed accordingly. (3.54)
- 8.9. We call on the Environment Agency and Ofwat to work together to ensure that water companies are encouraged to undertake water efficiency initiatives, and that water efficiency is given a higher priority in future price reviews. (3.56)

Infrastructure Maintenance and Renewal

- 8.10. We welcome the adoption of the Common Framework for Capital Maintenance and Ofwat's decision to allow a considerable increase in spending on infrastructure improvement in PR04. However, we are seriously concerned that the network replacement rate may still be far too slow and could be storing up problems for the future. In light of the concerns expressed by CIWEM and the Environment Agency, we strongly recommend that Ofwat gives serious consideration to working with the companies to increase the replacement rate. (3.64)

Research and Development

- 8.11. We call on Ofwat to address the disincentives in the regulatory system that discourage companies from investing in R&D. We recommend that Ofwat allocates to R&D a certain proportion of companies' turnovers that would be exempt from the efficiency targets, and reconsiders the mandatory return of all efficiency savings resulting from new technology. Any of the money allocated for R&D that is not spent should be returned to customers in the following price review. (3.76)

Water Bills and Affordability

- 8.12. It is clear that something concrete has to be done to address the very high level of unpaid bills, and experience in Melbourne suggests that partial disconnection may be both effective and publicly acceptable. We therefore recommend that the Government examine the evidence from Australia, with a view to introducing more effective strategies for reducing the number of people who can afford to pay their water bills but refuse to do so. (3.84)
- 8.13. At the same time as non-payment is a growing problem, water affordability is also becoming an increasingly serious issue; the help currently available for low income households is grossly inadequate and at variance with the Government support available for other essential needs such as energy. We urge the Government to heed the repeated calls of CCWater and two House

of Commons Select Committees, and to draw up plans to help the most vulnerable households with their water bills through the benefits and tax credits system. Providing even a fraction of the almost £2.5 billion that the Winter Fuel Payment cost in 2004-05 would be welcome. (3.97)

Competition

8.14. We welcome the introduction of greater competition to the water industry and look forward to the extension of the new regime to increasing numbers of customers in future. However, when judging licence applications, Ofwat must guard against “cherry-picking” of the easiest opportunities by new water supply companies. (3.105)

The Way Forward

8.15. We recommend that long-term integrated water management plans be drawn up by regional boards—one for each River Basin District—comprised of local representatives of Ofwat, the Environment Agency and CCWater. These boards would have a statutory duty to draw up such plans and to advise Ofwat accordingly at the national level in advance of each periodic review process. They would also have a duty to advise Regional Assemblies on Regional Spatial Strategies. (3.114)

8.16. This would enable all three components of sustainable development—economic, environmental and social—to be factored into the price-setting process far more effectively, whilst also ensuring that security of supply is maintained in a way that best suits the needs and pressures of each individual region. (3.115)

Demand for Water

Demographic and Social Factors

8.17. We are concerned by the impact that population growth, decreasing average household size and increasing *per capita* water use will have upon domestic demand for water. The only one of these factors that can be directly addressed by the industry and regulators is the growth in *per capita* water use. It is vital that the growing emphasis on water efficiency amongst the key stakeholders is communicated effectively to the public at large as rapidly as possible. (4.12)

Housing and Planning

8.18. It is regrettable that the ODPM failed sufficiently to consult the water industry directly—or to give due consideration to the water management implications—when formulating the Sustainable Communities Plan and selecting the growth areas. We recommend that, in future, DCLG and Defra work together to ensure that such consultation is held at the earliest possible stage, rather than taking the supply of water for granted. (4.28)

8.19. Whilst we welcome the consultative role of water companies and the Environment Agency in the formation of Regional Spatial Strategies and Local Development Frameworks, it is important that they should be involved at the earliest possible stages of planning. (4.29)

- 8.20. We do not believe that it would be practical for water companies to be made statutory consultees on every individual planning application. However, we recommend that the Government consider making water companies statutory consultees on applications for developments comprising a number of properties that exceeds a given threshold. It would also be desirable to make the Environment Agency a statutory consultee on water supply issues in these circumstances. However, the Environment Agency must receive adequate funding if its role in the planning system is to be expanded in this way. (4.30)
- 8.21. Whilst we welcome the Government's belated attempts to consider the likely impact of increased housing growth upon water use, we are completely unconvinced by the figures produced. Not only is the methodology flawed, but the findings are produced in such a way that even the Minister with responsibility for water issues misinterpreted them. The Government must be more transparent about the fact that their housing growth plans will have a very significant impact on water use in south east England, and focus on ensuring that the necessary preparations are made. (4.40)
- 8.22. It is worrying that the housing growth plans have not in many cases been factored in to the water companies' long-term plans, due to the way in which Government have initiated the planning. We recommend that the Environment Agency works closely with the water companies to ensure that this situation is rectified at the earliest opportunity, and further recommend that the companies be encouraged to consider the resource development that might be necessary beyond the timescale of the Regional Spatial Strategies. (4.47)
- 8.23. This process should be overseen by Defra and DCLG, both of which must take responsibility for the problems that their earlier lack of consultation has caused. Moreover, Defra must direct Ofwat to take a constructive and realistic approach towards allowing funding for the measures deemed to be necessary. (4.48)

Water Supply

Climate Change

- 8.24. We have seen insufficient evidence to convince us that the potential consequences of climate change are being adequately factored into long-term planning for water management, with due regard being paid to the inherent uncertainties. We therefore recommend that both Ofwat and the Environment Agency take steps to make the process whereby such issues are addressed within long-term planning more transparent and open to scrutiny. (5.13)

New Resources

Reservoirs

- 8.25. We believe that the construction of new reservoirs, and the enlargement of existing ones, for the purposes of public water supply are likely to be necessary in order to meet long-term water demand. However, the development of such new resources should be treated as only one part of the

twin-track approach, and the required water must be supplied as sustainably as possible. (5.23)

- 8.26. We recommend that the Government ensure that subsidies for the construction of winter storage reservoirs continue to be made available after the abolition of the Rural Enterprise Scheme. (5.25)

Desalination

- 8.27. We believe that, until better desalination technologies become available, desalination plants should not be the preferred option for general resource development. We recommend that the Government consider whether additional funding is needed to boost research into desalination in the United Kingdom, particularly since more efficient technologies will become increasingly marketable around the world. (5.30)

Leakage Reduction

- 8.28. Given that the development of technologies for leakage detection and repair continues unabated, we believe that leakage levels in England and Wales should be reduced further. We recommend that Ofwat replaces ELL with a broader concept of “sustainable level of leakage”. This would encompass economic impacts, but would also take greater account of the environmental and social implications—in each water company’s area—of providing additional supply instead of reducing leakage further. The sustainable level of leakage for each company should be determined in conjunction with the regional boards, as outlined in Chapter 3, taking full account of environmental impact assessments and agreed social priorities, balanced with the cost-effectiveness of resource development. (5.40)
- 8.29. Setting a “sustainable level of leakage” would, by factoring in environmental considerations, lead to more stringent leakage targets for companies and therefore offset some of the need for new resource development. We believe that it would also help to increase consumers’ trust in the water companies and reduce their resentment at being told to save water when so many water utilities are still losing such a large amount through leakage. (5.41)

Water Transfer

- 8.30. We have concluded that a national water grid is not currently feasible. However, we recommend that both Ofwat and the Environment Agency encourage and support greater connectivity between neighbouring water companies, particularly in the south and east of England. This would allow a more rapid and flexible response to localised supply/demand deficits. (5.46)

Water Re-use

Large-scale Re-use of Treated Wastewater

- 8.31. We recommend that the Government, the Environment Agency and Ofwat encourage and support schemes for the planned indirect re-use of treated wastewater by water companies, especially in the driest areas. We also believe that there is scope for greater industrial use of wastewater that has been treated to a sub-potable standard, and we recommend that the Government explore means by which such schemes could also be encouraged. (5.55)

Local Treatment and Re-use of Wastewater

8.32. We believe that the largely untapped potential for local re-use of wastewater should be explored, and we therefore welcome the Government's intention to use greywater recycling at the Northstowe development. However, the current wariness of the public should be treated sensitively and, initially at least, this kind of recycled water should only be used for external purposes, not internal ones. We also recommend that the Government consider, as a priority, the feasibility of introducing a universal statutory standard for sub-potable water intended for re-use. (5.65)

Rainwater Harvesting

8.33. We recommend that the Government make every effort to promote the development of rainwater harvesting techniques and to encourage the use of such systems in new developments for the provision of water for external purposes. (5.69)

Water Efficiency*Promotion of Water Efficiency*

8.34. Water companies need to be more energetic and imaginative in promoting water efficiency, and we urge Ofwat to look favourably upon the funding of such activities. However, there also needs to be an alternative, independent source of advice and support to both domestic and business consumers. (6.19)

8.35. We agree with the Government that a water saving trust is not on balance desirable at this time—as long as other bodies are mandated to take responsibility for promoting water efficiency. We therefore strongly recommend that the Government extend the remits of both the Energy Saving Trust and the Carbon Trust to cover water efficiency. We welcome the proposed establishment of Environment Direct, which will help to address the institutional fragmentation in the promotion of water efficiency, and look forward to rapid progress on this initiative. (6.20)

*Domestic Water Efficiency**Public Awareness*

8.36. In the long-term the educational system will be crucial in ingraining water efficient behaviour patterns in the minds of consumers. We urge the water companies to maximise their collaboration with schools in this regard. We also recommend that the Government make water efficiency—and the rationale behind it—a compulsory part of the citizenship syllabus. (6.29)

8.37. The Government should also seek to use all forms of media to promote and nurture water efficient behaviour amongst the general public. We recommend that the Government study the ways in which the Government of Victoria has achieved such impressive results, with a view to emulating such a strategy in this country. (6.30)

Metering

- 8.38. The general consensus amongst experts is that household metering is of value in reducing consumption, and we endorse this view. However, if metering is to make a long-term difference, it must be accompanied by a programme of awareness-raising about the importance of water efficiency. (6.34)
- 8.39. We draw the attention of the Government and Ofwat to the smart water bill reproduced in this report, and recommend that they consider the adoption of a design modelled on it for metered customers in England and Wales. (6.38)
- 8.40. We urge the Government to consider rising block tariffs as part of their current study of tariff structures. We recommend that the use of such tariffs be made obligatory for companies granted permission to impose universal metering under the water scarcity status provisions. (6.42)
- 8.41. We strongly recommend that the Government give priority to the consideration of smart meters by the Water Saving Group. More research is still needed, but we are sympathetic towards the idea of a gradual roll-out of smart meters as conventional meters reach the end of their useful life. (6.47)
- 8.42. We recommend that the Government make it easier for water companies in water stressed areas to obtain water scarcity status and therefore impose compulsory metering, thus improving the current piecemeal approach and giving a significant boost to demand management efforts in the south and east of England. We suggest that this be achieved through revision of the Water Industry (Prescribed Conditions) Regulations 1999. (6.54)

Water Efficient Fittings and Appliances

- 8.43. We recommend that the Government's Water Saving Group consider as a matter of urgency how higher-performance water efficient fittings and appliances can be developed, in order to increase their appeal to consumers and developers alike. (6.60)
- 8.44. We look forward to seeing the findings of the review of the water fittings regulations and urge the Government not to delay in the implementation of appropriate changes. (6.65)
- 8.45. We recommend that the Government consider what role reduced levels of Stamp Duty or Council Tax could play in making water and energy efficient homes more appealing to buyers. (6.66)
- 8.46. We recommend that the Government press for a mandatory EU labelling scheme for all household water-using products. (6.69)

Building Regulations

- 8.47. We welcome the decision to review Part G of the Building Regulations, but are concerned that the Government may be setting their sights too low. We recommend that they examine the ambitious water efficiency requirements established in Victoria and New South Wales and consider whether an analogous scheme could be introduced in England and Wales. We also recommend that the Government explore fully the advantages and potential problems in introducing some degree of regional variation in this area. (6.76)

Code for Sustainable Homes

- 8.48. We welcome the Government's intention to strengthen the Code for Sustainable Homes and urge them to establish genuinely challenging standards for water efficiency. We recommend that the Government set a timetable for the Code's incorporation into Building Regulations and give serious consideration to providing fiscal incentives to encourage maximum take-up of the Code in the meantime. (6.82)
- 8.49. We recommend that the Government consider altering the Code so as to include existing homes. We further recommend that they look at making water efficiency assessments—on the basis of the Code star rating—a mandatory component of Home Information Packs. (6.85)

*Industrial and Agricultural Water Efficiency**Industry*

- 8.50. We recommend that the Government make water audits compulsory for industrial and commercial consumers above a certain size, with those consumers meeting the cost through a direct charge or through their water bills. We also urge the Government to consider how Envirowise could reach out to a greater number of businesses—including small and medium sized enterprises—in a broader range of sectors. (6.89)

Agriculture

- 8.51. We recommend that the Government consider adding water efficient agricultural equipment to the Enhanced Capital Allowance Scheme. (6.93)

Water and the Environment*Water Framework Directive*

- 8.52. We welcome the Water Framework Directive, particularly its emphasis on river basin planning. However, it is essential that the Environment Agency should clarify the precise meaning of "good ecological status" as soon as possible if there is to be any hope of complying with the proposed timescales. In addition, the Agency must ensure that the new Liaison Panels represent a true cross-section of all stakeholders in each River Basin District. (7.26)
- 8.53. It is apparent that the biggest challenge in terms of tackling diffuse pollution comes from agriculture. We welcome Defra's Catchment Sensitive Farming Delivery Initiative to help farmers tackle water pollution, but it will only be successful if farmers and advisers work together in an open and positive spirit. Moreover, the Environment Agency must not place unrealistic or excessively rigid demands on farmers when formulating River Basin Management Plans. However, at the same time, the water industry must not be seen as a soft target for tackling diffuse pollution when compared to agriculture. We recommend that the Government give further consideration to how the Single Payment Scheme and cross compliance requirements could be used to help tackle agricultural diffuse pollution in a flexible manner. (7.27)

Priority Substances Directive

8.54. The lack of *de minimis* levels in the proposed Priority Substances Directive is extremely worrying, making it difficult—if not impossible—to comply with the Directive’s requirements. Moreover, it is most unlikely that a Directive without realistic target levels—taking into account background levels of these substances—could be justified in terms of the potential costs. We strongly recommend that the Government work towards the inclusion of appropriate, science-based *de minimis* levels in the Directive. (7.38)

Sustainable Drainage Systems

8.55. We strongly recommend that the Government give urgent consideration to ways in which the financial, legislative and regulatory barriers to the wider use and adoption of sustainable drainage systems can be removed. However, we are of the opinion that operational and maintenance responsibilities should not be entrusted to individual property owners due to the high risk that they will not be carried out satisfactorily. We suggest that the Government consider alternative arrangements such as those in Victoria, Australia and in the United States of America, which have facilitated the widespread utilisation of sustainable drainage systems. (7.55)

8.56. We were highly impressed by the use of Water Sensitive Urban Design in Melbourne. We commend such projects to the attention of the Government, and recommend that they give active consideration to ways in which the re-use of stormwater for irrigation of urban parks might be facilitated in England and Wales. (7.58)

8.57. We welcome the integrated approach to water management being pursued in Ashford, which is a positive step forward. In order to mitigate the need for significant expenditure to meet the requirements of environmental legislation in the water environment around new developments, we recommend that an integrated approach be taken—together with appropriate funding for supporting studies—wherever a large new development is planned. (7.61)

Water Resources

8.58. We recommend that the Office of Science and Innovation and the Research Councils give urgent consideration to ways in which the need for additional research into the water resource requirements of freshwater ecosystems can be met. We also call on the Natural Environment Research Council to fulfil its commitment to maintain and strengthen the research in key areas at the Centre for Ecology and Hydrology, particularly with regard to freshwater ecology research. We shall keep this issue under review. (7.67)

8.59. We welcome the introduction of Catchment Abstraction Management Strategies, but the Environment Agency must ensure that an appropriate balance is struck between the needs of water users and those of the environment, factoring in the potential change in climate. We also recommend that the Agency consider the water quality implications of each CAMS plan and assess how this might tie in with the requirements of the Water Framework Directive. (7.73)

8.60. The Environment Agency is required to take a precautionary approach to reviewing abstraction licences under the Habitats Directive, but at the same time adequate consideration must be given to security of supply. Moreover, abstraction licences must be judged on the basis of site-specific information,

not generic data alone, and we welcome the Government's assurance to this effect. (7.83)

APPENDIX 1: MEMBERS AND DECLARATIONS

Sub-Committee I

The members of the sub-committee which conducted this inquiry were:

- Lord Broers
 - Lord Howie of Troon
 - * Lord Lewis of Newnham
 - Lord Mitchell
 - * Lord Oxburgh
 - Lord Patel
 - Baroness Perry of Southwark
 - Baroness Platt of Writtle
 - Earl of Selborne (Chairman)
 - Baroness Sharp of Guildford
 - Lord Taverne
 - *† Lord Whitty
- * Co-opted
† Until March 2006

Specialist Adviser

Professor Richard Ashley, Professor of Urban Water, Department of Civil and Structural Engineering, University of Sheffield

Declarations of Interest

- Lord Broers
President, Royal Academy of Engineering.
- Lord Howie of Troon
Fellow, Institution of Civil Engineers.
- Lord Lewis of Newnham
Honorary Member, Chartered Institution of Water and Environmental Management.
- Baroness Perry of Southwark
Son owns Analytical Sciences (makes instruments for measuring water pollution).
- Baroness Platt of Writtle
*Honorary Fellow, Institution of Civil Engineers.
Fellow, Royal Academy of Engineering.
Member, Campaign to Protect Rural England.*
- Earl of Selborne
*Chairman, Blackmoor Estate Ltd.
Member of the National Farmers' Union.
Pensioner of English Nature.*

APPENDIX 2: LIST OF WITNESSES

The following witnesses gave evidence. Those marked * gave oral evidence.

- * Mr Gideon Amos, Director, Town and Country Planning Association
 Anglian Water
 Arup and Leeds University
 Association of Drainage Authorities
 British Geological Survey
 Broadland Agriculture Water Abstractors Group
- * Mr Phil Burnell, Programme Manager, Infrastructure and Environment,
 Engineering and Physical Sciences Research Council (EPSRC)
 Campaign to Protect Rural England (Kent)
 Chartered Institution of Water and Environmental Management
 Consumer Council for Water:
 - * Dame Yve Buckland, Chair
 - * Ms Teresa Evans, Chief Operating Officer
 - * Dr Richard Sturt, Chair, Consumer Council for Water Southern
 Department for Environment, Food and Rural Affairs:
 - * Mr Richard Bird, Head of Water Directorate
 - * Mr Elliot Morley MP, Minister for Climate Change and Environment
 - * Mr Mike Walker, Head of Water Resources Policy
 DG Environment, European Commission:
 - * Mr Peter Gammeltoft, Head of Unit, Protection of Water and Marine Environment
 Drinking Water Inspectorate:
 - * Mr Milo Purcell, Deputy Chief Inspector
 East Suffolk Water Abstractors Group
- * Professor Bryan Ellis, Middlesex University
 Elveden Farms Ltd
 English Nature:
 - * Dr Alastair Burn, Head of Water and Wetlands
 - * Dr Johan Schutten, Senior Hydro-Ecologist
 Environment Agency:
 - * Mr Ian Barker, Head of Water Resources
 - * Dr David King, Director of Water Management
 - * Mr Paul Woodcock, Regional Director, Anglian Region
 - * Baroness Young of Old Scone, Chief Executive
 Mr Gerry Evans

- * Dr Mike Farrimond, Director, UK Water Industry Research
 - * Professor Colin Green, Flood Hazard Research Centre, Middlesex University
 - * Dr Dave Griggs, Director of Climate Research, Hadley Centre
 - * Mr Gary Grubb, Associate Director for Research, Training and Development, Economic and Social Research Council (ESRC)
 - * Mr Lindsay Hargreaves, Council Member, UK Irrigation Association
 - * Mr John Hart, Senior Consultant, Centre for Environmental Consultancy, Building Research Establishment
 - * Professor Louise Heathwaite, Director, Centre for Sustainable Water Management, Lancaster University Environment Centre
 - * Dr Katherine Hyde, Centre for Environmental Consultancy, Building Research Establishment
- Institution of Civil Engineers:
- * Mr John Canton, Regional Manager, East of England
 - * Dr Paul Jeffrey, Principal Research Fellow, School of Water Sciences, Cranfield University
 - Mr Ken Livingstone, Mayor of London
 - * Mrs Sue Sida-Lockett, Chair, East of England Regional Assembly
 - The Inland Waterways Association
 - Professor Adrian McDonald, School of Geography, University of Leeds
 - * Dr Will Medd, Research Fellow, Centre for Sustainable Water Management, Lancaster University
 - Milton Keynes Friends of the Earth
 - * Mr David Mitchell, Technical Director, Home Builders Federation
 - * Professor Joe Morris, Cranfield University at Silsoe
- National Farmers' Union:
- * Dr Andrew Clark, Head of Policy Services
 - * Mr Tim Jolly, Water Resources Spokesman
- Office of the Deputy Prime Minister:
- * Yvette Cooper MP, Minister for Housing and Planning
 - * Mr Lester Hicks, Head of Minerals and Waste Planning Division
 - * Mr Andrew Wells, Director of Sustainable Communities
- Ofwat:
- * Mr Philip Fletcher, Director General
 - * Mr Kevin Ridout, Principal Engineer
 - * Dr Nick Reynard, Risk Analysis and Modelling Group, Centre for Ecology and Hydrology
- The Royal Academy of Engineering

The Royal Society for the Protection of Birds

- * Ms Christine Sefton, Research Assistant, Department of Geography and Environmental Science, University of Bradford

Mr Martin Shouler, Leader, Environmental Engineering Services, Arup

- * Mr John Slaughter, Director of External Affairs, Home Builders Federation

South East Water:

- * Ms Margaret Devlin, Managing Director

- * Mr David Shore, Operations Director

Southern Water

South West Climate Change Impact Partnership

- * Mr Brian Stewart, Chief Executive, East of England Regional Assembly

Thames Water Utilities:

- * Mr Werner Boettcher, Managing Director

- * Mr Rob Harrison, Director of Asset Management

United Utilities

Veolia Water Group

Water UK:

- * Mr Werner Boettcher, Member of the Council

- * Ms Margaret Devlin, Chairman

- * Mr Mike Pocock, Co-ordinator of the Water Resources Network

- * Ms Pamela Taylor, Chief Executive

Waterwise

- * Dr Keith Weatherhead, UK Irrigation Association

- * Dr Chris West, Director, UK Climate Impacts Programme

Mr D G Wilks

- * Mr Lawrence Wragg, Regional Chairman, East of England, Campaign to Protect Rural England

WRc plc:

- * Mr Ron Chapman, CEO

- * Mr Dene Marshallsay, Head of Demand Management

WWF-UK:

- * Ms Gwynne Lyons, Toxics Adviser

- * Dr Tom Le Quesne, Freshwater Policy Officer

Papers submitted by the following were not treated as formal evidence:

Professor David Butler, Department of Civil and Environmental Engineering, Imperial College London

Engineering and Physical Sciences Research Council

Mr Melvyn Kay, Executive Secretary, UK Irrigation Association

APPENDIX 3: CALL FOR EVIDENCE

The House of Lords Select Committee on Science and Technology has appointed a Sub-Committee, chaired by the Earl of Selborne, to investigate the future management of water in the United Kingdom¹³⁴ in the context of demographic and economic development, and, in the longer term, of climate change.

The Environment Agency recently voiced concerns that the water companies are concentrating on developing new supply rather than managing demand. The Committee invites evidence on all issues affecting the future balance of supply and demand, and in particular on the following questions:

Defining the problem

- What are the causes of the current problems of water supply, and how serious are they?
- What are the projections for future water supply, and what factors will influence these projections? Where, and over what timescales, may problems emerge?
- Is sufficient research being devoted to predicting, and handling, possible future scenarios?
- Is the response of Government, the EU, regulators and the industry adequate?

Supply and demand

- What are the options for increasing water supply, and what are the arguments for and against?
- What are the likely future trends in water demand, and what can be done to manage demand more effectively, and to influence the behaviour of consumers and others?
- What contribution can science, engineering and technology make towards reducing water use or waste by households, businesses and the public sector?

Infrastructure

- What is the current state of the water supply and drainage infrastructure? Is there sufficient investment in its improvement?

Context

- The Water Act 2003 amended previous legislation in order to promote sustainability and water conservation. Is the legislative and regulatory framework, at national and European levels, adequate?
- How does water figure in the development of Government policy in areas such as housing, land use planning and industry?
- What can the UK learn from the experience of other countries?

Note

The Committee will not be considering fluoridation, nor will it be covering flooding.

¹³⁴ Responsibility for the water industry and water resources in Scotland is devolved to the Scottish Parliament. The inquiry will therefore focus on issues affecting England and Wales.

APPENDIX 4: COMMENTS FROM PROFESSOR ADRIAN MCDONALD

Introduction

This paper examines the claims relating to water management in the Government's response to the Barker Review of Housing Supply¹³⁵ and in the supporting analysis produced by the Office of the Deputy Prime Minister (ODPM).¹³⁶ In addition, it considers a sustainability impact study commissioned by the ODPM which was published at the same time as the other two documents.¹³⁷

Government Response to Kate Barker's Review of Housing Supply

Comment on projected water demand is made in both the Government Response and the Supporting Analysis documents. Both are presented below.

"According to the research the demand for water is projected to rise from 12,000 megalitres/day to 12,728 ml/day¹³⁸ [sic] under the baseline, an increase of 6.1 percent. Under the scenario developed by ODPM analysts, this could increase by a negligible 12 ml [sic] per day. The reason this increase is so small is that water demand is driven primarily by population rather than household size."¹³⁹

"The analysis suggests that the additional housing supply needed to reach the Government's ambition of 200,000 net additions per annum within a decade would result in a marginal increase in water use. It could produce up to an additional 12 million litres per day in 2016 above the 12,728 mega litres/day in the baseline. This represents a 0.1 percent increase in total water use. This is because water demand is primarily driven by population, which is largely unaffected by housing supply."¹⁴⁰

This assertion of a very minor increase in water demand is at odds with every other forecast that has been made and with the plans of all water companies in the south east. As yet it has not been possible to trace the origin of the statement to a verifiable item of scientific analysis.

An earlier report commissioned by Defra, which appears to contain little original analysis of water demand forecasts, asserted, "over the next ten years a huge increase in the demand for water in the south east is forecast."¹⁴¹ In the appendix of the report it is argued that "the minimum (climate) change expected for the 2020s suggests impacts of 1–3 percent for domestic and commercial/industrial demand, with the high impact scenarios being in the range 2.5–6 percent. Given these potential modest increases in demand [attributable to climate change] it empathises [sic] the requirement to encourage more effective use of water."¹⁴²

¹³⁵ HMT, *The Government's Response to Kate Barker's Review of Housing Supply*, December 2005.

¹³⁶ ODPM, *Government Response to Kate Barker's Review of Housing Supply: The Supporting Analysis*, December 2005.

¹³⁷ ODPM, *A sustainability impact study of additional housing scenarios in England*, December 2005.

¹³⁸ Assumed to be intended as shorthand for megalitres per day. Should be Ml.d⁻¹ and not millilitres as indicated by ml.

¹³⁹ *Government Response*, p 83.

¹⁴⁰ *Supporting Analysis*, p 9.

¹⁴¹ Defra, *Study into the Environmental Impacts of Increasing the Supply of Housing in the UK*, April 2004, p 19.

¹⁴² *ibid*, Appendix C – Water Management Issues.

It is very difficult to foresee any plausible scenarios in which a water demand increase as low as 0.1 percent per year is reasonable. It may be that the 12 Ml.d⁻¹ increase in water demand relates only to the additional water needed to move from targets of 190,000 houses to 200,000 houses. If this is the case then the Government Response is not addressing the same estimates as in the Impact Study and is not being clear about precisely what is being estimated.

The two paragraphs above provide differing reasons for their very low demand forecasts. Both are inaccurate and misleading. Water demand is strongly driven by both population and household size. Even without population change, household size reduction will influence demand. The figures shown in Table 1 from Essex and Suffolk Water, one of the front-line companies in the south east and a leading demand research centre, emphasise the effect of household size. Four people living in a household use the same volume of water as three people living in separate houses. These generalised figures properly reflect the degree of precision with which we are currently able to estimate water use at the household level.

Table 1. Household water use for different household sizes

| <i>Number of people in the household</i> | <i>Average water use each year (m³)</i> |
|--|--|
| 1 | 50 |
| 2 | 90 |
| 3 | 130 |
| 4 | 150 |
| 5 | 170 |

The second paragraph asserts that “water demand is primarily driven by population, which is largely unaffected by housing supply.” While superficially accurate, if the housing demand skewed towards a higher proportion of single person households, water demand would again be significantly impacted.

In conclusion, over the post-war period water demand has risen steadily. All of the drivers, major and minor, of water demand—population, household size, lifestyle, individual behaviour, affluence, water using facilities, etc—indicate growth which is likely to be greater in the south east than elsewhere due to its planned expansion and the “pull” of the region as well as to climate change which is likely to be more pronounced (in water demand characteristics) than elsewhere in the UK.

The Sustainability Impact Study

Demand Forecasts

In the preamble to Section 8, “Demand for water”, it is stated that the material in the section relates to “the demand for water arising from the occupation of the new dwellings” and “presents information covering current domestic water use”.¹⁴³ However, Table 8.1 aggregates all billed potable water use by domestic, industrial and commercial customers. The emphasis in the title on domestic, taken with the preceding statements, misleads. Industrial and commercial water use¹⁴⁴ varies

¹⁴³ *Impact Study*, p 102.

¹⁴⁴ Industrial and commercial water use is usually termed *non-household* in the industry.

between water companies. Non-household water use is approximately 30 percent of billed potable water use in the UK overall.

The forecast figures in Table 8.1 cover only the immediate future, from 2003 to 2010. For the most part the table shows a marginal decline in water demand in the first years followed by relatively constant demand. Most water company planners suggest that this is due to the decline in industrial water demand as industry moves from heavy, processing and manufacturing to a more service and knowledge-based economy. The largest reductions in demand appear to occur in the regions coping with the greatest industrial change. If the analysis is repeated focusing primarily on those water companies responsible for water supply to the south east (as defined in the Impact Study Table 8.3) then, overall, an upward trend is seen (see Table 2).

Table 2. Water requirement changes in companies serving the south-east

| <i>Water Company</i> | <i>Volume change 2003-10 Ml.d¹</i> | <i>Volume change (%)</i> |
|------------------------|---|------------------------------|
| Thames | -3 | -0.1 |
| Southern | +12 | +2.3 |
| South-east | +12 | +3.8 |
| Folkestone and Dover | -1 | -2.3 |
| Mid Kent | +5 | +3.6 |
| Portsmouth | -3 | -1.8 |
| Sutton and East Surrey | -2 | -1.3 |
| Overall | +20 | +0.6 ¹⁴⁵ |

The claims of a 6.1 percent increase by 2016, and a 9.1 percent increase by 2031, in billed water delivered are dubious.¹⁴⁶ Unfortunately the lack of detail in the Impact Study makes it difficult to assess precisely the analysis employed and the scale of the uncertainties. The only per capita water consumption figure mentioned in the report is 145 litres per person per day for metered users. The analysis appears not to distinguish between metered and unmetered users. This is an important distinction as metered and unmetered households have differing water use patterns and demographic profiles. The correct figure can be better approximated by aggregating, for metered and unmetered customers, the demand generated by each household occupancy fraction. Such an analysis should use measured water use for metered customers and approximated water use derived from domestic consumption monitors¹⁴⁷ for unmetered customers. Where possible these consumption figures should be locally derived as consumption varies regionally. It should be noted that this is a major task.

¹⁴⁵ Derived from original volume data; not from a summation or averaging of the data above.

¹⁴⁶ *Impact Study*, p 112.

¹⁴⁷ A Domestic Consumption Monitor (DCM) is a survey to measure the water consumption of unmetered users. Typically it comprises about 1000 households who pay for their water on a rateable value basis but who have agreed that a meter and data logger is installed on their property.

*Claims of insufficient provision in water resource plans**Clean Water*

Clean water resource deficits are predicated on a Halcrow report to the Environment Agency.¹⁴⁸ In essence the Halcrow report identified planned new housing numbers anticipated in the resource plans of every water company supplying the south-east of England and aggregated these numbers yielding a total of 649,660 homes. The Impact Study noted that the proposed new housing in the Regional Planning Guidance and Sustainable Communities Plan totals 791,996 homes; on this basis the authors claim a 22 percent shortfall. The assumption that all planned housing will be developed may not be realistic and is a poor basis on which to develop new resources and infrastructure. Indeed, OFWAT is unlikely to have agreed the financing of the full figure. Further, since many companies have operating regions which overlap the south east there is inevitably a degree of estimation in the component of the plans that refer to the region specifically.

Dirty Water Treatment Capacity

Table 8.2 in the Impact Study contains basic information on the volume of sewage expected to be collected for treatment in the south east of England. Several points reduce the confidence in the analysis based on this table:

- the data again contains aggregated information on Domestic, Industrial and Commercial customers;
- units in the table are incorrect or incomplete—Ml should be Ml d⁻¹;
- the text refers to a table for a five year period, 2005–2010, but shows the seven year period 2003–2010, with 2004–2005 missing;
- the text confuses the terms sewage and sewerage;
- the conclusions drawn in the text do not tally with the data in the table. Also, Thames Water shows a decline in sewage volume and is thus not an exception as stated in the text.

It is highly likely that the forecast reduction in sewage treated relates to a decline in the industrial wastewater component. The analysis is continued in Table 8.6 in which a population equivalent to the planned investment is calculated. The formula employed is unclear, even after assuming that the errant “?” symbol was intended to be a “=“. The rationale for applying a single, unchanging, occupancy rate nationwide—an unsound assumption for new housing—when regional figures exist for new housing and the Office of National Statistics has forecasts of occupancy rate changes, is unclear.

The figures in Table 8.6 (populations derived from possible investment using a suspect formula) for the five years 2005–2010 appear to have been totalled and averaged and placed in Table 8.7 where they are compared to population forecasts from a parallel report.¹⁴⁹ If the figures are believed, all water companies, with the exception of Anglian Water, are planning to invest much more capacity than required—up to five times the required capacity increase. For example in the north west, United Utilities plan sewage developments for a population equivalent to 51,330 per year for each year but the affordability model has a population increase

¹⁴⁸ *Impact Study*, p 109.

¹⁴⁹ ODPM, *Affordability Targets: Implications for Housing Supply*, December 2005.

of 11,873 in the baseline and lower population increase in all other scenarios. Is it credible that a company will invest in unneeded capacity to the extent of a small city of 200,000 people over the Asset Management Period of 5 years? Figures for Thames Water are similarly incredible; planned capacity for 139,695 people per year but forecast increases below 85,000 per year in all scenarios. In contrast but equally incredible, Anglian Water is claimed to be preparing additional annual sewage capacity for 8,447 people but the model indicates c39,000 people would require sewage treatment facilities. Again these figures are not credible. The crude translation of investment into new population served is likely to lie at the heart of these claimed imbalances in provision. Some investment, possibly the majority, is directed towards improvements in treatment rather than to additional capacity.

Inaccurate Assertions and Processes within the Impact Study

The impact study contains several inaccurate assertions.

- (1) “Behavioural change is less effective [in comparison to more water efficient appliances] in terms of saving water”.¹⁵⁰

There is no evidence given in the report to support this assertion. I am not aware of such support in peer reviewed scientific literature. The structural changes cited by the authors will all be enhanced by, and some will require, behavioural change. Water efficient dishwashers and clothes washers are more water efficient when run on full loads. Dual flush toilets require the user to select the low flush volume when appropriate. Much more fundamentally, if behaviour changes such that customers wash cars much less frequently or reduce garden watering, one might anticipate significant water saving, particularly during the peak summer months.

- (2) “Per capita consumption by metered customers is lower than that for unmetered customers, as metering helps to provide householders with a greater incentive to use less water”.¹⁵¹

This is a seductive argument linking two accurate statements to yield a dangerously inaccurate overall assertion. Metered customers do use less water than unmetered customers. Metering does give an incentive to save water (although it is a small incentive). However the lower use is not caused by the incentive. The volume of water used by households varies greatly depending on the house type, the region, the household structure, affluence etc. Thirty years ago there was effectively no metered domestic water supply in the UK. As metering became an option, those households who believed (or calculated) themselves to be lower water users opted for metering. Thus this self-selecting group is low water using.

In contrast the unmetered group that remains (the majority of the UK population), having lost the low water users, has a higher average consumption. It is false and misleading to automatically assume and assert that unmetered customers will become low water users on transfer to a metered tariff.¹⁵² There is a general switch to metering driven by the

¹⁵⁰ *Impact Study*, p 102.

¹⁵¹ *ibid*, p 103.

¹⁵² The danger is that such inaccurate assertions gain credibility by repetition and policy could develop based on highly suspect evidence. There may well be a “fairness” argument that in the long-term customers should pay for what they use but a wholesale conversion to metering will have less conservation impact than is implied in the *Impact Study*. Some senior water company resource managers hold the view that in purely economic terms water metering is not an attractive option.

metering requirement for new homes and, over time, by 1 or 2 person households opting for metering without an option to switch back as they evolve to be 3 or 4 person households.

- (3) “This [decreased collection of sewage] reflects the planned reduction in demand”.¹⁵³

It is not a planned demand reduction but a short-term forecast. And the south east does not show a water demand reduction in any event.

- (4) “Based on a visual assessment”.¹⁵⁴

This is simply not an appropriate technique for conducting research that attempts to be quantitative. The analysts are simply making “guesstimates” of the relative contributions of the water companies to the supply in a region. It is not necessary to do this. Water companies have smaller supply units—water supply zones, leakage control zones etc which can be used to provide a more accurate weighting. An approximation may still be required at the margins but, if used, should be explicitly stated. More important, perhaps, is the spurious accuracy and precision of Table 8.3 derived from this “visual assessment”.

- (5) “The effects across regions differ as a result of the regional migration generated by additional house building”.¹⁵⁵

This is simply silly. If 100,000 additional houses were constructed in Salford or Shetland, one would not expect 100,000 people to arrive to occupy them. The pull of the south east is towards jobs and opportunity (and the push is generated by the lack of this elsewhere). The housing need is a reflection of this and of a trend towards single person occupancy.

An appraisal of the analytical approach made in the impact study

The method of analysis is outlined on pages 16-17 and 46-47 of the Impact Study. In essence, the authors have used the results of two “studies” on which to base an equation of the relationship between household size and water use. Unfortunately there are both errors and worrying assumptions in this analysis.

There are many studies of the relationship between water demand and household size, and the statement that “two studies have considered the relationship”¹⁵⁶ is misleading. Indeed, every water company has to provide information on demand by household for each five year AMP period to OFWAT and to update this annually in the June returns. Severn Trent Water, Essex and Suffolk Water, South West Water and Yorkshire Water hold data that allows this relationship to be determined. The choice of Portsmouth Water and Thames Water is arbitrary. The results of the “studies” are summarised in Table 3.2 of the Impact Study and are reproduced on the following page.

¹⁵³ *ibid*, p 105.

¹⁵⁴ *ibid*, p 106.

¹⁵⁵ *ibid*, p 112.

¹⁵⁶ *ibid*, p 46.

Table 3. The key data used in the Impact Study

| <i>Occupancy</i> | <i>Thames Water per capita consumption (litres/person/day)</i> | <i>Portsmouth Water per capita consumption (litres/person/day)</i> |
|------------------|--|--|
| 1 | 201 | 222.7 |
| 2 | | 181.7 |
| 3 | | 135.7 |
| 4 | | 128.7 |
| 5 | | 120.8 |
| 6 | 124 | 84.7 |

The authors claim to have averaged the data in the table, but with so much missing data it is hard to see how this was achieved. The authors have not drawn attention to the dramatic variance in the figures. For 1-person households, the Portsmouth Water figures are more than 10 percent higher than Thames Water's. For 6-person households, Portsmouth Water figures are 30 percent lower than Thames Water's. This is introducing a very high degree of variance and error into the analysis at an early stage and this will be promulgated throughout the analysis. The assumption of a linear relation (between water use and occupancy) is untested and frankly I cannot see how the data in the table above can be averaged to determine a relationship. The wording in the impact study is unclear and unhelpful:

“The relationship between occupancy and per capita consumption was estimated for each bracket of occupancy (e.g. 1-2 people, 2-3 people, etc.) based on the average of the two studies”.¹⁵⁷

The Impact Study goes on to state:

“For occupancy rates between two and three people, for example, this resulted in the following relationship: Per capita consumption (litres/ person/ day) = 245 – (30.7 x occupancy)”.¹⁵⁸

Again this is less than helpful; it is to be hoped that the analysis did not depend on a straight-line between two points (for 2 and 3 person consumptions) as any two points make a straight line, and a third point is always more convincing. It should be noted that this equation indicates that the water problem could be solved by having 8 person households, in which per capita consumption would be zero according to the equation presented.

Moreover, it is not stated for which year or period the data is derived nor whether the data refers to metered or unmetered customers. Let us assume metered customers, as the new housing will be metered. There must then be a survey of the attributes of the metered customers and demographic age data. It is therefore important to know the date of the attribute survey and to know why the important 2, 3, 4-person households are not reported as they are much more significant to the overall water demand than the less common 6-person households. Worryingly, such attribute data is most commonly held for unmetered customers on a sample survey called the Domestic Consumption Monitor (DCM). If this was the source of the data (and both Thames and Portsmouth operate these surveys) the results

¹⁵⁷ *ibid.*

¹⁵⁸ *ibid.*

for metered customers would be yet more inaccurate. If the net increase in water demand is sought then both the metered and unmetered customer water demand will have to be forecast as the transfer of households to metering over time will have an influence on water saving and thus on net water requirement. DCM surveys are complex and if used in these studies would have to employ bias corrections.

The Impact Study strongly suggests that the analysis accounted for both new and existing housing:

“Using the information on population and occupancy for both the new and existing dwellings, it was possible to estimate the demand from households living in new dwellings and the change in demand from households living in existing dwellings.”

This being the case it would require the analysis to use both metered and unmetered demand data and it has not. I would judge the analysis to be conceptually flawed and to have used, inappropriately, very dubious data. Policy based on this analysis would not be scientifically secure.

Conclusion

Regional water demand is driven primarily by demographics and only thereafter by water using facilities. Thus the key drivers are:

- net migration into the south east;
- a trend towards a lower occupancy;¹⁵⁹
- hidden and transient populations which are estimated to number well in excess of 100,000 in the south east; and
- increases in water-using facilities.

¹⁵⁹ With consequences for water demand as per capita consumption generally increases as household size decreases (e.g. 1000 single person households will use more water than 500 two-person households who will in turn use more than 250 four-person households)

APPENDIX 5: NOTE OF THE SEMINAR

Present

Lord Broers
 Lord Howie of Troon
 Lord Lewis of Newnham
 Lord Mitchell
 Baroness Perry of Southwark
 Baroness Platt of Writtle
 Earl of Selborne (Chairman)
 Baroness Sharp of Guildford
 Lord Whitty
 Tom Wilson (Clerk)
 Michael Collon (Clerk)
 Dr Jonathan Radcliffe (Specialist Assistant)

Chairman

Professor Richard Ashley (Department of Civil and Structural Engineering, University of Sheffield)

Participants

Mr Ian Barker, Head of Water Resources, Environment Agency
 Professor Chris Binnie FREng
 Dame Yve Buckland, Chair, Consumer Council for Water (CCWater)
 Professor David Butler, Imperial College
 Mr Les Dawson, Water UK/Southern Water
 Ms Teresa Evans, Chief Operating Officer, CCWater
 Dr Colin Fenn, Chair of Water Resources Panel, Chartered Institution of Water and Environmental Management (CIWEM)
 Mr Philip Fletcher, Director General of Water Services (Ofwat)
 Dr Paul Jeffrey, Cranfield University
 Mr John Lawson, Chairman, Institution of Civil Engineers Water Board
 Ms Susan Lovelock, Sustainable Communities Delivery Division, Office of the Deputy Prime Minister (ODPM)
 Professor Adrian McDonald, Leeds University
 Mr Phillip Mills, Director of Water Services, Water UK
 Mr Nick Reeves, Executive Director, CIWEM
 Dr Hans Schutten, Senior Hydro-Ecologist, English Nature
 Dr Liz Sharp, Bradford University

Mr Richard Streeter, Head of Parliamentary and Government Relations, Environment Agency

Ms Kate Trumper, Parliamentary Office of Science and Technology

Ms Helen Twelves, Head of Supply/Demand, Ofwat

Mr Mike Walker, Head of Water Resources Branch, Department for Environment, Food and Rural Affairs (Defra)

Professor Godfrey Walters, Exeter University

Mr Richard Wood, Head of Water Supply and Regulation, Defra

Ms Cindy Warwick, Parliamentary Office of Science and Technology (POST)

Presentations (morning)

Introduction: Professor Richard Ashley (Specialist Adviser)

The seminar was opened by Professor Ashley, who noted that there appeared to be an increasing risk of drought, particularly in the south east of England, and that rainfall this year had been significantly lower than in previous years. There was great uncertainty about the changing climate, and a broad range of stakeholders were involved in water management. He went on to set out the inquiry's terms of reference and briefly mentioned those organisations that had submitted evidence to the Committee.

Water needs, demands and infrastructure: Mr Les Dawson (Water UK/Southern Water)

There was a serious shortage of water in southern England, which had both less rainfall per head than parts of north Africa, and high levels of urbanisation which led to rainwater run-off.

Southern England had had one of the driest winters and springs since 1904; one of Southern Water's reservoirs, Weir Wood, was currently at 28 percent of its normal level. Across the whole country, reservoirs were on average 12 percent below their usual levels.

A number of factors were leading to greater demand for water: drier summers; modern appliances and lifestyles in general; and an increase in smaller households, which used more water *per capita* than larger households. However, the water companies had adequate reserves and did not expect to activate their drought plans in the medium term. The companies had prepared 25 year demand forecasts.

An important component of demand management would be household metering, which currently had a nationwide penetration of around 28 percent (up to 45 percent in the south east). All new houses were fitted with meters and existing householders had the option of having a meter installed free of charge. In addition, there was a programme of customer education which had included the provision of free water-saving devices. There was a need for "smarter" meters that would allow more complex tariffs to be established, such as seasonal or time-of-day tariffs.

It was also necessary to increase supply through resource development and reducing leakage levels. Water was a capital-intensive industry. There had been investment of £55bn since 1990 and £17.3bn between 2000 and 2005. However, it was becoming increasingly difficult to reach the economic level of leakage, the level beyond which expenditure on the prevention of leakage became uneconomic.

Demand management: Professor Adrian McDonald (Leeds University)

The ongoing increase in demand was inevitable but the rate of increase had slowed down. However, there was uncertainty in the figures because most demand was not directly measured—due to the low penetration of metering—with the result that people could use as much water as they wanted for a set price.

The key factors in demand were population, climate and economy.

The rising population, along with a reduction in the average size of households (including a 40 percent growth in the number of one person households), would lead to an increase in the number of households in England from 20.2 million in 1996 to 24 million in 2021. In the south east, the region with the greatest house-building rate, the Regional Planning Committee had decided that an average of 28,900 new homes would be built each year for the next 20 years. Population figures did not include hidden and transient populations which were unlikely to be captured in water demand measurement systems.

Climate change would only have a modest impact on demand—it would mostly affect resource. More significant was the need to increase the level of metering, and there were a number of ways in which this might be done. For example, it might be possible to require meter installation as a condition of granting planning permission to those applications that would affect the water-using potential of the property. Or meter installation could be compulsory upon a change in ownership of the property.

The use of water-saving devices was also desirable. Their use could be encouraged through building regulations or the planning system, and education of the consumer also had a valuable role to play.

The economic regulator's perspective: Mr Philip Fletcher (Ofwat)

Ofwat was one of three water regulators in England and Wales, the others being the Environment Agency and the Drinking Water Inspectorate. Ofwat's role was to improve competition in the water industry and to ensure that the water companies, which each had monopolies in their regions, were carrying out their functions.

The price of water to domestic consumers was rising: the average water bill would increase in real terms from £249 in 2004-05 to £295 in 2009-10. Bills were affected in different ways by a number of factors: for example, water efficiency brought down the price but the maintenance of services, work on security of supply and general improvements increased the level of bills. Ofwat set prices five years ahead, bearing in mind the companies' 25 year water resource plans.

The quality of drinking water and the water environment had improved massively over recent years, with over £50bn of investment. The water companies were expecting to achieve their targets on security of supply by 2010, although Thames Water still had much to do. Significant progress had also been made in tackling leakage since the 1994-95 drought, with Ofwat's focus on the "economic level of leakage". Again, Thames Water had not performed well in this respect and had been subjected to "special measures", necessitating the production of quarterly leakage reports. However, it was noteworthy that the effect of frost on London clay presented the company with particular difficulties in reducing leakage. The company's performance was now improving.

With regard to capital maintenance, there had been a big increase in expenditure since privatisation. Ofwat had estimated the capital maintenance needed up to

2020, and believed that the permitted increase in prices would be adequate to fulfil these estimates.

Ofwat's figures suggested that 26 percent of households in England and Wales had meters (the discrepancy with the Water UK estimate was accounted for by the inclusion of Scotland in that figure). Water companies were unable to install meters compulsorily in people's homes unless they had achieved official "scarcity status" from the Government—a status for which Folkestone and Dover Water had applied.

It was also noted that Thames Water had applied for permission to build a desalination plant. Although such plants were not thought to be energy efficient, it was worth noting with regard to this proposal—which had been rejected by the Mayor of London—that it would process brackish water rather than seawater, and was in an area of need.

Discussion

The Water Framework Directive was praised for taking a more holistic approach to resource management, but there were also a number of risks. In particular, the requirement to achieve good ecological status by 2015 was very ambitious; the principles of the target were solid but the timescale was optimistic. More time was needed to apply the "polluter pays" principle and cover the issue of diffuse pollution. It was suggested that it would be better for both the environment and consumers if more time was allowed to determine which measures would be effective.

The issue of leakage was discussed at length. It was noted that leakage was hard to measure, and that data were therefore inexact and could be misleading. However, companies were working on improving their understanding of leakage measurement. It was noted that the leakage under discussion referred to potable water—there was no significant leakage problem between reservoirs and treatment plants. In addition, as much as a quarter of leakage was from pipes which either led to or were within customers' homes, whose maintenance was not the responsibility of water companies.

There were ongoing problems with cast iron pipes, which compared unfavourably with newer polyethylene pipes, which would last for as long as 100 years. Gas companies had made widespread use of plastic pipes but gas leakage was far more dangerous than water or sewage leakage. The issue boiled down to capital maintenance costs. In this regard, it was noted that none of the water companies had appealed to the Competition Commission over Ofwat's price setting, which some saw as a good sign.

The Water Act 2003 marked a change of focus in water management, from the economic to the sustainable. However, it was still early days, and the economic realities of sustainability had not necessarily been fully addressed. Currently the customer picked up the costs of improvements to the water infrastructure, but it was suggested by some that certain future costs might be met from general taxation or subsidy.

The question of water transfer was referred to on a number of occasions. It was argued that it would be difficult to transfer large quantities of water via the canal network without considerable investment: canals were not built to cope with water moving at speed; there might be an adverse impact on the use of canal boats; and there was the possibility of damage to ecosystems through the mingling of different types of water. However, in general more connectivity was a good idea, and there

was agreement that neighbouring water companies should support each other and share water where necessary. Bulk supply agreements were available to support such a move.

It was asked why better use was not made of rainwater run-off, not least to replenish aquifers. In response, it was noted that rain provided an excess of supply in a short space of time and that it was very difficult to store such large amounts of run-off. It was also problematic to get the water back into the aquifers, unlike in the United States where there was adequate space to allow large pools to form over the aquifers until all of the water had drained off. Finally, there was a risk of contamination by agricultural products.

There were plenty of water conservation and recycling options available, with the potential to make a significant impact at a low cost, but research was still at a relatively early stage. It was important to choose options carefully in order to avoid risk increasing alongside innovation. There were also safety concerns over the use of roof water by individual households, with a serious risk of contamination.

On water efficiency and building regulations, it was noted that there were currently far more obligations on energy supply companies than on water companies. However, changes to Part G of the building regulations would see better water regulation with the scope to produce more water-efficient new homes. But the use of building regulations to promote water efficiency could be a blunt instrument, making no distinction between areas with water scarcity and areas with abundant supply. However, even in the latter case increased water efficiency would be beneficial, not least because less energy would be wasted on pumping water.

Presentations (afternoon)

Consumers' Perspectives: Dame Yve Buckland (Chair, CCWater)

The Consumer Council for Water (CCWater) was a newly-formed statutory body representing consumers, ensuring that they were placed at the centre of decision-making. It also had responsibilities in relation to sustainability.

Consumers had faced water price rises without having the chance to change suppliers; at the same time water companies were no longer permitted to cut off people's supply. Increasing numbers of people were unable to pay their bills; pensioners in south west England living off a state pension would have to spend around 7 percent of their income in order to meet their water bills. The issue of affordability should be addressed, probably through the use of the tax credit or benefits systems, rather than cross-subsidy.

Customers expected high quality water, available on tap and for any purpose. They did not want discolouration or a bad taste. However, they did understand supply problems and were willing to accept certain restrictions where necessary, and with sufficient warning. The exception to this would be people living under water restrictions that did not apply to immediately adjacent water areas.

There was rising demand for water, but with regional variations. The national average was 150 litres/head/day, but Southern and Mid-Kent had higher figures. Tendring Hundred Water, an area with very high metering penetration, had one of the lowest figures.

Metering appeared to have an impact on demand, producing an average saving of 9 percent. However, there was anecdotal evidence to suggest that patterns of water usage returned to normal once the meter had been in place for a period of time.

Moreover, early adopters of water meters tended to be those people who knew they could make savings, and it was uncertain whether compulsory metering would have the same impact. A broad education package was therefore needed alongside more longitudinal research into the impact of compulsory metering. Finally, it was desirable to introduce “smart” metering which could factor in the time of use of the water.

Water Resources in England and Wales: Mr Ian Barker (Head of Water Resources, Environment Agency)

It was important to balance human and environmental needs when considering water management. On sustainability, the Water Act ensured that all new abstraction licences would be time-limited and remain sustainable. However, most existing licences were not time-limited and some unsustainable abstractions were taking place. There were two considerations in revoking such licences: the level of compensation involved and the importance of maintaining the stability of the public water supply.

The Environment Agency felt that the water companies were focusing too heavily on resource development and not enough on demand management. Indeed, eight new or enlarged reservoirs and two new desalination plants had been proposed. There should also be more confidence about the prospective impact of technological innovation on leakage.

Environmental impact: Dr Hans Schutten (Senior Hydro-Ecologist, English Nature)

Both water and the environment were important for human health, and the environment featured very highly on the public’s agenda. The environment needed water in the same way that human beings did.

Drainage and abstraction were drying out many wetland habitats and a number of Sites of Special Scientific Interest (SSSIs) were also being adversely affected. It was vital to adopt a precautionary approach to water abstraction, ensuring that the appropriate action was taken before the damage became visible on the ground—which was not the case in East Ruston Fen, for example. It was necessary to understand the needs of the environment and freshwater ecosystems in particular.

In conclusion (i) human and environmental water needs are intrinsically linked; (ii) we need to increase the knowledge basis of environmental, agricultural and landscape requirements for water, both now and under a changed climatic scenario; and (iii) we need to investigate smart solutions (what quality of water is needed, what quantity is needed and when); and finally (iv) we need to act on damaging abstractions before irreversible damage occurs.

Discussion

In response to a question on the sourcing of groundwater below cities for drinking, it was noted that, although Thames Water had done so in London, there was in general a risk of contamination. For example, heavy metals were present in the water in Birmingham. It was not currently generally cost effective to clean such water, although new technologies would reduce the cost of doing so in future.

On the wider question of water transportation, it was agreed that the sharing of resources made more sense on a regional basis than a national one. The sharing of resources between neighbouring companies was to be encouraged but long-distance transportation of water was inherently difficult. Apart from the intensive energy use associated with moving around big volumes of water over large

distances, there were potential risks in mixing hard and soft water and there was a danger of damaging the water course and the wider environment.

On the broader issue of water resources in the future, particular challenges were the Habitats Directive, groundwater pollution and climate change. Water companies were obliged to consider the latter in their plans but uncertainties surrounding supply and demand were more immediately pressing. However, there was scope for increased storage of water for irrigation in the agricultural industry, particularly in the south east and East Anglia. Likewise, although industrial water use was declining, there was still an opportunity to achieve greater efficiencies—for example in breweries.

It was noted that some other countries had universal metering, and that Dutch consumers were provided with a breakdown of their pattern of water use. However, there was some evidence from Bristol Water that people with meters were less likely to constrain their water usage during a time of shortage, because they were more likely to take the view that they were entitled to use water that they were paying for. In general, more research was needed into the impact of metering upon behaviour, particularly among poorer members of society.

Nonetheless, there was much to learn from other countries: for example, in Australia there was a much better awareness of water shortages and reservoir levels. It was suggested that a systematic review of best practice overseas would be desirable.

APPENDIX 6: NOTE OF THE VISIT TO YORKSHIRE WATER

Tuesday 13 December 2005

1. Members visiting Yorkshire Water were Lord Lewis of Newnham, Lord Mitchell, Lord Oxburgh, the Earl of Selborne (Chairman), Lord Taverne and Lord Whitty. In attendance were Tom Wilson (Clerk), Professor Richard Ashley (Specialist Adviser) and Dr Jonathan Radcliffe (Committee Specialist). Also present was Dr Liz Sharp of Bradford University.

Presentations

2. The Committee was welcomed on behalf of Yorkshire Water by John Napier (Chairman), Kevin Whiteman (Managing Director) and Richard Flint (Director, Water Business Unit). Mr Napier introduced the day by referring to Yorkshire Water's journey from "pariah" status in the 1990s to "Utility of the Year" in 2005 for the second consecutive year.

3. The Manager of Assets, Strategy and Technical Support, Bob Lloyd, gave a presentation on water resources and security of supply at Yorkshire Water. He explained that, following the serious supply problems experienced by the company in the mid-1990s, a healthy security of supply status had been reached by 2000.

4. Yorkshire Water favoured a genuine twin-track approach to water management, but Mr Lloyd emphasised that this meant addressing demand management and resource development simultaneously—not consecutively as the Environment Agency seemed to favour. Indeed, five elements needed to be developed in tandem: new planning tools; new pipelines and pumping stations; sustainable river abstraction licences; significant leakage reductions; and a new drive in water conservation.

5. On new planning tools, Yorkshire Water had developed a computer-controlled approach encompassing 130 impounding reservoirs, 80 boreholes and seven river intakes. The computer system allowed effective modelling on a daily or weekly basis, but also contributed to the 25-year plans. It was estimated that this system, which was developed through in-house research and development initiatives, saved £5m per annum in energy costs and assisted with incident management and control. Few other water companies had a similar system.

6. Turning to new pipelines and pumping stations, Yorkshire Water had invested over £150m on infrastructure improvement, with coverage spreading to outlying villages and a new pipeline to Swaledale planned. Mr Lloyd referred to several pumping stations, praising Bradford in particular for its gravity distribution system.

7. On sustainable river abstraction licences, Mr Lloyd suggested that water should be taken from environmentally sustainable sources when available in spring, autumn and winter. During the summer, water should be taken from reservoirs. Yorkshire Water had agreed with the Environment Agency to investigate the effects of enforcing the Habitats Directive through five projects, including abstraction from the River Ouse, at a cost of £1.5m. The projects would improve scientific understanding, and compared with the cost of simply resolving suspected effects of £70m. Mr Lloyd noted that zero abstraction levels—hands-off flow—were set if rivers went below a certain limit that was determined through scientific methods. The majority of monitoring that would be needed under the Water Framework Directive was thus already being undertaken.

8. Leakage reduction was another crucial area and had played a key role in the recovery of Yorkshire Water—leakage levels had been cut by 250m/l per day, or approximately 20 per cent of the total, which was equivalent to the water used by Leeds in one day. Night-time monitoring of the 2,100 “Distribution Management Areas” had been invaluable in this regard, enabling the company to measure water losses accurately in each zone. If necessary, an engineer would be sent out to identify the leak, which would then be repaired. Subsequently, it was necessary to ensure that the area had returned to its target night-flow. This was a labour-intensive and expensive activity, costing around £14m per annum, but had led to Ofwat leakage targets being beaten every year. Yorkshire Water was now at its economic level of leakage, and there was no sense in forcing customers to pay more in order to reduce leakage further if sustainable water sources were available.

9. Finally, on the water conservation side, Yorkshire Water provided and installed domestic water meters free of charge, but Mr Lloyd felt that the technology was old and expensive. Each installation cost £128 and, when compared with other water resource options for filling supply or demand deficits, was not thought to make economic sense. However, with technology improvements for metering installations and reading, new economies of scale would make a difference and more widespread metering could become worthwhile. The company also provided a number of other free water conservation services, including supplying cistern displacement devices, undertaking domestic water audits and setting out useful tips for saving water.

10. The second presentation was given by Anthony Harrington, Head of Environment, Health and Safety, who discussed the challenges of the Water Framework Directive. Yorkshire Water welcomed the Directive, which was one of the first in this area to include a cost benefit test and provided a good opportunity to achieve sustainable management of water resources. However, Mr Harrington warned that there was a very high risk of failing to achieve the required “good ecological status”—a concept that urgently needed clarification if the Directive was to be efficiently implemented—for all waters by 2015. It was important that the companies should work with the regulators on improving understanding of the science involved and identifying the action needed, thus ensuring that abortive investment could be avoided.

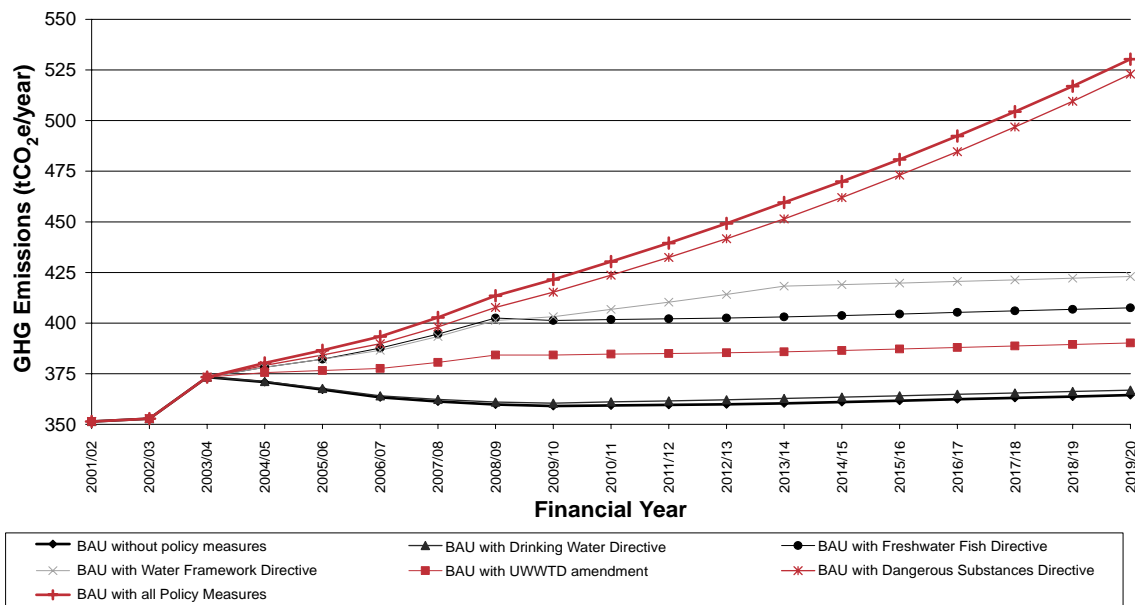
11. He also noted the dissonance between the six year review cycle for the Water Framework Directive and the five year periodic review for water companies, not to mention other reviews of similar legislation such as the four yearly reviews of designations within the Urban Waste Water Treatment Directive. Referring to Ofwat’s consultation on the length of the periodic review, Mr Harrington suggested that a more efficient way should be found to join up these regulatory regimes.

12. Addressing the 1976 Dangerous Substances Directive, which would be implemented if the EU was unable to agree a new “daughter” Directive of the Water Framework Directive on Priority Substances, Mr Harrington explained that Yorkshire Water had analysed the capital and operational costs of compliance for the largest 48 of its 624 wastewater treatment works. This appraisal indicated that the whole life cost—assuming end-of-pipe treatment—would be £880m over 25 years and, since Yorkshire Water was around 10 percent of the UK industry, this would point to an overall figure of perhaps £8.8bn for the whole country. This was comparable with published industry-wide estimates of circa £6bn in capital expenditure alone to achieve improved levels of compliance. Furthermore, he said, it would not necessarily be possible to remove many of these substances altogether

because of technological constraints, and so compliance with the Directive’s requirements to phase out and cease the discharge of some specific substances which are ubiquitous in the environment from all point source discharges was simply not a technologically sustainable option at this time. According to Mr Harrington, the new Priority Substances Directive—if implemented—would be “every bit as unsustainable” as the 1976 Dangerous Substances Directive.

13. Yorkshire Water had also considered the greenhouse gas implications of complying with the Water Framework Directive, the daughter Directives and the other associated water Directives including those on Nitrates and Bathing Water. The conclusion was that the company’s greenhouse gas emissions would increase by two-thirds, as shown by the graph below, particularly if the Directive on Priority or Dangerous Substances was implemented in accordance with the letter of the law. Mr Harrington criticised the EU’s lack of overall vision, accusing them of focusing on the precise subject of each Directive without considering the other environmental consequences of their decisions.

Yorkshire Water - Total GHG Emissions Projections



Source: Yorkshire Water

14. During the group discussion following the presentations, the Yorkshire Water representatives gave their opinion on the state of research and development in the water industry. There were some promising new technologies, such as the HawkEye system which measures water levels in wastewater systems and sends data to a telemetered hub, which in time could allow real time management of sewerage systems. Yorkshire Water’s own research had also yielded some useful results, particularly in terms of pipe maintenance, and UK Water Industry Research’s work on issues common to all companies was valuable. However, it was to be regretted that water companies’ efficiency savings were effectively “given up” to Ofwat at the end of each five year price review, which meant that investments in renewable energy projects were not cost beneficial. There should be more incentives for research and innovation, particularly into carbon efficiency and renewable energy.

15. Finally, the water regulatory system was considered briefly. In addition to the need for Ofwat to improve the incentives regime, it was felt that the Environment

Agency should focus on being experts and regulators, rather than “campaigners”. The campaigning path was thought to be a dangerous one. In addition, there was concern that nobody, other than Water UK and the companies, was effectively arguing for a twin-track approach which would deal with resource development and demand management simultaneously, rather than consecutively.

Site Visit to Yorkshire Water Control Room

16. Following the presentations and discussion, the Committee was shown how Yorkshire Water’s network was managed centrally from the Control Room. One-third of the water in its system could be moved by remotely switching valves and pumps. Approximately 4,000 monitors were located on supply, demand and infrastructure assets which would alert staff to a fault. Alarms could sometimes be dealt with remotely, if not, a field engineer would investigate. The use of monitoring technology was progressing to allow detection of a problem before a failure.

17. The cost of water was calculated in real time, varying from £11 to £25 per megalitre at the time of the visit. This figure referred only to the basic electricity and chemical costs—the variable daily element of production—and excluded the slow-moving and fixed costs. These basic costs depended on a number of factors including the water’s quality and location—the further away from demand, the more expensive. Whilst a computer model was run weekly to optimise costs by analysing assets and weather forecasts, from day to day, control room operators made decisions reacting to changing circumstances. The relative cost of water informed this process.

18. Geographic Information Systems (GIS) provided a means of cross-referencing map-based data. For example, if a leak was detected or reported, operators could view the distribution network, see which households would be affected and determine whether any vulnerable customers would need special attention.

APPENDIX 7: NOTE OF THE VISIT TO BEDZED

Tuesday 24 January 2006

1. Members visiting Beddington Zero Energy Development (BedZED) in Sutton were the Earl of Selborne (Chairman) and Lord Oxburgh. In attendance were Tom Wilson (Clerk) and Professor Richard Ashley (Specialist Adviser).
2. The Committee was welcomed by Peter Wright, a consultant to the Peabody Trust which developed BedZED, and Pooran Desai, co-founder of the environmental consultants BioRegional, which also worked on the development. Also present during the visit were: Bill Dunster, the architect of BedZED; Professor David Triggs, who redesigned the Living Machine wastewater treatment system; Chris Shirley-Smith, who worked on the Living Machine; Jane Durney, Project Manager of Z-squared, a proposed BioRegional development in the Thames Gateway; and Kendal Marsland-Murray, One Planet Living Australia Manager and BedZED resident.
3. The rationale behind the BedZED development of around 100 properties was outlined by the architect, Bill Dunster. He explained that the designs had offered a high density of environmentally-friendly housing—up to 116 homes per hectare, which was significantly higher than the adjacent Laing site—whilst maintaining amenity by providing all units with a garden. The development was highly energy efficient and Combined Heat and Power (CHP) energy was generated on-site, although the CHP system was no longer working and needed to be modified. Moreover, there was an advanced sustainable water management system, which is discussed below. Mr Dunster admitted that the units (housing and a small office) were rather more expensive than average new built properties, but insisted that much of this cost came from the quality of the building materials and the provision of aerial roof terraces, rather than the eco-friendly nature of the development *per se*. He also noted that all of the properties had been sold and had increased substantially in value since being built.
4. Mr Wright gave a presentation on behalf of the Peabody Trust, which is a housing association with 20,000 properties in London. The Trust had seen the BedZED development primarily as an exemplar for sustainable construction.
5. Turning to water management at BedZED, there were two main schemes: collection of rainwater from the green roofs and recycling of wastewater through the “Living Machine”. The rainwater, having been collected by the green roofs, was filtered and delivered to the green water storage tank, which in turn supplied all toilets in the development. Unfortunately, the rainwater had been contaminated by the green roofs and—unless chlorinated—was potentially a health risk, with *e-coli* being a particular problem. The water also had turned brown through contact with the green roofs and had therefore proved unacceptable to many residents, even though it was being used solely for toilet flushing purposes. Finally, it was established that the volume of recycled waste water (from the sewage treatment, below) was sufficient to supply the toilets without the need for rainwater. Therefore, the rainwater was to be diverted to soak-away instead. However, Mr Wright noted that the green roofs would still provide a useful “interruption” to water run-off, allowing evaporation and re-cycling to groundwater whilst providing a habitat for flora and fauna.
6. The other main element of the water management system at BedZED was the on-site Living Machine, a small-scale treatment plant for wastewater and sewage.

This system would extract the nutrients for plants and treat the water to a reasonable standard, allowing the water to be piped to the green water storage tank and, together with the rainwater, used for toilet flushing. The Living Machine itself was situated in a greenhouse (which was intended to provide a pleasant setting with a range of plant life) in a prominent position to make sure its presence was apparent.

7. Accordingly, an attempt had been made to secure an inset agreement, allowing an alternative water and sewage treatment utility to operate the system inside Thames Water's area of operation. However, Mr Wright explained that this had not been possible because BedZED only requires 6,000 cubic metres of water per year, whereas a minimum supply of 50,000 cubic metres per year was necessary to obtain an inset agreement. Therefore, the contract had been given to a private company called Envirollogic which was supported by South West Water. However, the lack of an inset arrangement caused problems with Sutton Borough Council, which had been in favour of a sustainable development but had raised numerous health and safety concerns when it was made clear that the water recycling system would not be run by one of the established water and sewerage utilities.

8. The Living Machine was based on a design by Living Technologies and adapted by Professor Triggs. The system had worked but Professor Triggs had found that, to process the waste water at an adequate rate, it was necessary to bypass the reedbed (living) tanks and to run a conventional activated sludge system. However, this modified system required constant supervision and no financial provision had been made to employ anybody. Moreover, the Living Machine had used far more energy than would have been the case if the mains water and sewage system had been used, mainly due to pumping and process aeration. It also produced more waste sludge than anticipated. As a result, the Living Machine had been abandoned.

9. However, as part of a £400,000 research project, Thames Water had recently proposed to install a Membrane Bioreactor (MBR) unit at BedZED which would treat the sewage and wastewater. The MBR—along with the Living Machine—would then be evaluated over a period of time by on-site researchers. It was hoped that this arrangement would provide a long-term water management solution for BedZED.

10. In conclusion, Mr Wright felt that the type of water management system originally proposed for BedZED was not commercially viable for such a small-scale development whilst mains water was available at the site boundary and prices remained so low. If water prices remained as low as at present, only additional inward investment or Government support could make this kind of small-scale scheme viable. He also noted that local authorities—such as Sutton—could present bureaucratic obstacles in the way of water management schemes that were too small to be given an inset agreement. Finally, Mr Wright suggested that there should be a universal standard for required green water quality, as there was in several other countries. The required green water standard for BedZED had been set on a site-specific basis by the Environment Agency but a national standard would make it easier for developers to design and construct systems for water re-use. This was illustrated by Thames Water's intention not to rely on ultra-violet treatment of the product of their MBR plant, which would be near potable standard, but to chlorinate the water in the holding tanks as an additional precaution.

11. Following the presentations, the Committee was given a tour of the defunct Living Machine by Professor David Triggs and Chris Shirley-Smith, formerly of

Envirollogic. Professor Triggs explained how the system had worked, detailed some of the problems encountered and discussed the proposed investment by Thames Water.

12. The Committee was subsequently given a tour of the BedZED show apartment. It was emphasised that the provision of highly water efficient devices—dual flush toilets, water efficient dishwashers—had led to considerably lower per capita water use compared to the average, but it was also pointed out that some residents had replaced such devices with more favoured versions. In addition, in all units the electricity, gas and water smart meters were on display behind a glass panel in a prominent position in the kitchen, enabling residents to keep track of their use of resources. Furthermore, all of the meters could be read remotely, which was highly convenient for residents. However, it was noted that the meters looked unattractive and it was agreed that more aesthetically-pleasing and user-friendly models might ward off the danger of residents covering up the glass panel, which had happened in several cases.

13. Finally, the Committee heard presentations from Jane Durney and Kendal Marsland-Murray of BioRegional. The aim of BioRegional was “to work with partners to implement commercially viable solutions for sustainable living”. Central to this aim was the concept of One World Living, a joint initiative with WWF. Ms Durney explained that, if everybody in the world had the same “ecological footprint” as the inhabitants of Europe, then three planets would be needed to support the global population. Therefore, the One Planet Living project sought to provide ways for people to live comfortably “within the carrying capacity of one planet”, primarily by creating a global network of One Planet Living communities in different countries.

14. Z-squared, for which Ms Durney was Project Manager, was a One Planet Living development of 2,000 homes for up to 5,000 people in the Thames Gateway. Water efficient appliances would be used in the development but, of note, Ms Durney felt that water recycling did not make financial or environmental sense for small-scale households where the toilet would only be flushed a few times each day. Nonetheless, local on-site wastewater treatment comprising co-digestion with organic solid wastes (from kitchen sink grinders) was proposed, with energy recovery, followed by reed beds for the residual liquid and direct use of the digested solids as fertilizer. It appeared to the Committee that the main concerns of the development were efficient energy use and eco-friendly treatment of waste, rather than water re-use.

15. Lastly, Ms Marsland-Murray told the Committee that several projects were being planned in Australia along the same lines as the Z-squared development. For example, one community of 35,000 people was being planned on a green field site outside Melbourne and another of 1,500 people was mooted for a brown field site in Sydney.

APPENDIX 8: NOTE OF THE VISIT TO AUSTRALIA

1. The Sub-Committee visited Australia from Monday 30 January until Saturday 4 February. Members present were Lord Broers, Lord Howie of Troon, Lord Mitchell, Lord Oxburgh and the Earl of Selborne (Chairman). In attendance were Tom Wilson (Clerk) and Professor Richard Ashley (Specialist Adviser).

Monday 30 January

Tour of Western Treatment Plant, Werribee

2. The first engagement was with Melbourne Water at the Western Treatment Plant in Werribee, where the Committee was given a tour and a presentation. Melbourne Water is a state-owned company, run as a corporation, which is responsible for looking after the dams, the major supply pipes and the water treatment process. The company treats 94 percent of Melbourne's sewage in two large treatment plants and also manages rivers, creeks and major drainage systems in greater Melbourne. The "retail" companies, also state-owned, purchase water from Melbourne Water and are responsible for supplying this water—as well as sewerage services—to their customers.

3. The tour was conducted by Brad McLean and Peter Scott of Melbourne Water, who explained that Werribee treated 52 to 53 per cent of Melbourne's wastewater, equating to a flow of around 480 megalitres per day. The plant was spread over an enormous site of 11,000 hectares, with the wastewater passing through a succession of stabilisation ponds and undergoing activated sludge treatment. As part of this process, methane was collected from the anaerobic section of the first pond and used to generate power on-site, with the result that the plant was getting close to being energy neutral. A further initiative was the re-use of "Class A" water—treated effluent that had been further treated by chlorine and ultraviolet—which was used for the irrigation of food crops in the surrounding areas.

4. The tour was followed by presentations from Professor Malcolm Chaikin and Professor Michel Lefebvre of the University of New South Wales, who believed that desalination needed to play an important role in addressing the demand-supply imbalance in cities in future. However, Professor Chaikin noted that there were significant problems with current desalination technology—the high energy requirements, the environmental impacts and the cost—and he felt that Sydney should delay their proposals in this area for the moment. In the meantime, his studies were concerned with the process of osmotic distillation, which might provide a lower energy method of removing salt from water. Professor Lefebvre concluded the session by explaining how the principles of fractal geometry can be applied to membrane technology and the process of osmotic distillation.

Presentations from Melbourne Water and VicUrban

5. Later in the day, the Committee was given presentations by senior figures from both Melbourne Water and VicUrban, the Victorian Government's urban development agency.

6. Howard Rose, Manager of Corporate Strategy at Melbourne Water, started by explaining that because of state ownership the Minister for Water was responsible for setting the company's policy and legal framework, as well as obligations on conservation and recycling. Financial performance was monitored by Victoria's Treasurer [Treasury Minister], with the company having to pay a dividend to the

state each year. In terms of regulation, prices and consumer service were overseen by the Essential Services Commission, the environment by the Environmental Protection Agency, and water quality by the Department of Human Services.

7. Bruce Rhodes, Manager of Urban Water Planning at Melbourne Water, gave the Committee a more in-depth look at some of Melbourne's key supply and demand issues. Of the water used across Victoria, 77 percent was used for irrigation (supplied from separate reservoirs), 8 percent for urban and industrial purposes in Melbourne, 9 percent for non-metropolitan urban and industrial purposes, and 6 percent for rural purposes. Within Melbourne itself, 62 percent of the water was used for residential supply, of which 47 percent went to taps, showers and toilets. The remainder was used in the garden, in clothes washers and for other purposes.

8. Turning to Melbourne Water's catchments, it was noted that 80 percent of water was supplied from 140,000 hectares of land specifically set aside for water supply, with the remaining 20 percent coming from unprotected areas. The protected areas were designated as national park and were free from human habitation, farming and industry, resulting in a very high quality of water. The reservoirs could hold 1.7 million megalitres, but there had been a below average inflow since 1997. Accordingly, the Drought Response Framework—providing for increasingly severe water restrictions—had been implemented alongside a high-level communications campaign to promote water conservation amongst the public. The latter consisted of distributing brochures and booklets, running a comprehensive website—with information on reservoir levels, water conservation, educational initiatives and so forth—and disseminating daily water storage information through the media and various other means. As a result of the restrictions and communications campaign, water use during the summer had dropped significantly.

9. The second presentation came from Barton Williams and Simon Hilbert of VicUrban, the Victorian Government's urban development agency. VicUrban was responsible for developing rural and metropolitan projects throughout Victoria, focusing on community, affordability, sustainability and commercial success (the body is required to make a profit). The sustainability objective was underpinned by a Sustainability Charter.

10. VicUrban had worked on water sensitive urban design for over 15 years, using collected stormwater as an amenity in developments such as Lynbrook and the Docklands, and working towards demand reduction through efficient water use and the utilisation of alternative water supplies. The current flagship project, Aurora, a community of around 25,000 people in 8,500 homes on a 622 hectare site, would aim to minimise demand for potable water through water re-use and a fit-for-purpose water use strategy.

11. Specifically, it was intended to treat wastewater on-site and re-use it for car washing, garden watering and toilet flushing. In addition, stormwater would be treated through swales, rain gardens and bio-remediation ponds before being discharged into receiving waters. The use of roofwater for domestic hot water supply had also been encouraged. There were potential health issues relating to the latter, but these could probably be addressed if the water was heated to the regulation minimum of 60 degrees Celsius.

12. In general, however, there were several challenges and obstacles facing the spread of water sensitive urban design which needed to be addressed. At an economic level, there were few financial incentives for developers and the costs of

supply and installation of the necessary infrastructure could not always be recovered through the sale price. Moreover, local authorities could be reluctant to carry out the required infrastructure maintenance, predominantly through a lack of understanding of the benefits and potential costs involved. At a regulatory level, there was a perceived lack of information from the Environment Protection Authority and local councils about the requirements for water sensitive urban design elements, for example the required water quality standards for different uses. Finally, there were potential problems with ensuring public acceptance of water re-use due to the fear of adverse health impacts.

Tuesday 31 January

Tour of Council House 2 and meeting with Lord Mayor

13. In the morning the Committee was given a tour of Council House 2 (CH2), a new development by the City of Melbourne to provide the Council with additional office space. As the Lord Mayor explained later (see below), CH2 is intended to be a benchmark building reflecting the City of Melbourne's determination to achieve environmentally sustainable growth.

14. The tour was conducted by Peter Cooper of NuSource Water, which designed the wastewater treatment and sewer mining facility in the basement. The facility would take the building's wastewater and treat it to a "Class A" standard, before recycling it for toilet flushing, cooling devices, irrigation around the building and other purposes around the City. To augment the amount of water available, it was intended to take raw sewage from the mains sewer that runs past the building and subject it to the same treatment process. It was suggested that up to 100,000 litres of Class A water could be produced each day. The cost of the process was estimated at A\$1.57 per cubic metre of water treated, comparing favourably to the A\$1.86 per cubic metre (a combined water and sewerage price) with Melbourne Water. However, it was not entirely clear to the Committee exactly which costs and externalities were factored in to these figures, nor how the energy use needs could be reconciled in terms of life cycle analysis.

15. The treatment process itself had no biological component and operated within a sealed unit, ensuring that there were no odour problems. The solids would be removed by screening and returned to the mains sewer, with the remaining wastewater passing through ultra-filtration ceramic membranes. Ceramic membranes were being used in spite of the extra expense because they could deal more effectively with contaminants and be cleaned easily with hot water. Finally, the treated water would go through a reverse osmosis process. The facility could be switched off during holiday periods.

16. Following a look around the other parts of the building, the Committee was greeted by the Lord Mayor of the City of Melbourne, John So, at the Town Hall. He explained his determination to promote sustainable growth within the City, referring both to CH2 and to other initiatives such as the installation of a solar panel system over Victoria Market. There was also huge potential to export environmentally sustainable technologies to Asia. The Chief Executive of the Council added that CH2 was intended to demonstrate to the building industry that environmentally sustainable design is practicable. He also noted that consideration was being given to using sewer mining to provide all of the water needed to irrigate the City's parks and gardens.

Tour of Docklands

17. The Committee proceeded to the Melbourne Docklands, where VicUrban is working on regenerating the area with the intention of creating a home for 20,000 people and a workplace for 30,000. The area is a municipality in its own right and VicUrban currently controls all development as well as the parks and the roads. Mark Haycox, an urban designer with VicUrban, welcomed the Committee and conducted a tour around the outside of the 64,000m³ National Australia Bank and the surrounding Docklands Park.

18. Using the National Australia Bank building as an example, Mr Haycox explained that all roofwater was channelled through an attractive bio-swale system before being piped to the wetlands in Docklands Park for further treatment prior to storage. Similarly, stormwater landing on the streets was captured and drained to the trees at the side of the road, which acted as “mini bio-filters” by removing the nitrogen and phosphorus, before being piped to the wetlands and thence to underground storage. The treated stormwater in the storage areas was then used for irrigation of the parks in the precinct. Up to 10 million litres of stormwater was treated each year, with each storage area holding up to 550,000 litres at any one time. The park itself was an attractive space, with the wetlands and urban art providing features of interest and a public amenity.

Seminar at Monash University

19. In the afternoon, the Committee took part in a discussion session with a group of academics from Monash University at the Clayton Campus. The Monash attendees were: Dr Grace Mitchell, Dr Tim Fletcher and Dr Ana Deletic of the Institute for Sustainable Water Resources; Dr Rebekah Brown of the School of Geography and Environmental Science; and Dr Bob Birrell of the Centre for Population and Urban Research.

20. The Monash representatives started by praising Australia’s Cooperative Research Centre (CRC) Programme, an initiative funded by the federal government to bring together researchers and research users. The programme, which included a number of CRCs dedicated to water, had provided solid financial incentives for industry and the universities to work together, and had stimulated collaboration between the universities themselves. The industry was very much signed up to this kind of collaboration, not least because of the long-term drought problems.

21. By contrast, it was noted that it was difficult for British universities to work with the UK water industry, which tended to focus disproportionately on certain issues such as leakage at the expense of more visionary research. Part of the reason for this was that efficiencies resulting from innovation by water companies were effectively “taken away” by Ofwat at each five-yearly period review. Thus there was little for companies to gain, and much for them to lose, by investing in new technologies which were not guaranteed to succeed.

22. A practical example of where Australia’s positive attitude to innovation had reaped benefits was the Lynbrook development, constructed in the mid-1990s. This development had included an innovative form of stormwater management, not dissimilar to that seen at the Docklands site, whereby stormwater was collected, filtered through wetlands and collected in a lake that provided a pleasant amenity for residents. Crucially, Melbourne Water had underwritten the economic risk of this innovation, pledging to replumb the whole area if it did not work. However, the scheme had proved economically beneficial for Melbourne Water

which, along with the positive impact on house prices of a view over water, had generated momentum for the construction of more such developments.

23. On the issue of demand management, it was felt that there had been less incentive for UK water companies to cut demand since privatisation. By contrast, a business case for cutting water demand had been identified in Australia and the government, regulators, academia, industry and the public were all signed up to it. This attitude manifested itself in many different ways: for example, billboards around Melbourne alerted people to reservoir levels; the Deputy Premier of Victoria had become a champion of water issues; and the media was very much involved in the drive to heighten awareness of the problems presented by the ongoing drought.

24. These initiatives had combined effectively with the psychological impact of some restrictions on water use and the use of rising block tariffs, whereby households were charged a progressively higher unit cost for the water they used above a certain threshold. Because of this combination of factors, water saving devices had become very popular amongst the public. Devices such as water butts were thought to be almost “fashionable”. There was also praise for the new Water Efficiency Labelling and Standards (WELS) Scheme, under which water-using appliances and fittings would carry a “star” rating indicating their comparative water efficiency alongside an estimate of their water consumption. The UK could learn lessons on all of these issues.

25. Finally, the issue of desalination was discussed. Although low-energy desalination would be desirable if it could be achieved, there was a general feeling that stormwater and wastewater were arguably easier to treat than salt water. Therefore, it was suggested that the primary focus should be on the latter for the time being, especially in the UK.

Presentation from Yarra Valley Water

26. In the afternoon, the Committee was welcomed to Yarra Valley Water’s offices by the Chairman, Alan Cornell, and the Chief Executive, Tony Kelly. Mr Kelly gave the first presentation, explaining that Yarra Valley Water—which has a customer base of some 1.6 million people—was one of the three retail water companies providing water and sewerage services in the Melbourne area, all of which were state-owned but operated under corporation rules. It had originally been intended to privatise the three retail companies but this plan had been shelved indefinitely.

27. Faced with the current serious drought, and an expected long-term increase in temperature and decrease in rainfall, Mr Kelly explained that Yarra Valley Water was focusing above all on water conservation. This was by far the best way to cope with the twin challenges of population growth and water shortages, because as a concept it was socially acceptable, economically viable and ecologically desirable. Yarra Valley Water demonstrated that they had undertaken very detailed and comprehensive sustainability assessments of all aspects of their service provision.

28. The key to water conservation was behavioural change amongst the public, which was being addressed in Melbourne in the following ways: the introduction of permanent water saving rules; continuing community education; a rebate scheme on water-saving devices until June 2007; mandatory water efficiency labelling on appliances; water efficient plumbing for new homes (fittings, flow control valves); and funding for conservation initiatives such as Smartwater. In addition, the water companies were working with developers to reduce water use

by up to 25 percent in new developments and with industry to help cut consumption. Work was also continuing on leakage reduction.

29. The Committee was particularly impressed by the company's Smart Accounts, introduced in 2004 to provide better information to customers about their consumption of water. Under this scheme, water bills¹⁶⁰ showed each household its consumption over the last quarter and compared this to its usage in each quarter over the last year. Furthermore, the bills enabled comparison of usage against the average for households of a similar size and against best practice levels.

30. Also in 2004, the company had introduced rising block tariffs, under which there were three "tiers" of water usage with the unit price increasing in three steps, including a five percent environmental contribution to help factor in externalities. The unit price for the first block of water, at 2004/5 prices, was A\$0.75 per kilolitre; the price per kilolitre in the next block was A\$0.88; and the price in the highest block was A\$1.30. This clearly provided an additional spur for customers to keep their water use in check. There were a range of measures available to help vulnerable customers or large households having trouble paying their bills, although it was notable that family size and household income were not factored into the tariff structure.

31. Another initiative of interest, currently in the testing phase, was the Ecosaver retrofit programme whereby banks would offer discounts on loans to members of the public on the condition that the saving be spent on water efficient devices. This was felt to be a promising scheme because the customer would pay the same overall and no subsidies would be needed. Yarra Valley Water's end-use research had shown that using the most water efficient appliances could potentially reduce household non-seasonal indoor usage from 169 litres per day to 118 litres per day, which would clearly be a valuable saving.

32. Finally, the Committee was told about the new "star" rating for energy and water efficiency in homes. Under this initiative, promoted by the federal Government and picked up by the Victorian Government, all new houses would require a five star rating which could be achieved through the provision of one of the following: a rainwater tank connected to a toilet; solar power for hot water; or connection to the water utility's water recycling network.

Meeting with the Treasurer of Victoria

33. The Committee later went to the Victoria Department of Treasury and Finance, where we met with the Honourable John Brumby MLA, Treasurer of the State of Victoria, Minister for State and Regional Development and Minister for Innovation. He explained to the Committee that one of the key reasons that water was managed successfully in Victoria was the high level of bipartisan policy cooperation over the last 20 years.

34. Praising the changes to the way in which water was priced and traded, Mr Brumby noted that water was now being purchased for the cultivation of more high-value products such as grapes and almonds, which helped maximise the return on the water used. He also pointed to progress made by industry, for example the proposal to send recycled wastewater from Melbourne to Gippsland (a region east of Melbourne) for use in industrial cooling in place of fresh potable water, which would in turn be sent to Melbourne or put back into river flows.

¹⁶⁰ An example of which is reproduced on page 76.

35. Finally, Mr Brumby spoke about the success of VicUrban, which not only helped to deliver the sustainable development required by the Government, but also provided the Government with financial dividends. Moreover, the Government was entitled to instruct VicUrban on a particular project, although this would mean that the agency would be exempt from having to provide a commercial return.

Presentation from CSIRO

36. In the evening, the British Consul General, Peter West, hosted the Committee and some of the people with whom we had met, for dinner at his residence. Before dinner, the Committee was given a presentation by Colin Creighton, Director of the Water for a Healthy Country Flagship at the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CSIRO received A\$600m of federal government money and A\$300m of external funding. In terms of water research, the focus was on three main areas: identifying better desalination technology; promoting a higher level of indirect potable re-use of water; and preparing for the impacts of climate change.

37. Mr Creighton told the Committee that there were three key issues facing water management in Australia: making the best use of water by finding the optimum balance between irrigation and ecology; enhancing water quality and tackling diffuse pollution; and identifying sustainable urban water systems. The presentation focused on the latter point, with Mr Creighton stating that the combination of population growth and climate change meant that Australia's main cities needed to find a reduction in per capita water consumption of 40 percent over 25 years and to find alternative water sources, not least through re-use. Demand management alone would not be sufficient.

38. Mr Creighton went on to discuss the individual situations in Perth and Sydney. In Perth, there were a number of options to address the problems presented by a drying climate: desalination; groundwater development; engineering redesign; enhanced water trading; tariff changes; and managed aquifer recharge. The latter would involve recharging aquifers with treated wastewater, which would have the added benefit of helping to improve public attitudes to drinking re-used water. In Sydney, meanwhile, Mr Creighton noted that demand management had been very successful and was in fact the cheapest of all the options if external costs were properly factored in. A desalination plant was also planned but he felt that this was problematic because it would not help to create a long-lasting community conservation ethic.

Wednesday 1 March

Tour of Caroline Springs

39. On Wednesday morning the Committee was welcomed to Caroline Springs, a very large new housing development outside Melbourne, by Tod O'Dwyer of Delfin Lend Lease, the development company. Construction of the new community had commenced eight years ago and completion was scheduled for six or seven years time.

40. Mr O'Dwyer told the Committee that water sensitive urban design was a key feature of Caroline Springs. The stormwater that fell on the development was collected before being delivered into Kororoit Creek and the ponds throughout the development, thus creating a community asset and improving the habitat for

wildlife such as the endangered growling grass frog. The water was cleaned during passage through on-site wetlands, with a higher quality of water leaving the site than entering it. Of note, the ponds were maintained by Melbourne Water, which had a statutory duty to do so if the relevant asset had a catchment of more than 60 hectares. The local council was responsible for maintaining the other open spaces and, elsewhere, assets with catchments of less than 60 hectares.

41. This contrasted with the situation in England and Wales, where water companies were responsible for the provision of water and sewage services but not sustainable stormwater drainage systems. Therefore, it was easier for development companies to allow stormwater to drain into the sewers, where it became the responsibility of the water companies. There was thus little or no incentive for development companies to install sustainable drainage systems. However, it was notable that the proposed Code for Sustainable Homes encouraged the use of these systems, despite there being no clear institutional responsibility for their future maintenance.

42. On the issue of wastewater, Mr O'Dwyer acknowledged that Caroline Springs was served by a traditional sewerage system rather than any kind of re-use process, but he suggested that a different course might be taken nowadays because there had been significant technological advances in the last decade or so. Indeed, at Delfin's new development at Mawson Lakes in Adelaide, both stormwater and wastewater would be recycled and delivered to all properties—through a separate pipe—for irrigation, car washing and toilet flushing. There would be separate meters for recycled water and drinking water.

Presentation from the Ecological Engineering Company

43. In the afternoon, the Committee visited Professor Tony Wong and Dr Peter Breen of the Ecological Engineering Company, which was working on a framework for better urban design. Professor Wong explained that there were three water “streams” in the urban environment—potable water, treated wastewater and stormwater—which in turn related to the three priorities of water sensitive urban design: water conservation; wastewater minimization; and effective stormwater management. His presentation focused on sustainable management of stormwater.

44. Sustainable management of stormwater was felt to be relatively straightforward on green field sites such as Caroline Springs, because the water could be treated through large-scale wetlands and ponds. In urban areas, however, there simply was not enough space for this kind of system and it was therefore necessary to treat the stormwater on a “micro” scale as seen in the Docklands development. In particular, the use of trees as “bio-filters” was appropriate because tests had shown that they were as effective as normal soil at removing nutrients and heavy metals, and the trees themselves in fact helped to maintain the porosity of the soil around them. Professor Wong added that it was important to engage local residents on such projects, ensuring that they understood the processes and felt a sense of ownership. It was also extremely valuable to bring water into the public domain by making it highly visible in the ponds and wetlands, because it helped to ingrain in people's minds that water is a precious natural resource.

45. If this kind of stormwater management was to become widespread, it was important for local, state and federal government to set catchment-wide water management goals and to increase the provision of guidance on best practice and run-off quality. Guides for designers were also felt to be of value, but it was important to allow scope for innovation.

Meeting with Professor John Langford

46. Subsequently, the Committee visited Professor John Langford, Director of the Melbourne Water Research Centre at the University of Melbourne. He emphasised the importance of careful allocation of water because, with the growth in demand and the impact of climate change, there would be greater competition for resources between household and industrial use, irrigation and the environment. It was therefore important to establish water markets that allowed reallocation of water between users and sectors, and the separation of water rights from land ownership had been valuable in this regard. He also felt that the rigour of financial accounting should be applied to accounting for water resources.

47. On demand management, Professor Langford told the Committee that universal metering helped to drive down water consumption in the short-term but that, after four to five years, consumers' behaviour tended to revert to what it had been before. It was therefore essential to reinforce the conservation message, which could be achieved by user pays pricing—including the rising block tariffs discussed above—and by initiatives such as making mandatory the installation of dual flush toilets in new bathrooms. Combined with continuing public awareness campaigns, these initiatives had proved remarkably successful in Australia; for example, Sydney had accommodated 700,000 additional people since 1982/3 while average annual demand for water had remained essentially the same. Melbourne had also reduced the average per capita demand significantly.

48. However, the “low hanging fruit” had now been picked and making further progress in demand management was becoming increasingly tricky. Apart from anything else, it was difficult for a water utility that makes money out of selling water to sell less of it, thus reducing profits. It would therefore be desirable to provide financial incentives to companies to promote water efficiency because, unlike with heavy regulation, this would stimulate innovation. Currently, however, Melbourne had a target of reducing per capita consumption by 15 percent by 2010 yet there were no rewards or penalties in place.

Presentation from the Water Services Association of Australia

49. The final meeting of the day was with Ross Young, Executive Director of the Water Services Association of Australia (WSAA). The WSAA is the industry body for water companies but also has a role in research along the lines of UK Water Industry Research (UKWIR). Recently the WSAA had commissioned a report to develop a methodology for the assessment of sustainability in water management in Australia. This study was undertaken by specialists from the Centre for Water and Waste Technology (University of New South Wales, Sydney), the Sustainable Water Division of the New South Wales Department of Commerce and CIT Urban Water (Chalmers University, Sweden).

50. Setting out the context of water management in Australia, Mr Young reported that agriculture accounted for 67 percent of the water used whereas domestic consumption only accounted for nine percent. However, he noted that politicians were notoriously reluctant to take any action to change water allocations because it would be electorally unpopular. Of the water used in households, 44 percent on average was used outdoors—mainly because of the long, hot Australian summers and the popularity of “English-style” gardens that required large amounts of water—which was far higher than in the UK.

51. Having provided an outline of the projected population growth in Australia's cities and the implications for water demand and supply, Mr Young addressed the

issue of competition in the water industry. Although competition was virtually non-existent because of the water companies being state-owned, certain third party access rights were being introduced in Sydney, whereby private companies would be able to take on customers and then extract a proportionate amount of sewage from the mains sewerage system. This would then be treated and might be passed on to industry, for example. However, there was a danger that private companies might “cherry-pick” the easiest or most profitable opportunities, thus unfairly disadvantaging the existing utilities.

52. Finally, Mr Young displayed considerable caution about increasing the use of desalination as the sole solution. The costs had decreased in recent years but the rate of decrease was slowing, and there were considerable concerns from the community about the high energy requirements (and thus increases in greenhouse gas emissions) and the impact of brine discharges on the marine environment. Moreover, there was a danger of engendering a perception amongst the public that there was an endless supply of water, which would most likely have an adverse impact on attitudes towards water conservation.

Thursday 2 March

Presentation from Sydney Water

53. On Thursday the Committee arrived in Sydney, where we were welcomed to the offices of Sydney Water by Judi Hansen (General Manager, Sustainability) and Tom Gellibrand (Manager, Urban Growth). Sydney Water was a state-owned corporation whose prices were set by the Independent Regulatory and Pricing Tribunal. The company purchased water from the Sydney Catchment Authority—an agency of the New South Wales Government—and delivered it directly to customers; in other words, there were no separate retail companies unlike in Victoria. Sydney Water also treated the bulk of Sydney’s wastewater at its treatment plants on the coast, with a portion of the bio-solids being re-used by agriculture. Interestingly, there were few difficulties with public attitudes about this kind of re-use of bio-solids from sewage treatment, unlike in the UK.

54. Ms Hansen proceeded to outline Sydney’s Metropolitan Water Plan, which set out the city’s plans to secure supply and reduce consumption over 25 years. Sydney was expected to accommodate an additional one million people by 2031, with approximately 23,500 additional dwellings being built per year. The main supply options to meet this extra demand were: increasing water transfers; accessing deep water in existing storages below the current outflows; investigating the groundwater supply; providing desalination for drought and long-term water supply; and recycling of wastewater, although only for non-potable uses at this point in time because of public acceptance issues.

55. On water conservation, Ms Hansen noted that the company had retrofitted 300,000 properties with water efficiency devices at a heavily subsidised charge of A\$22 per household (or free of charge for certain low income households). This included the provision and installation of a water efficient showerhead, tap flow regulators and toilet cistern flush arrestors—as well as the repair of minor leaks. This had resulted in an impressive average saving of 20,900 litres per household per year (approximately 12 percent of average indoor water use), a figure which showed little signs of declining over time. This amount of water also equated to an annual saving of three tons of greenhouse gas emissions per household per year. Overall, Sydney Water’s Demand Management Programme had cost A\$107m since 1999 and, as of 2005, a total of 34,600 megalitres per year was being saved.

56. The State Government had also implemented a number of initiatives aimed at cutting water use. The Water Saving Fund had provided financial incentives for businesses to save water. The BASIX (Building Sustainability Index) scheme, meanwhile, had required all new houses built in Sydney—and alterations or additions to existing homes—to reduce their mains water consumption by 40 percent compared to the current average for similar sized homes. In order to meet this target, builders could install water efficient fittings and rainwater tanks, or connect to a recycled water supply where available. Moreover, from 2007 a minimum level of water efficiency would be required when a dwelling is sold, a level which could be achieved through Sydney Water’s retrofit service.

Friday 3 March

Presentation from the Institute for Sustainable Futures

57. On Friday morning the Committee visited the Institute for Sustainable Futures (ISF) at the University of Technology Sydney. The Director of the ISF, Professor Stuart White, and Research Principal, Ms Andrea Turner, explained that the Institute worked with industry, government and the regulatory authorities to undertake applied research and feed into public policy.

58. Professor White focused on the concept of Integrated Resource Planning, which says that water is a derived demand whereby people need the services it provides rather than the water itself—so saving water through investment in improved efficiency or substitution has the same effect as increasing supply. Accordingly, the role of utilities should be redefined as one of service provider rather than commodity supplier. Cost reflective pricing was necessary but not sufficient; a disaggregated understanding of water use was needed, including end-use analysis, to identify the best ways of reducing usage.

59. The ISF had undertaken very detailed studies of the economic and energy implications of introducing individual demand management measures and of exploiting new resources. Case studies had shown how certain measures could be optimally introduced in stages and how some schemes (such as retrofitting rainwater collection for garden irrigation) were not always the best option. There were also major differences between the effectiveness and efficiency of options for new buildings and retrofitting in existing properties. The ISF approaches predominantly focused on economic cost-effectiveness and in some cases had also used sustainability assessment based on multi-criteria assessment, coupled with deliberative processes.

Meeting with Blair Nancarrow

60. The following meeting, with Blair Nancarrow, Director of the Australian Research Centre for Water in Society at CSIRO Land and Water, covered the social components of water management. She noted that the social aspects of water use were often neglected, with the task of involving the public all too often occurring only after major water management decisions had already been taken. Social research was essential in understanding the drivers of people’s decisions and behaviour and therefore the limitations to particular courses of action; difficulties often started to crop up when initiatives began to impinge on people’s lifestyles.

61. Turning to her research, Ms Nancarrow discussed some of the difficulties presented by public attitudes to water. For example, on the issue of recycled wastewater, she had identified a “yuk” factor which is an emotion brought about

by thoughts of human waste products. Information and education had little impact on people's intention to drink treated wastewater or eat products grown with treated wastewater, and the emotional component had a significant influence on these decisions. Interestingly, people were more willing to consider drinking recycled wastewater if it first went through a managed aquifer recharge process or into a short length of river; the interaction of the treated wastewater with nature reassured the public about its quality.

62. Asked about the implications of the Water Framework Directive in the UK, Ms Nancarrow noted that Australia was at the forefront of integrated catchment management, as demonstrated by the success of the grassroots-led Landcare movement. However, she warned that historically there had been too large a distance between federal funding and the stakeholders on the ground, with funding often reputedly being siphoned off by states rather than reaching those stakeholders. By contrast, she pointed to the National Action Plan for Salinity and Water Quality (NAP) which was bringing together all levels of government, community groups, individual land managers and local businesses to tackle these issues and for which the funding would be more effectively delivered.

Tour of Warragamba Dam

63. The final engagement of the visit to Australia was a tour of Warragamba Dam, which alone accounts for around 80 percent of the region's available water supply. Water is collected from the catchments of the Wollondilly and Coxs River systems, covering an area of 9,050 square kilometres, to form Lake Burragorang behind Warragamba Dam. The Committee was given an introductory talk by Graeme Head, Managing Director of the Sydney Catchment Authority, before being given a tour around the dam.

APPENDIX 9: NOTE OF THE VISIT TO ESSEX AND SUFFOLK WATER AND ANGLIAN WATER

Friday 10 February 2006

1. Members visiting Essex and Suffolk Water and Anglian Water were Lord Lewis of Newnham, Baroness Perry of Southwark, Baroness Platt of Writtle, the Earl of Selborne (Chairman), Baroness Sharp of Guildford, Lord Taverne and Lord Whitty. In attendance were Tom Wilson (Clerk) and Professor Richard Ashley (Specialist Adviser).

Presentations

2. The Committee was welcomed to Essex and Suffolk Water's offices at Hanningfield water treatment works by Martin Lunn (Scientific and Water Resources Manager, Essex and Suffolk Water) and Dave Harker (Water Resources and Licensing Manager, Anglian Water Services). Also present was Graham Wilson, Strategic Planning Manager at the Environment Agency.

3. Mr Harker opened by explaining that the Anglian region was the driest region in the UK, receiving only half the national average rainfall each year. Therefore, water had to be transferred over long distances and, because the terrain was relatively flat, this led to high pumping costs. The increase in the volume of water supplied, though, had been successfully addressed since the late 1980s through leakage control—most importantly—and the promotion of metering and water efficiency measures. There had also been a gradual reduction in industrial demand.

4. However, the projected population growth in the Anglian region and the threat of climate change presented ongoing challenges. These might be addressed in a number of ways. For example, there was significant potential for a greater level of water efficiency in homes but there was currently no way of securing this change; it was felt that the building regulations should be toughened accordingly by the Office of the Deputy Prime Minister. It was also important for water and wastewater infrastructure to “lead” development so that water issues were given due consideration at the earliest stages of planning—particularly in the proposed “growth areas”.

5. Another issue was the proposed sustainability reductions in water abstraction under the Habitats Directive. There was concern about the use of the precautionary principle in the Review of Consents by the Environment Agency, with the burden being on the abstractors to prove that their abstractions do not adversely impact upon the Natura 2000 sites. However, Mr Wilson did note that each site had its own research project and that the review was taking place on a site-by-site basis, so decisions would not be taken merely on the basis of generic criteria.

6. Subsequently, Mr Lunn discussed the action being taken by the two water companies to prepare for the future. Although he noted that initially there would be a dip in demand for water in Essex and Suffolk Water's area, due to the amount saved from industry closures exceeding the additional resource needed to service the growing population, the increase in demand would soon resume.

7. Therefore, Essex and Suffolk Water was preparing through the so-called Abberton Trilogy scheme at a cost of £80m. The first part of the Trilogy involved

varying the Denver and Blackdyke licences in Norfolk so as to reduce the residual flow to the Wash. The second part involved the construction of additional pipelines to transfer water from Norfolk to Essex. The final part of the Trilogy involved raising the dam at Abberton Reservoir in Essex by 3.2 metres, allowing its storage capacity to increase by 40 percent. It was particularly notable that planning for this scheme had commenced in 1993 yet it would not be operational until 2014/15, not least because the company had been compelled to show the environmental implications in great detail and simultaneously to demonstrate that no other option would have been more environmentally-friendly. This highlighted the long timescales involved in securing new water resources.

8. Anglian Water was looking at constructing a new reservoir in Lincolnshire and at increased water transfers from the River Trent in the longer term. In the short term, an extension was being planned to Wing water treatment works at Rutland Water, increasing the treatment capacity by 90 megalitres per day with the result that approximately 200,000 new properties could be supplied. However, Rutland Water was a Special Protection Area for birds, so a mitigation package had been proposed to help compensate for potential environmental impacts on surrounding habitats.

9. The next presentation, on water efficiency, came from Clare Ridgewell, Demand Planning Manager at Essex and Suffolk Water. There were a number of factors affecting the successful promotion of water efficiency. First, in terms of economics, it was difficult to measure the savings and therefore to establish a cost-benefit case. It was a risky option compared with resource development because of the dependence on human behaviour. Second, there was a challenge in persuading planners and developers to adopt best practice, and there was potentially a need to provide market transformation incentives to manufacturers and their customers. Third, the sustainability of water efficiency improvements relied upon permanent customer acceptance of water wise behaviour, which again might require incentives. Finally, there were technological issues: rainwater harvesting was fine as long as it rained and greywater recycling was practical as long as the infrastructure was maintained.

10. Ms Ridgewell then turned to some of Essex and Suffolk Water's research projects. At the Heybridge social housing development, the company had installed point-of-use meters (i.e. on every water outlet) in 24 houses. Of these houses, 12 had been made more water efficient through the installation of smaller baths, spray taps and various other devices, at a total cost of £50 per house. There was also some greywater recycling. The other 12 houses had been used for control purposes in the experiment, which ran for a total of 15 months.

11. The greywater recycling had presented significant problems, with the filters becoming blocked and the pumps failing, so this part of the experiment had been abandoned. However, the water efficient devices had resulted in significant savings of around 100 litres per day per household, equating to a 13 percent saving per person (as compared to the amount that would have been used in the equivalent non-water efficient devices) or a five percent saving per person as a proportion of total water use. These savings could have been even greater had water efficient washing machines been provided.

12. However, some customers were not happy about the smaller baths or the spray taps. In general, it was felt that developers would not voluntarily install this kind of device because water efficient homes were not saleable in the way that energy efficient homes were becoming. Customer attitudes would need to change if this situation was to improve. More successful had been Essex and Suffolk Water's

water audits, which involved the installation of items such as cistern displacement devices, water efficient showerheads and water butts, as well as a supply pipe leakage test. Ms Ridgewell felt that the key was altering customer behaviour—for example, they were trialling a water bill that compared each household's water usage against the average—but it was important to focus on minimising water wastage rather than dictating lifestyles.

13. Linda Berkshire, Water Efficiency Officer at Anglian Water, described how the company was currently involved in a three year project on over 10,000 households in Peterborough which had aimed to promote sustainable living in terms of energy and water use as well as waste recycling. The houses had not been built to be sustainable but the intention was to modify residents' behaviour with the intention of embedding environmentally sustainable behaviour. This included the provision of a pack of sustainable products to each household. This experiment was felt to be extremely valuable because it was concerned with cutting water use in existing homes, which obviously far outnumbered the amount of new homes.

14. The meeting then turned to water metering and pricing. Essex and Suffolk Water had encouraged greater take-up of meters—even offering a switchback option to allay customers' suspicions—but despite initial success, the increase in metering penetration was now levelling off around the 30 percent mark. The company did exercise its right to insist on meter installation in houses undergoing a change in ownership, but even then only about 75 percent of houses were meterable because of issues such as common supply pipes and shared water tanks. Another point of interest was that the meters were out of sight so it was very difficult for customers to track the water use day-to-day. Moreover, the existing mechanical meters could not be read often enough to make rising block tariffs work effectively, mainly because there was no remote reading facility. In short, the company felt, more sophisticated meters were needed if they were to make a genuine and long-lasting difference to water use.

15. The final topic of the day was water recycling. Mr Lunn explained Essex and Suffolk Water's Langford wastewater recycling scheme to the Committee, noting that whereas all treated wastewater had previously been released into the tidal Blackwater Estuary, up to 40 megalitres per day was now sent for further treatment—nutrient removal and UV disinfection—before being discharged into the River Chelmer four kilometres upstream of the water treatment works. This meant that up to 40 megalitres of water which was previously being put directly into the sea each day was now being made available for water supply and environmental flows. Interestingly, the recycled water was of a better quality than the river water itself, and the only reason that it was put back into the river rather than being piped directly to Hanningfield Reservoir was to satisfy public misgivings. In general, it was felt that many wastewater treatment plants were discharging treated effluent into the sea when it could easily be re-used.

16. Anglian Water had a different type of scheme for re-using wastewater, whereby treated wastewater was supplied to Flag Fen gas-fired power station in place of potable mains water. There was felt to be potential for more such schemes, thus helping to minimise unnecessary use of potable water.

APPENDIX 10: ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

Acronyms

| | |
|--------------------|---|
| ADA | Association of Drainage Authorities |
| AMP ¹⁶¹ | Asset Management Plan |
| BedZED | Beddington Zero Energy Development |
| BBSRC | Biotechnology and Biological Sciences Research Council |
| BGS | British Geological Survey |
| BAWAG | Broadland Agricultural Water Abstractors Group |
| BRE | Building Research Establishment |
| BREAM | Building Research Establishment Assessment Method |
| CPRE | Campaign to Protect Rural England |
| CAMS | Catchment Abstraction Management Strategies |
| CEH | Centre for Ecology and Hydrology |
| CSERGE | Centre for Social and Economic Research on the Global Environment |
| CIWEM | Chartered Institution of Water and Environmental Management |
| CAP | Common Agricultural Policy |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| CC | Competition Commission |
| CCWater | Consumer Council for Water |
| CRC | Cooperative Research Centre |
| DCLG | Department for Communities and Local Government |
| Defra | Department for Environment, Food and Rural Affairs |
| DTI | Department of Trade and Industry |
| DNO | Distribution Network Operator |
| DOMS | Distribution Operation and Maintenance Strategies |
| DWI | Drinking Water Inspectorate |
| EERA | East of England Regional Assembly |
| ELL | Economic Level of Leakage |
| ESRC | Economic and Social Research Council |
| EPSRC | Engineering and Physical Sciences Research Council |
| ERDP | England Rural Development Programme |

¹⁶¹ AMP1/AMP2/AMP3/AMP4 refer to the Asset Management planning periods for 1990-1995/1995-2000/2000-2005/2005-2010.

| | |
|-------------------|---|
| EA | Environment Agency |
| EC | European Community |
| EEA | European Economic Area |
| EU | European Union |
| GM | Genetically Modified |
| IWA | Inland Waterways Association |
| IFI | Innovation Funding Incentive |
| IPPR | Institute of Public Policy Research |
| ICE | Institution of Civil Engineers |
| IPCC | Intergovernmental Panel on Climate Change |
| IWRM | Integrated Water Resource Management |
| IDB | Internal Drainage Board |
| JNCC | Joint Nature Conservation Committee |
| LDF | Local Development Framework |
| LOCAR | Lowland Catchment Research |
| Ml | Megalitre (one million litres) |
| NEP | National Environment Programme |
| NFU | National Farmers' Union |
| NERC | Natural Environment Research Council |
| NGO | Non-governmental Organisation |
| ODPM | Office of the Deputy Prime Minister |
| Ofwat | Office of Water Services |
| Ofgem | Office of Gas and Electricity Markets |
| OPA | Overall Performance Assessment |
| PCC | Per Capita Consumption |
| PCPPs | Pharmaceuticals and Personal Care Products |
| PPS | Planning Policy Statement |
| PR ¹⁶² | Price Review/Periodic Review |
| RDA | Regional Development Agency |
| RPG | Regional Planning Guidance |
| RSS | Regional Spatial Strategy |
| RWA | Regional Water Authority |
| REACH | Registration, Evaluation and Authorisation of Chemicals |
| R&D | Research and Development |
| RSA | Restoring Sustainable Abstraction Programme |

¹⁶² PR04 refers to the 2004 Price Review for the period 2005-10.

| | |
|--------|---|
| RBMP | River Basin Management Plan |
| RSPB | The Royal Society for the Protection of Birds |
| RDS | Rural Development Service |
| RELU | Rural Economy and Land Use |
| RES | Rural Enterprise Scheme |
| SEERAD | Scottish Executive Environment and Rural Affairs Department |
| SOSI | Security of Supply Index |
| SSSI | Site of Special Scientific Interest |
| SWCCIP | South West Climate Change Impacts Programme |
| SAC | Special Areas of Conservation |
| SUDS | Sustainable Drainage Systems |
| SAC | Special Areas of Conservation |
| UKCIP | United Kingdom Climate Impacts Programme |
| UKIA | United Kingdom Irrigation Association |
| UKRep | United Kingdom Permanent Representative to the European Union |
| UKWIR | United Kingdom Water Industry Research |
| UID | Unsatisfactory Intermittent Discharge |
| WaND | Water Cycle Management for New Developments |
| WELS | Water Efficiency Labelling and Standards programme |
| WFD | Water Framework Directive |
| WISE | Water Information System for Europe |
| WSUD | Water Sensitive Urban Design |
| WSAA | Water Services Association of Australia |
| WSRA | Water Services Regulation Authority |
| WSL | Water Supply Licensing |
| WHO | World Health Organisation |



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