Future Water

The Government's water strategy for England

HM Government

defra
Department for Environment
Food and Rural Affairs

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Ministerial foreword

In England, the average person uses about 150 litres of water a day – that's about a tonne a week! This is water that has been cleaned, treated and pumped from reservoirs, rivers and aquifers, and too much of it still leaks out of pipes before it ever gets into the home.

We've rightly come to expect some of the highest quality water in the world, and an almost endless supply, for brushing our teeth, filling a glass to drink, taking a shower in the morning or preparing food. But we also use this water to heat our homes and offices, clean our clothes, water our gardens, wash our cars and in thousands of industrial processes. And the more we use the less there is for the countryside and the wildlife around us.

Much of the water we use is then disposed of through sewers. We demand safe bathing water and good public health, so we clean sewage to high standards. But along with direct pollution, for example from agriculture, sewer discharges continue to cause problems for the natural environment of our rivers, lakes and seas.

The problem we face is this; because of our need to adapt to climate change, our water intensive lifestyle and other pressures such as changing land use, we need to find ways of using water much more efficiently and sustainably if we are to continue to enjoy high standards and constant supply.

The South East and East of England already face increasing demand on a finite water supply. The drought of 2004-06 was only managed through controls on what we could use water for. This was not a one-off; indeed droughts are likely to be more common. By 2080, some long term climate projections forecast half as much rainfall in summer (nothing like fully offset by 30% more rainfall in winter) in the South East. We need to plan ahead and each of us needs to play our part.

We have, of course, not only to cope with too little water. Indeed the last year has been characterised more by too much water with serious flooding in many parts of the country. Sir Michael Pitt's report into these floods shows that we still have lessons to learn as a country about defending ourselves from, and learning to live with, floods. One particular issue is how we cope with 'surface water' flooding. Just as climate change seems likely to mean less water on average, it is also likely to mean more extreme weather events, with more inland and coastal flooding.

Finally, the way we pump, treat, clean and heat water has profound implications for energy use. The water industry is a major energy user, and together with domestic hot water use, there's a carbon impact here that simply has to be tackled. Saving water reduces emissions.

This water strategy for England sets out the Government's plans for water in the future and the practical steps that we will take to ensure that good clean water is available for people, businesses and nature. It looks ahead to 2030 and describes the water supply system we want to see then and how to get there. It looks at the water cycle as a whole, from rainfall and drainage through to discharge and treatment. And because almost everything we do affects water in some way – from what we put down the drain and treat in our sewage works, to how we design our houses or farm the land – it looks at every aspect of water use.

The practical steps we will need to take will include: improving the supply of water; agreeing on important new infrastructure such as reservoirs; proposals to time limit abstraction licences; and steps we are taking to reduce leakage. We will tackle direct pollution to rivers, and reduce discharges from sewers.

And we intend to reduce demand, through better building design, more efficient appliances and improving industrial processes, and ensuring that as we move increasingly towards water metering in areas where supplies are under pressure this is done in the fairest and most effective way, so saving water and reducing bills.

Our floods plan 'Making Space for Water' has already set out the steps we are taking to tackle flooding, including record spending on flood defence. But this summer's events dramatically highlighted the problem of 'surface water' flooding, made worse by the increasing amounts of concrete and paving in our towns and cities. Too much of this water is left to the sewerage and drainage networks to cope with. So this strategy sets out a new approach to managing surface water, with better co-ordination and planning and promoting sustainable drainage above ground.

We are all increasingly understanding that we need to value water more, use it more wisely and play our part in taking responsibility for protecting this essential and unique resource. This strategy aims to help all of us to do so.

Hilary Benn
Secretary of State for Environment, Food and Rural Affairs

Executive summary

1. Water is essential for life. It is vital for our health and wellbeing, and for agriculture, fisheries, industry and transportation. Healthy water resources are necessary for a high-quality natural environment. Water provides us with countless benefits as we swim in it, sail on it, water our gardens and take pleasure in the plants and animals which depend on it. Healthy water environments, such as wetlands and floodplains, also provide natural water storage and flood protection.

2. The drought in South East England in 2004-06, and the floods of 2007 have brought into focus the pressures we know climate change will bring. Future Water, our new water strategy for England, is our response.

3. Future Water sets out how we want the water sector to look by 2030, and some of the steps we will need to take to get there. It is a vision where rivers, canals, lakes and seas have improved for people and wildlife, with benefits for angling, boating and other recreational activities, and where we continue to provide excellent quality drinking water. It is a vision of a sector that values and protects its water resources; that delivers water to customers through fair, affordable and cost-reflective charges; where flood risk is addressed with markedly greater understanding and use of good surface water management; and where the water industry has cut its greenhouse gas emissions. The vision shows a sector that is resilient to climate change, with its likelihood of more frequent droughts as well as floods, and to population growth, with forward planning fully in tune with these adaptation challenges.

4. In short, our vision is for sustainable delivery of secure water supplies and an improved and protected water environment.

Water demand

5. A recurring theme of this strategy is the need for us all to value water and not inadvertently waste it. Wasting water means wasting a resource on which we are dependent and which is limited in its seasonal and regional availability. It means wasting the energy required to supply, treat and distribute the water to where it is used, and to remove and treat wastewater. And wasting hot water in our homes also wastes a lot of energy and money.

6. Good forecasting of demand will be essential. For example, we will need to take account of likely changes in lifestyle, household formation, population and temperatures from region to region. We must continue to manage demand, especially through increased water efficiency and reduced water wastage. Water can be saved in our homes and communities, in industry and agriculture, and by the water industry itself.

7. Minimum water efficiency standards for all new homes are now in prospect through changes to the Building Regulations. In addition, the Code for Sustainable Homes, a voluntary standard for new homes introduced last year, will be applied to new government-funded social housing. Better product labelling is becoming available, and we will be exploring how to work with whole supply chains to encourage the purchase of more water efficient products. Better informed customers make better choices, and we know that the increased use of metering is a further spur to reducing water demand without compromising our quality of life.

8. The Water Saving Group will continue its work to reduce per capita consumption, and in the year ahead will also review the measures in place to promote water efficiency in industry and commerce. Stronger and more consistent water saving messages from Government and other stakeholders are also needed to raise awareness and encourage behaviour change. For its part, the water industry must demonstrate its commitment to demand management by meeting its leakage reduction and water efficiency targets.

Water supply

9. Demand management measures alone will not secure water supplies. We need to continue with a twin track approach. New or enhanced supply may be inevitable in some areas to complement demand management measures and deliver the necessary long term resilience. The National Policy Statement for water supply and wastewater treatment infrastructure, as envisaged in the Planning Bill, will contribute to speeding up the process of reservoir development, where this is an appropriate option. In addition, we will be consulting on proposals to time limit all abstraction licences as a way to allow better management of our water resources and to allow for regular reassessment of the pressures on our rivers, reservoirs and aquifers.

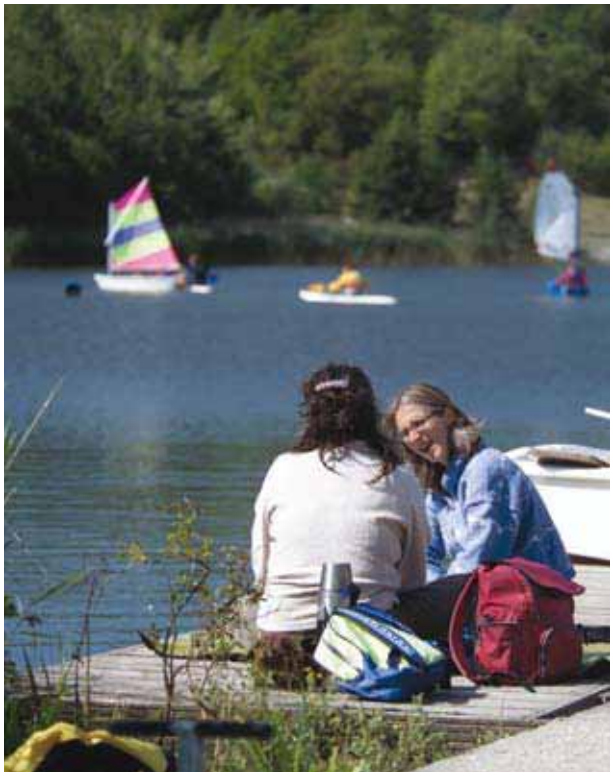
10. Central to the long term forward planning for water supply are the statutory 25-year water resources management plans that water companies are required to produce and which help inform the 5-yearly reviews of water price limits carried out by Ofwat, the economic regulator for the water industry. In these plans, water companies must examine their supply options strategically and innovatively and take into account the best available information about changes in climate, population and water demand. We believe these plans will become a vital tool in climate change adaptation efforts.

11. We will also encourage the increased use of rainwater harvesting where appropriate, as a means of managing local water demand and reducing reliance on the public water supply. Property developers and owners as well as land managers can make a positive difference here.

12. Planning authorities will need to work particularly closely with the water companies and the Environment Agency on timing and numbers of new households in those areas likely to see the greatest growth. The recent report into the feasibility of water neutrality i.e. where total water used after new development is no more than that used before the development, in the Thames Gateway area, for example, provides a compelling vision which must now be explored further.

Water quality in the natural environment

13. The quality of the water in our rivers, lakes and estuaries is of crucial importance as an indicator of how well we look after our environment. Good quality waters have great amenity and recreational value, they enhance biodiversity, and diverse ecosystems can further enhance water quality.



14. Over recent decades, large-scale investment has helped to address some of the most polluting industrial processes and acute sources of pollution such as sewage treatment works and sewer overflows. However, some significant water quality issues remain, and more needs to be done to tackle discharges that enter sewers, for example phosphates from domestic laundry cleaning products, and fats, oils or greases, as well as pollution direct to the water environment, such as nutrients from agriculture. Tackling these pressures is a challenge, but also a real opportunity to improve the water environment, for its own sake and for the benefit of anglers, sailors, ramblers, birdwatchers, and the many others for whom water quality is particularly important.

15. We will consult on the possibilities for phasing out phosphates as an ingredient in domestic laundry cleaning products. We will also, over a further three years, continue to support farmers in the adoption of more environment-friendly farming practices. We are also addressing other sources of pollution, and will undertake further work to address situations where physical changes to water bodies, such as straightening of channels, are causing water quality problems.

16. The Government, water companies, industry, land managers and individuals all need to work together at the catchment scale, to prevent pollution problems arising in the first place. In the long term, this would not only benefit the water environment, but would also reduce the energy consumed in water treatment processes and therefore the water industry's greenhouse gas emissions.

Surface water drainage

17. Water quality problems can also be caused or exacerbated by poor surface water management. Large amounts of surface water run-off lead to two main problems: pollution of water courses and flooding. Pollutants such as nutrients and sediment from farmland, and heavy metals and hydrocarbons from roads, are picked up as water runs over land and is washed into watercourses. Large amounts of run-off can also lead to serious flooding. With climate change, we are expecting more extreme weather events which are likely to cause large amounts of run-off.

18. It is more sustainable to manage surface water, especially storm water, in a way that allows it to be reused or allowed to permeate naturally through the catchment rather than being directed into and potentially overloading the public sewers. There are real opportunities for rainwater harvesting, through the use of water butts and whole building systems with underground tanks, which can help alleviate demand on the public water supply while playing an important part in surface water management.

19. We want to use Surface Water Management Plans as a tool to improve the coordination of drainage stakeholders. We also want to promote sustainable drainage by clarifying responsibilities and improving incentives for property owners and developers. We are consulting on these issues, including options for ownership and maintenance of sustainable drainage systems, and alternatives to the ability to automatically connect surface water drainage to the public sewerage system.

River and coastal flooding

20. As a densely populated and highly urbanised coastal country with lots of rivers, we already have a serious flood risk. Anyone who has experienced flooding will appreciate the devastating effects it can have. To respond to the increasing probability of flooding from all sources, we have committed to *Making Space for Water,* an approach to managing flood and coastal erosion risk in England.

21. Since April 2003, Government has invested around £2.2 billion in managing risks from flooding and coastal erosion, with a further £600 million planned to be invested in 2007/08, increasing to £800 million in 2010/11. It has been agreed that the Environment Agency will have a strategic overview of all forms of flooding and coastal erosion risk management. Through Planning Policy Statement (PPS) 25 on development and flood risk we have strengthened consideration of flood risk at all stages of planning. We are committed to continually developing and improving our approaches to managing flood risk, and have undertaken a number of pilot studies to help inform future approaches.

22. In addition, to ensure all lessons are learnt from the 2007 summer floods, the Government has asked Sir Michael Pitt to lead an independent review of the floods, the emergency response and the way in which recovery efforts were managed. The Government welcomes this work and is already implementing some of the recommendations in the interim findings of this review, published in December 2007. When the final report is published later in 2008 Defra will host a major conference to consider the findings in the context of the new UK Climate Impacts Programme (UKCIP) climate change projections.

Flooding around Mythe Water Treatment Works, Gloucestershire. Image supplied courtesy of Severn Trent Water Limited.

Greenhouse gas emissions

23. The water industry emits under 1% of total UK greenhouse gas emissions, but there is a real risk that this will rise with water demand and more ambitious standards for water quality in the natural environment. Climate change mitigation however must not be an excuse for failing to deliver other improvements. Greater efforts must be made to align environmental and other objectives. The water industry must play its full part in meeting national targets for the reduction of greenhouse gas emissions and explore its significant potential for renewable energy generation and use.

24. In addition to the emissions by the water industry, hot water use in our homes – for things like washing, bathing and cooking – is responsible for 35 million tonnes of greenhouse gas emissions each year: over 5% of total UK greenhouse gas emissions. Water efficiency measures, particularly those that focus on hot water use, are therefore doubly beneficial, with water as well as greenhouse gas savings. We must do more to promote these types of water savings which have multiple benefits.

Charging for water

25. Improving our water environment, securing our supplies for the future and protecting our homes and infrastructure from flooding will bring benefits to society and the environment. But even the most cost effective solutions will cost money to implement and may have an impact on customers' water bills.

26. The current system of charging for water, based on rateable values from the 1970s, is increasingly indefensible, particularly in water stressed areas. As less than one third of customers have a water meter, this means that for most customers water bills bear no relation to water use. Metering is increasing, predominantly through customers' own choice. Households that stand to save money tend to opt for meters, which has an impact on those households left behind without meters, including large families in properties with a low rateable value. As a consequence, these households could be faced with higher bills as bills for unmetered customers grow faster than metered ones.

27. Metering is the usual method of charging for water in most other European countries. It is a fair way to pay for water, in that customers pay for what they use, and it introduces a financial incentive to save water. Metering can therefore stimulate water efficiency. Evidence shows that fitting a meter reduces household water consumption by about 10%. On its own, or combined with innovative tariffs and other technologies, it increases the range and flexibility of measures to address water availability issues. However, installing, reading and maintaining meters adds to water company costs and customers' bills, which in turn are determined by the timescale over which change occurs.

28. The regulatory framework was changed last year to make it easier for companies in areas of serious water stress to implement compulsory metering. Later this year, we will commission an independent review to advise how metering and charging should progress beyond any applications that water companies may make in seriously water stressed areas, as well as look at charging more generally. The review will in particular take into account social, economic and environmental concerns.

Regulatory framework, competition and innovation

29. The current regulatory framework for water works well and has delivered real social and environmental benefits. We will however consider how we can improve the competition framework by commissioning an independent review to further encourage competition. We also consider innovation, improvements in customer service, better regulation and efficiency in the water industry for the benefit of customers and the environment.

Working together

30. Our vision cannot be achieved by Government alone. We all need to take responsibility for ensuring that we achieve our objectives and work collaboratively to protect and enhance our water resources and manage them in more sustainable ways.

31. This strategy sets out the Government's evolving priorities for water which will be subject to further reviews. Comments on it can be emailed to **waterstrategy@defra.gsi.gov.uk.**

1. Our vision for water policy and management is one where, by 2030 at the latest, we have:

- improved the quality of our water environment and the ecology which it supports, and continued to provide high levels of drinking water quality from our taps;
- sustainably managed risks from flooding and coastal erosion, with greater understanding and more effective management of surface water;
- ensured a sustainable use of water resources, and implemented fair, affordable and cost-reflective water charges;
- cut greenhouse gas emissions; and
- embedded continuous adaptation to climate change and other pressures across the water industry and water users.

2. Water is essential for life. It is vital for our health and wellbeing, drinking and sanitation, and for agriculture, industry, and transportation. Beyond these uses, water brings countless other benefits to society. We use it to swim in, sail on, water our gardens, and take pleasure in the plants and animals that depend on it. Our health and environment are dependent on a sustainable use of water as well as an effective wastewater infrastructure.

3. Meandering rivers and functioning floodplains can hold water on the land, keeping it out of homes in times of flood. At the same time, they create a landscape which people can enjoy and where wildlife can flourish. Protecting these precious systems is important for us and for future generations.

4. Historically, water management has been driven by human health concerns, followed by considerations of availability for supply. Over time, this has given us extensive and effective systems for clean water and wastewater. Our drinking water quality is among the best in the world, and almost all our bathing waters consistently reach the mandatory EU standards.

5. But, despite huge improvements, we still have environmental water quality problems, a need to maintain the infrastructure – some of which dates back to Victorian times – and pressures on the supply-demand balance in certain parts of the country. And of course, water in the wrong place at the wrong time can be devastating, as demonstrated by last summer's floods.

6. We must secure a sustainable water supply and demand balance. This means limiting and even reducing our water consumption, while not ruling out new supply infrastructure. It means reducing the environmental impacts of abstracting, distributing and treating the water we drink, and the impacts of collecting and treating our wastewater before returning it to the natural environment. It also means reducing the negative impacts of a whole range of human behaviours and activities on our water resources. Some of these actions and investments lead to costs for water companies and bill increases for consumers. Affordability concerns need to be taken into account.

Box: Human behaviours and the water environment – examples

Food chain: pressures on the water environment come from agriculture, food processing and domestic food preparation, both from resource use and pollution of waters, for example through nutrients

Homes: the types of homes and gardens we build and live in impact on water use, from the water-using appliances we install, what we pour down the drains, to how we water and drain our gardens

Consumer products: water is used in several production processes, and manufacturing involves many substances which can have adverse consequences for water when released into the environment. In addition, the fittings and appliances we use in our homes, such as toilets, showers, dish washers and washing machines, use water more or less efficiently, depending on their age and design

Transport: water that runs off the surface of roads, carrying heavy metals and other pollutants, impacts on water quality as well as flooding

Tourism: a healthy, attractive water environment can be great for tourism but high levels of tourism can in turn put substantial stress on that environment

7. Wasting water means wasting a resource whose seasonal and regional availability is finite, and it means wasting the energy required to supply, treat and heat it and to remove and treat wastewater. We need to value our water more.

Water, housing and climate change

8. More pressure will be put on our water resources from changes in population, household formation and development, and lifestyles. Government has an ambitious new housing agenda, to meet the demand for housing in the places where people want to live. However, in most cases, these places coincide with areas where there is already a lot of pressure on our water resources.

9. Climate change is already a major pressure. With predictions for the UK of rising temperatures, wetter winters, drier summers, more intense rainfall events and greater climate variability, we can expect to experience higher water demand, more widespread water stress with increased risk of drought, more water quality problems, as well as more extreme downpours with a higher risk of flooding. If we are to maintain our quality of life while protecting the environment, we must take action now.

10. Water use also produces greenhouse gas emissions that contribute to climate change. These come from the water industry, primarily from treating and supplying water and disposing of wastewater, and from water use more widely. We must mitigate climate change by taking action to reduce these emissions wherever possible (see Chapter 7). However, and more generally, the impacts of historic actions are already inevitable. Even if all greenhouse gas emissions stopped today, we would still have around 40 years of warming and another century of rising sea levels. The need for adaptation to climate change as well as mitigation is therefore unquestionable. We need to ensure that climate change considerations, using the best available evidence, are fully integrated in all water policy and management.

Box: Future UK climate projections

In general, the UK climate is expected to become hotter and drier in the summer and warmer and wetter in the winter.

- **Average UK annual temperatures may rise by 2 to 3.5°C by the 2080s**. In general, greater warming is expected in the South East than the North West of the UK, and there may be more warming in the summer and autumn than winter and spring. Under a 'High Emissions' scenario, the South East may be up to 5°C warmer in the summer by the 2080s.
- **Offshore waters in the English Channel may warm in the summer by 2 to 4°C by the 2080s**. The temperature of UK coastal waters will increase, although not as rapidly as over land, with again the greatest warming expected in the South. Sea-level is also expected to rise, and by the 2080s could be between 9 and 69cm above the 1961-90 average around the UK.
- **Annual average precipitation across the UK may decrease slightly, by between 0 and 15% by the 2080s**. But the seasonal distribution of precipitation will change significantly, with winters becoming wetter and summers drier. Under the 'High Emissions' scenario, precipitation in the 2080s may decrease in summer by 50% in the South East and increase in winter by up to 30%.
- **Snowfall amounts will decrease significantly throughout the UK**, perhaps by between 30 and 90% by the 2080s.
- **Increase in the prevalence of extreme weather events**. High summer temperatures and dry conditions will become more common. Very cold winters will become increasingly rare and extreme winter precipitation will become more frequent. The summer heatwave experienced in 2003 is likely to become a normal event by the 2040s and considered cool by the 2060s.

11. We are currently developing a strategic approach to adaptation. This will be delivered through the Climate Change Bill, which will provide the legislative structure. The Government's Adaptation Policy Framework will set out our vision and work programme for adaptation in the UK. We will take a responsive and regionally based approach, recognising that impacts are experienced at the local level and that we need to work with communities to ensure locally appropriate responses to climate change.

12. It is clear that the Government alone cannot deliver the changes needed to adapt our water management to the changing climatic conditions. Everyone must play their part and work together. By doing so we can help drive innovation and share best practice to ensure that we are prepared for the future.

13. This document provides a clear direction for England and sets the long term vision of where we want the water sector to be by 2030. The work of the Defra-funded UK Climate Impacts Programme[1]

[1] www.ukcip.org.uk

will inform and help shape this vision. A new set of future climate change projections, UKCIP08, will be launched later this year and will indicate the likelihood of different changes in precipitation and other climate variables across the UK up to 2100. These projections will be a publicly available interactive resource, with customised user outputs to help decision makers in assessing the risks from climate change to their operations.

14. The Planning Policy Statement on climate change, recently published by Communities and Local Government (CLG), sets a clear direction to ensure local authorities have regard to changing climatic conditions. It will be accompanied by detailed guidance to ensure regional spatial strategies and development strategies take climate change impacts and adaptation needs fully into account.

15. Underpinning the direction from a water supply perspective will be the new statutory water resources management plans. These are discussed in Chapter 3 and will provide a responsive framework for action at the local or regional level, through which water companies will meet challenges over the next 25 years.

Future Water

16. Future Water builds on and replaces the previous strategy for water, *Directing the Flow*[2] and it's action points, to which we remain committed. This new strategy will help us realise all our water commitments while contributing to two key Public Service Agreements:

- securing a healthy natural environment for the future, for which water availability and quality are key, and for which we have developed an ecosystems approach action plan[3] to ensure integrated delivery; and
- leading the global effort to avoid dangerous climate change.

17. Future Water outlines a strategic and integrated approach to the sustainable management of our water resources, for the public water supply as well as for the provision of healthy ecosystems and the services they provide. Achieving the vision will have social, environmental and economic implications, which we need to address.

18. In addition, the Government's objectives for the marine environment are for clean, healthy, safe and biologically diverse oceans and seas. Here too, through a Marine Bill, we are working to establish new strategic marine planning, management and environmental protection arrangements. This will allow us to achieve optimum environmental, social and economic benefit from our marine resources and the marine area. We also have a developing strategy for flood and coastal erosion risk management, *Making Space for Water*, which is discussed in Chapter 6.

[2] www.defra.gov.uk/environment/water/strategy/directflow.htm
[3] www.defra.gov.uk/wildlife-countryside/natres/eco-actionp.htm

19. A number of documents and measures will play a significant role in delivering this vision. These include:

- statutory **Social and Environmental Guidance** to Ofwat, which we are publishing in draft alongside this strategy for consultation and which will set out key social and environmental policy areas to which Ofwat is expected to contribute in carrying out its role as economic regulator of the water industry;
- the **Statement of Obligations** which was issued in December 2007 and brings together the key environmental and drinking water legislation applying to water and sewerage undertakers. It aims to be a helpful checklist to water and sewerage undertakers and regulators as they prepare for Ofwat's periodic review of water price limits (PR09);
- **River Basin Management Plans** produced under the Water Framework Directive 2000/60/EC, which will determine specific environmental objectives at a river basin district level and the measures to achieve them. These plans will be subject to consultation in 2008 and finalised in 2009; and
- **Water Resources Management Plans**, which have now been placed on a statutory basis, and which will allow each water company to set out how it will meet water demand up to 2035 and deal with factors such as changes in climate and population. Draft plans will be subject to consultation this summer and finalised in 2009.

20. This strategy sets out our vision and key priorities for water. Individual policy initiatives will now be developed with full public consultation and be subject to impact assessments where appropriate. Value for money and affordability, as well as environmental impact, are key criteria in such assessments. Each of the policies discussed in the strategy will also be subject to the usual process of monitoring and final evaluation. We will work with partners to do this. The outcomes of these evaluations will be actively disseminated so that lessons can be learned about what is working, where and why.

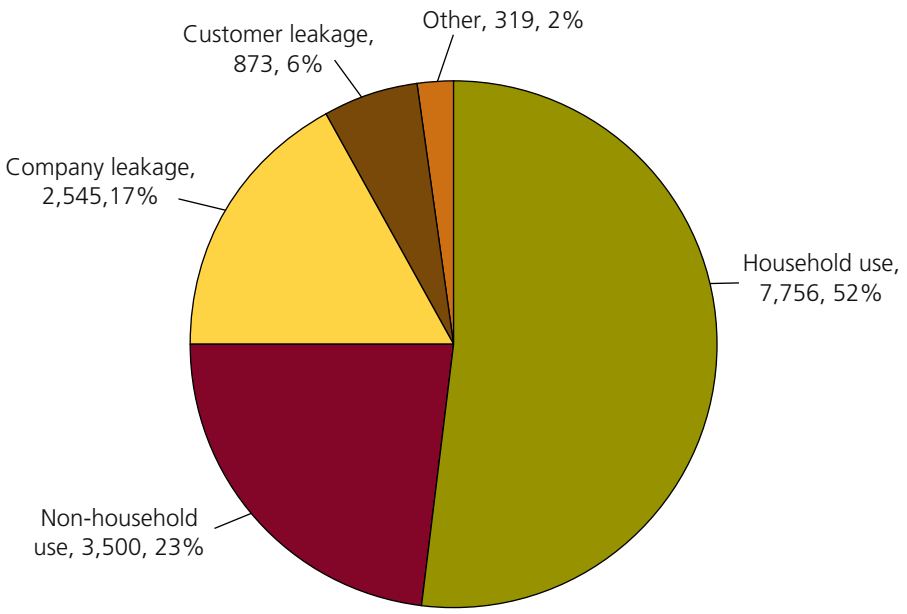
21. This is a strategy for England. Water policy and the application of EU Directives are devolved matters. We continue to work closely with our Welsh, Scottish and Northern Irish counterparts, particularly in catchments where there are cross-border waters such as rivers, lakes, coastal and ground waters.

Water demand today

1. Access to a safe water supply is a fundamental requirement. We do not want restrictions, least of all on essential uses, but in many areas there are excess claims on available water, and in nearly all areas there are environmental costs associated with abstraction and treatment. We must use water efficiently and minimise waste. Reducing the inadvertent wastage of water, particularly hot water, also reduces our greenhouse gas emissions. This is why hot water efficiency is part of our climate change campaign, Act on CO_2[4].

2. Household water demand has been increasing since the 1950s, due to population growth and changes in the way we use water in the home, and is now more than half of all public water supply use (Figure 1). In contrast, public water supply usage by industrial and commercial sectors has been declining, reflecting in part the changing nature of UK industry.

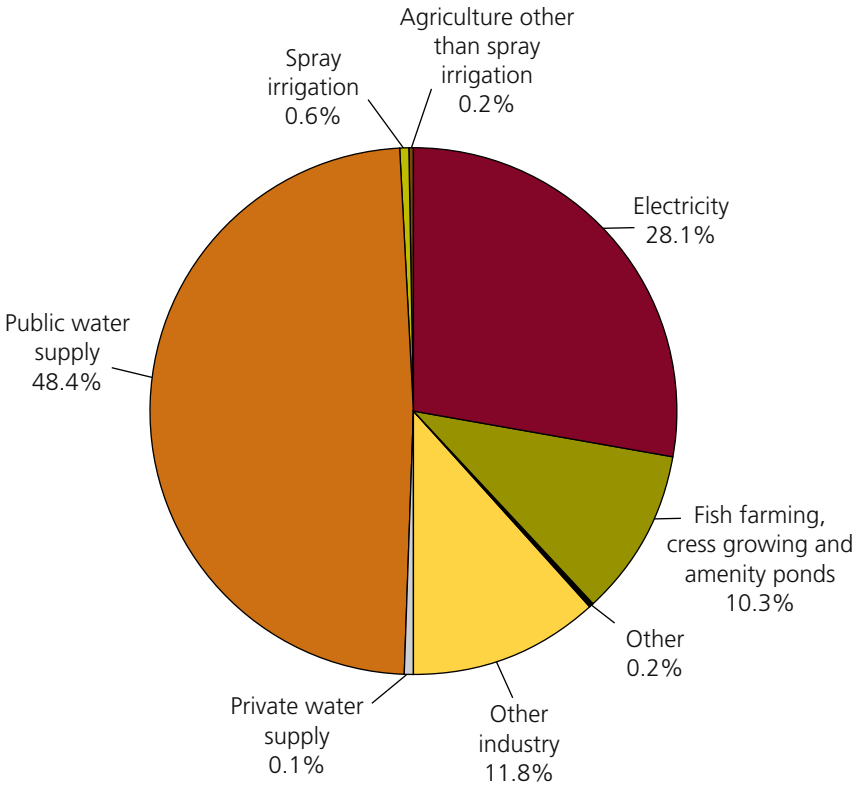
Figure 1: Public water supply, England and Wales (megalitres (Ml) per day, and %)



Source: based on Ofwat 2007 data

[4] www.direct.gov.uk/en/Environmentandgreenerliving/actonco2/DG_067197

Figure 2: Licensed abstractions, England and Wales (%)

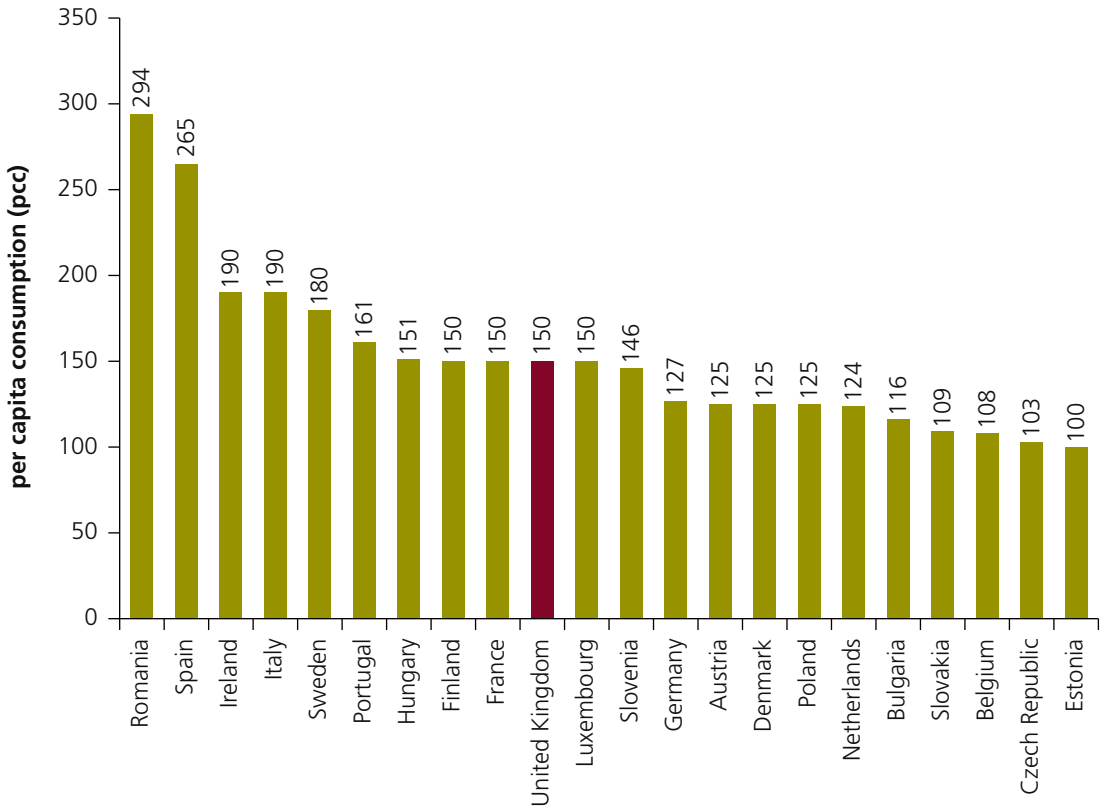


Source: based on Environment Agency 2005 data

3. Some industries, such as power generation, rely on direct, non-consumptive abstractions and the water is readily discharged back to the environment with limited associated environmental costs. However, the totality of water abstractions can still be unsustainable. We need to monitor and control abstractions across all sectors. Agricultural abstractions have remained fairly constant over the last 30 years, although with some regional variations.

4. It is estimated that average water use in England is about 150 litres per person per day (l/p/d), equivalent to approximately one tonne of water per week. International comparisons are not always straightforward, but it seems many other countries are already using substantially less than this. (Figure 3). We can all significantly reduce our water consumption without compromising our quality of life or the services we get from water.

Figure 3: EU per capita water consumption (l/p/d)



Source: based on Waterwise data, 2006

5. Around 7% of the water used in our homes is used for drinking and cooking. Almost one third of the water we use is, after being treated to what is among the best drinking water quality standards in the world, at significant financial and environmental cost, simply used to flush our toilets.

Future pressures

6. In southern and eastern regions of England, where rainfall is comparatively low, per capita water consumption tends to be higher than elsewhere. In some areas abstraction is above its sustainable level. Combined with projections for rainfall and demand, this has lead to the classification of all south-eastern areas as seriously water stressed (Figure 4).

7. Under the current 'High Emissions' climate change scenario[5], precipitation in the 2080s in the South East would decrease by 50% in summer, and increase by up to 30% in winter, whereas in the North West, it may decrease by 30-40% in summer and increase by 20-25% in winter.

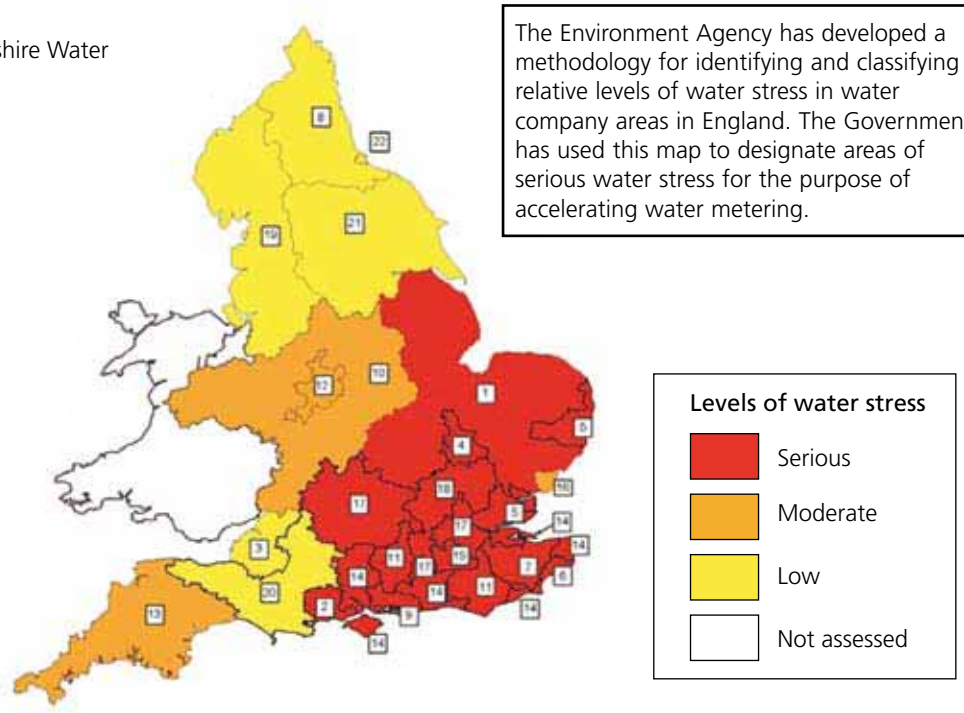
8. Unless we change our current water management and behaviour, and strive for lower levels of water consumption, we will face serious threats both to the security of our water supplies and to the health of our water environments and nature conservation sites.

[5] www.ukcip.org.uk/scenarios/

Figure 4: Areas of relative water stress

1. Anglian Water
2. Bournemouth and West Hampshire Water
3. Bristol Water
4. Cambridge Water
5. Essex and Suffolk Water
6. Folkestone and Dover Water
7. Mid Kent Water
8. Northumbrian Water
9. Portsmouth Water
10. Severn Trent Water
11. South East Water
12. South Staffordshire Water
13. South West Water
14. Southern Water
15. Sutton and East Surrey Water
16. Tendring Hundred Water
17. Thames Water
18. Three Valleys Water
19. United Utilities
20. Wessex Water
21. Yorkshire Water
22. Anglian Water (formerly Hartlepool Water)

The Environment Agency has developed a methodology for identifying and classifying relative levels of water stress in water company areas in England. The Government has used this map to designate areas of serious water stress for the purpose of accelerating water metering.



Source: Environment Agency, 2007

Vision for the future

Box: Vision for 2030

Consumers using water wisely, appreciating its value and the consequences of wasting it

A sustainable supply-demand balance across England, with no seriously water stressed areas

Reduced per capita consumption of water through cost effective measures, to an average of 130 litres per person per day by 2030, or possibly even 120 litres per person per day depending on new technological developments and innovation

Water companies actively encouraging demand management to protect customer and environmental needs

Low levels of leakage, with targets set and met at the optimum balance of economic, environmental and other costs

Water efficiency playing a prominent role in achieving a sustainable supply demand balance, with high standards of water efficiency in new homes, and water-efficient products and technologies in existing buildings

Pro-active industrial and commercial sectors leading by example, through initiatives such as voluntary agreements

Achieving the vision

9. We should not imagine that saving water is something we can leave to others. Government, industry, manufacturers, land managers, and individuals all need to take action to reduce water consumption and help protect this unique resource. This is a shared responsibility. One of the ways the Government is addressing this issue is through the work of the Water Saving Group (WSG)[6]. Established in October 2005, the group brings together key water sector organisations to develop a range of measures to reduce per capita consumption in households in England.

Household behaviour

10. We need to promote more sustainable behaviours. Government and industry can make it easier to save water and provide incentives, but taking personal responsibility is at the heart of water efficiency. People need clear advice on how to save water, and Government for its part needs to relate this to wider environmental messages. As part of the WSG the Consumer Council for Water (CCWater), in close collaboration with Waterwise, is co-ordinating the development of a long term national strategy to encourage the efficient use of water. The Government will continue to work with CCWater, Waterwise, other members of the Water Saving Group and wider stakeholders to use co-ordinated messages to raise customer awareness of the need to save water.

11. Defra's framework for pro-environmental behaviours[7] includes an improved understanding of consumer attitudes and behaviour and the motivations and barriers to individual and community action across a wide range of environmental issues. This will help link water saving to other behaviours on energy, waste, transport and environmentally friendly products.

12. We recognise the importance of embedding sustainability measures within Government. The 'Defra as Sustainability Leader' (DaSL) programme has been established to take this forward. One of the priorities for DaSL is to take a more strategic approach to tackling performance, and to develop a better understanding of how to meet sustainability targets, including water consumption. The programme will look at best practice, in particular, the promotion of examples where Government offices can lead the way on using water more efficiently.

[6] The Defra-led WSG, www.defra.gov.uk/environment/water/conserve/wsg/index.htm, comprises members from Communities and Local Government (CLG), the Consumer Council for Water (CCWater), the Environment Agency, the Water Services Regulation Authority (Ofwat), Water UK, Waterwise, and representatives from water companies.

[7] www.defra.gov.uk/news/2007/071123b.htm

Box: Top water saving tips

There are some things we can all do at no or low cost:

- **Turn off the tap while we brush our teeth, shave, wash our hands or wash up**. This can save up to 6 litres of water per minute.
- **Fix dripping taps**. A dripping tap can waste up to 15 litres of water a day, or almost 5,500 litres per year. Replace worn washers for a quick and cheap way of saving water.
- **Wait until we have a full load before switching on dishwashers and washing machines**.
- **Use the minimum amount of water required when boiling water in saucepans and kettles**; that way we'll save energy as well as water.
- **Reduce the water used to flush toilets by fitting a water saving device such as a 'hippo' or fitting a dual flush toilet**. When replacing our toilets, we should look out for low flush or dual flush models.
- **Wash vegetables and fruit in a bowl rather than under a running tap**. The water collected might even be used for watering pot plants.
- **Lag water pipes and external taps to prevent bursts in cold weather**.
- **Collect rainwater in water butts and use a watering can instead of a hose**. If we need to use a hosepipe, a trigger nozzle can be fitted to control the flow.
- **Wash our cars using a bucket and sponge, rinsing with a watering can**. Just 30 minutes with a hosepipe will use more water than the average family uses in a day.

We can also change how we use our water in more fundamental ways, such as taking short showers instead of baths, and having drought-resistant plants in our gardens.

Approved by the Water Saving Group, 2007

13. The sections below set out more specific actions and initiatives necessary for effective demand management, in our homes and communities, in industry and agriculture, and among the water industry and its regulators.

Homes and communities

14. It is people who use water, not houses. Although household numbers across England are projected to increase, this varies significantly between regions. In order to address affordability, we need to build more housing where the demand is greatest. Some of these areas are seriously water stressed, and we continue to work with the Environment Agency to ensure water efficiency is taken into account in planning and delivery of housing growth. Both the Environment Agency and water companies are statutory consultees for Regional Spatial Strategies and Local Development Frameworks, which enables them to make representations on the adequacy of water resources to support housing growth.

15. We are confident that with today's technology for metering, tariffs and water efficiency that **per capita consumption of water can be reduced, through cost effective measures, to an average of 130 litres per person per day (l/p/d) by 2030**. We hope that developments in new technology and future innovation will improve the cost effectiveness of these measures over time and that this can drive consumption down further to an average of 120 l/p/d per day by 2030.

16. **In April, the Energy Saving Trust will launch the new Green Homes Service, to help people move towards a greener lifestyle**. This will provide a one stop shop service through a network of advice centres in every region of the country to provide advice to householders on energy and water efficiency, micro generation, waste reduction and recycling, and greener travel options[8]. Increasing water efficiency to reduce the amount of water we use in our homes, particularly hot water, will help us reduce our greenhouse gas emissions.

17. Government also encourages schools to teach children about water efficiency, install water efficient equipment, collect/use rainwater, and monitor their consumption. This has educational benefits and helps schools save water and money on bills.

Metering

18. Currently only 30% of households in England have a water meter. Metering gives customers a financial incentive to save water, and can therefore promote water efficiency measures and water savings. On average, households reduce their water consumption by around 10% after a meter is fitted. The introduction of variable tariffs to encourage efficient water use, such as rising block tariff and seasonal tariffs linking price to seasonal availability, could provide an incentive to reduce water consumption further still in metered households.

19. As metering increases, so does the range and flexibility of measures to address water availability and quality problems, as well as measures to address affordability concerns. It is potentially a very important tool for ensuring adaptability in the water sector. From October 2007, following the agreement of a proposal developed by the Water Saving Group, water companies whose areas have been identified as seriously water stressed have been given extended powers to increase compulsory metering. We welcome the commitment to metering that those companies have now made in their strategic direction statements in advance of their water resources management plans later this year.

20. Later this year, **we will commission an independent review to provide further advice on metering and charging**. Further details are set out in Chapter 8.

New buildings

21. We are working to reduce the impact of new housing developments. The joint Communities and Local Government department (CLG) and Defra policy statement on water efficiency in new buildings announced, alongside the Housing Green Paper[9], that **we will amend the Building Regulations to include a requirement for a minimum standard of water efficiency in new homes**. The requirement will be in the form of a calculated whole building performance standard set at 125 litres per day (l/p/d). This will ensure that all new homes have fittings with a good standard of water efficiency, while retaining flexibility in the way overall performance is achieved. New requirements on water efficiency will be introduced into Building Regulations at the same time as any changes to improve the safety of hot water systems and to update the supporting technical guidance. New

[8] www.energysavingtrust.org.uk/help_and_support/green_homes_service
[9] www.communities.gov.uk/publications/housing/homesforfuture

technical guidance will be available from October 2008 and the new requirements will come into force in April 2009.

22. Government is also showcasing building sustainability – buildings with good environmental performance and high levels of water efficiency – through various exemplar projects, such as the Olympic Village[10], the proposed Eco-towns[11], and the Thames Gateway[12]. We are committed to improving the sustainability of Government buildings – the new Defra offices in York and Alnwick are integrating rainwater harvesting systems to use in flushing urinals and toilets, as well as installing water efficient fittings. The Department of Health will be producing new best practice guidance on water management and water efficiency in 2008. This will reduce the demand for mains water and aims to surpass the Government 2020 water use target of $3m^3$ per person per year.

23. CLG has also issued the Code for Sustainable Homes[13], a national voluntary standard for the sustainable design and construction of new homes, specifying three minimum performance levels for water use. As of April 2007, all housing built on English Partnerships' land and **from April 2008 all social housing funded through the Housing Corporation has to be built to Code level 3, a performance standard of 105 l/p/d, representing current best practice in water efficiency without requiring water reuse or rainwater harvesting**. Last year CLG consulted on whether all new homes should receive a mandatory rating and has since confirmed that the Government will introduce this measure.

Box: Thames Gateway – towards water neutrality

The Thames Gateway is Europe's largest regeneration project and a major growth area. It will help deliver the Government's house building targets, with 160,000 new homes by 2016. Like much of the South East, the Gateway area is seriously water stressed, and there are few water supply options without serious financial and environmental implications.

The Environment Agency, in partnership with CLG and Defra, has led a study exploring the feasibility of achieving water neutrality – where total water used after new development is no more than that used before the development, leaving water in the environment for wildlife and for people to enjoy. The study shows that, even with the forecast new development, population growth and increases in water demand, water neutrality is technically possible to achieve. The study identifies different packages of measures for achieving neutrality through increasing the level of metering, introducing variable tariffs, improving the water efficiency of new housing, retrofitting existing homes with water efficient options and reducing demand from non-households.

This study demonstrates how growth and sustainable management of water resources can go hand in hand. We are working with CLG, the Environment Agency, Ofwat and water companies to explore further the costs and delivery mechanisms for achieving water neutrality in the Thames Gateway.

[10] www.london2012.com/documents/locog-publications/london-2012-sustainability-plan.pdf
[11] www.communities.gov.uk/documents/housing/pdf/eco-towns
[12] www.environment-agency.gov.uk/subjects/waterres/287169/1917628/?version=1&lang=_e
[13] www.planningportal.gov.uk/uploads/code_for_sust_homes.pdf

24. The recently published Planning Policy Statement on climate change[14] confirms that there will be situations where it could be appropriate for local planning authorities to expect higher levels of building sustainability than the standards set nationally through building regulations. Local requirements should be brought forward through development plan documents and focus on known opportunities. Local planning authorities are expected to demonstrate clearly the local circumstances that warrant and allow such local requirements. These could include, for example, where planned areas of development are located in areas of serious water stress and the envisaged development would be unacceptable without a higher standard of water efficiency. Any local requirements should be specified in terms of the achievement of nationally described sustainable buildings standards. In the case of housing, this could be done by expecting proposals to be delivered at a specific level of the Code for Sustainable Homes.

25. CLG is commissioning work as part of the wider Green Commercial Buildings Task Force programme to explore the scope for developing water efficiency performance standards for non-domestic buildings and services. This would exclude water used for industrial processes.

Existing homes

26. The revised Building Regulations and the Code for Sustainable Homes will ensure that new buildings will be significantly more water efficient than much of the existing building stock. However, new housing will only represent a minor proportion of the total.

27. Defra, CLG, the Environment Agency and others are working to identify measures that could be introduced to achieve substantial improvements in the water efficiency of existing homes. We are reviewing evidence to identify the most effective measures, overcome barriers to their adoption, and assess the costs and benefits of implementation programmes, as well as learning lessons from programmes to improve the energy efficiency of the existing housing stock.

Products and appliances

28. We expect the demand for water efficient products from new housing to help drive the market and improve the efficiency of everyday water using products over time. To further facilitate these improved levels of efficiency, **we will review the Water Supply (Water Fittings) Regulations 1999 later this year. These cover for example the maximum water use of toilets, urinals, washing machines etc. The review will also consider enforcement issues, advances in technical standards and water conservation, and the case for setting new performance standards for key water fittings**. During the review, we will apply better regulation principles and seek opportunities to reduce the overall administrative burden.

29. In due course, there may be European standards and labelling schemes for some categories of water using products, as measures proposed by the European Commission in its Communication on Water Scarcity and Droughts are taken forward. We welcome the principles behind these measures

[14] www.communities.gov.uk/documents/planningandbuilding/pdf/614742

and will continue to work with the Commission and other Member States on the different proposals, including establishing minimum water efficiency standards for products such as dishwashers and washing machines, via the Framework Directive for the Eco-design for Energy Using Products[15]. We will encourage the Commission to do the same for other water using products under its wider proposals for eco-design requirements under the Integrated Product Policy Framework.

Box: European communication on water scarcity and droughts

On 18 July 2007, the European Commission published *Addressing the challenges of water scarcity and droughts in the European Union*. This Communication envisages that water scarcity and drought management can be handled through the Water Framework Directive. It places a strong emphasis on demand side action as a measure to alleviate water scarcity, and to improve resilience against the consequences of drought. It also emphasises the role of water pricing. These topics are addressed in subsequent chapters of this document.

Defra and the devolved administrations broadly support the Communication's aims, and agree with the Commission that there is no need for further EU legislation to deal with either water scarcity or drought. The water company drought and water resources planning regimes in England and Wales mean we are well placed to take forward any national actions or requirements under the Communication.

The Communication has been welcomed by the Council of Ministers and the European Parliament.

More information is available at http://ec.europa.eu/environment/water/quantity/scarcity_en.htm

30. Retailers play a powerful role in influencing manufacturers and industry to develop more water efficient products, and householders in their purchasing decisions. We will be exploring how to work with whole supply chains to encourage the purchase of such products. The launch of the industry-led, voluntary labelling scheme for water efficient products announced by the Bathroom Manufacturers' Association last year, is a very welcome development that will help customers make informed choices when buying bathroom products.

31. Government is taking action to identify and address the environmental impacts of products, services, and materials consumed and used in the UK. As part of this work, the Market Transformation Programme (MTP) is working to identify options on how to improve the efficiency of water using products, such as showers, dishwashers and washing machines. For example, MTP estimates that toilet flushing will use over 1,900 megalitres of water per day (Ml/d) in 2010, but that by using a mix of policy measures, including establishing minimum standards, this could be reduced to 1,450 Ml/d by 2020.

32. Plumbers often advise consumers on products and appliances. There are a number of existing registration schemes for plumbers, and we will work with existing scheme operators, trade associations and others to further the role of plumbers in promoting water efficiency.

33. The opportunities for capturing and using water, through rainwater harvesting, or reusing water through recycling greywater, are discussed in Chapter 3.

[15] http://ec.europa.eu/enterprise/eco_design/index_en.htm

Box: Did you know…? Water footprinting

While the average person in England and Wales uses about 150 litres of water daily in the home, this is only the tip of the iceberg. Waterwise has estimated that the average person consumes over 3,400 litres every day, taking into account the water which has gone into making the products we consume, from the car we drive to the food on our plate. This includes water use along the supply chain both in the UK and overseas.

Well-run businesses understand and report on where the water used in their supply chains may have significant impacts on water resources and water quality, whether in the UK or overseas. Our environmental reporting guidelines suggest that companies report discharges to water, such as effluents; direct water use such as the inputs into production and cleaning processes; and indirect water use which has been embedded through the supply chain. We will also be taking water use into account in work to develop 'product roadmaps' to identify and address the environmental impacts occurring across the life cycles of ten key products. The products under focus include WCs, which account for almost a third of water consumed in the home, and clothing, where hidden water use from irrigation of cotton crops, clothing manufacturing, and laundering is high.

Non-household water use

Industrial and commercial use

34. Water is a key resource for industrial and commercial sectors, nearly all of which pay for water through meters. This means that most businesses have a financial incentive to reduce the amount of water they use. We want to continue to work with industry to promote awareness of the need to use water resources more efficiently, and to encourage industry-led water efficiency initiatives that do not compromise health and hygiene standards.

35. The food industry, for example, is a major water user, taking around 10% of all industrial abstractions and another 10% of total industrial water use from the public supply. The Food Industry Sustainability Strategy (FISS)[16], launched in 2006 to improve environmental, social and economic performance, challenged the food industry to reduce its current levels of water usage by setting the industry an overall water reduction target of 20% by 2020, against a 2007 baseline. The Food and Drink Federation responded to this challenge with a partnership initiative to reduce water consumption[17], and in addition 21 food and drink firms have recently pledged to cut the amount of water they use in manufacturing. We welcome this action and encourage other sectors to undertake similar voluntary agreements and to lead by example in order to implement water saving measures.

36. The Envirowise programme[18] has provided practical advice to businesses on different aspects of resource efficiency, including water minimisation, which has directly resulted in savings through reduced water and effluent costs for the industry. Envirowise has also engaged with businesses on specific initiatives. For example, it is collaborating with Severn Trent Water to support its key business customers in assessing their water use and identifying changes that will enable them to use

[16] www.defra.gov.uk/farm/policy/sustain/fiss
[17] www.fdf.org.uk/reducingwateruse.aspx
[18] www.envirowise.gov.uk/

water more efficiently. Envirowise has also managed Defra's Enhanced Capital Allowance scheme[19] to support businesses investing in water efficient technologies.

37. The National Industrial Symbiosis Programme[20] (NISP) has matched operators' waste resources, including water, with the raw material needs of other operators. This has helped recover value from resources that would otherwise be wasted, and generated new business opportunities.

38. **In 2008, the work of the Water Saving Group will be extended to review the arrangements for promoting water efficiency in the industrial and commercial sectors and consider whether there is a case for further measures**.

Agriculture

39. Although agriculture uses only 1% of our water resources, this masks significant seasonal and regional differences. In East Anglia, for example, agriculture uses 16% of abstracted water, and in some rivers all the water abstracted is for agriculture. In summer, daily irrigation can exceed abstraction for public use and damage habitats.

40. In general, climate change – in particular higher temperatures and drier summers – is likely to increase the demand for irrigation in the summer. Agricultural irrigation could increase by about 20% by 2020, and 30% by 2050, at the same time as summer rainfall would decrease[21]. Demand is concentrated particularly on lighter soils, sands and sandy loams, in Eastern England, the East Midlands and the South East, where most field crop irrigation is carried out. This distribution of irrigation use corresponds to areas of high isolation and least summer rainfall. In addition, this supply is demanded during the driest part of the year, when pressure on the public water supply system and the environment is at its highest, and is abstracted almost equally from ground and surface water sources.

41. However, changes to farming practice, crop type or variety, can reduce the demand for water from agriculture, and research and knowledge transfer can also help address water use. We recently produced an irrigation best practice guide and water management toolkit for field crop growers, and are funding research to optimise water use in crop production, focusing on breeding, novel watering techniques, and irrigation practice.

42. Perennial energy crops will generally use more water than food crops, potentially impacting on both the ecology and water availability within the catchment. We fund breeding programmes for willow and Miscanthus to enable the sustainable development of crops for use in energy generation, and research which includes the development of water efficient crops.

Water industry and regulators

43. Water companies have a duty to promote the efficient use of water by their customers. In August 2007, Ofwat set voluntary targets for water companies to reduce the amount of water delivered. Performance against these targets will be reported annually by Ofwat and are an interim measure to inform future decisions on targets and benchmarks for PR09.

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[19] www.eca-water.gov.uk
[20] www.nisp.org.uk
[21] King, J. et al (2006), *Water use in agriculture: establishing a baseline*, http://randd.defra.gov.uk/Document.aspx?DocumentID=1327.

44. We welcome Ofwat's voluntary water efficiency targets and are working with them and the water industry on the rapid development of mandatory targets. The draft Social and Environmental Guidance encourages Ofwat to take into account the wider social and environmental benefits of such targets when setting them. Experience from the energy sector shows that the energy efficiency commitment has driven energy efficiency activity. Government will consider whether some form of water efficiency obligation on the water industry is required in light of the experience of Ofwat's targets.

Box: Water efficient devices from your water company

All water companies offer water efficient devices either free of charge or at a subsidised rate. These include:

- Cistern Displacement Devices (e.g. Hippos, Save-a-Flush)
- Water butts
- Trigger hose attachments
- Domestic/commercial water audits
- Free supply pipe repair/replacement (in most cases)

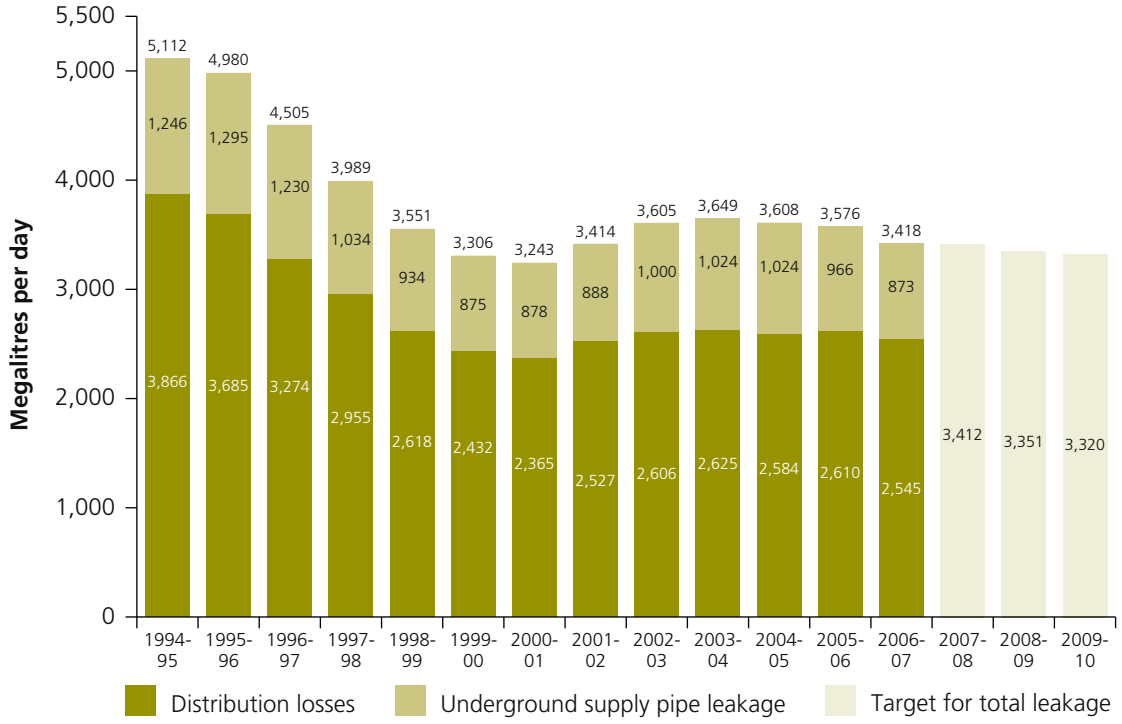
In addition, all water companies have water saving information on their websites, along with information in bills and literature – check your water company's website to see what you are entitled to.

Leakage

45. Since total leakage peaked in 1994/95, it has been reduced by 33% in England and Wales, and leakage rates are comparable to some of the lowest in Europe. While completely eliminating leakage would be impossible, particularly as in many cases we are left with Victorian infrastructure, almost one quarter of all water supplied is still lost through leakage. Leakage not only wastes water, it also wastes the energy used in treating and distributing it. The emissions associated with the water lost through leakage are equivalent to around 10% of the water industry's total greenhouse gas emissions. New technology and improved management techniques should improve the finding and fixing of leaks in the long term. We therefore expect the level of leakage to reduce over time. Failure of water companies to meet their leakage reduction targets and communicate progress on leakage to consumers will compromise wider messages on water savings.

46. Of the water lost through leakage about one quarter is lost through customers' supply pipes. The expected increase in metering within the domestic sector, as outlined in water companies' strategic direction statements, and the development of technologies to help detect household leakage will assist in reducing the extent of supply pipe leakage in the future.

Figure 5: Total water industry leakage, 1994/95-2009/10



Source: Ofwat, 2007

47. The majority of water companies are now at their Economic Level of Leakage (ELL), the level at which the cost to companies, and therefore to customers, of further reducing leakage exceeds the cost of producing water from an alternative source. The ELL is responsive to changes in the cost of water, as water resources become more scarce, the cost of developing new water supplies will increase and cause the ELL to fall. Balancing the costs of water saved by reducing leakage and the costs of developing new water resources helps ensure that water is supplied to customers in the most cost effective manner. Reducing leakage below this level could not be achieved without significant increased costs to consumers. We have been concerned that the present approach to setting ELL did not take proper account of all the social and environmental costs. Ofwat has recently reviewed its approach to leakage regulation to identify where improvements could be made.

48. The final outputs from this review provide recommendations on technical improvements to the calculation of per capita consumption estimates and best practice guidance to water companies on how to assess environmental and social costs in their leakage target calculations. **Ofwat will inform water companies how they will be expected to update their methodologies to take account of the technical recommendations for per capita consumption estimates and the guidance on the social and environmental costs**.

49. Ofwat's review also investigated a full range of alternatives to the ELL, to ensure that the methodology is achieving the best outcomes for customers and the environment. This confirmed ELL as a robust method and identified two approaches for further consideration: a refined ELL, taking wider account of social and environmental costs, and a 'frontier' approach. The frontier approach would involve banding of water companies based on their leakage management efficiency, and reducing leakage as companies move towards the best performers in the industry. **Ofwat and the Environment Agency are reviewing suggested refinements to the ELL, and have commissioned further research into the viability and likely impact of the frontier approach**.

Twin-track approach

50. We expect water companies to adopt a twin track approach to water supply and demand, having assessed the impact of climate change and other factors on their business. Water companies should look at the full range of options for reducing water demand. Where the projected demand reductions are insufficient or unjustified in terms of cost, water companies should also progress with the development of sustainable new supply side measures, such as reservoirs. Each option has costs, benefits, risks and uncertainties, and each water company needs to find the most sustainable and cost effective balance of measures according to its own circumstances in its water resources management plan.

51. The same principles apply to other water users too. The projections for demand side measures should be factored into decisions on increasing supplies of water, whether taken from water companies or by direct abstraction. The next chapter outlines different water supply options.

Water resources today

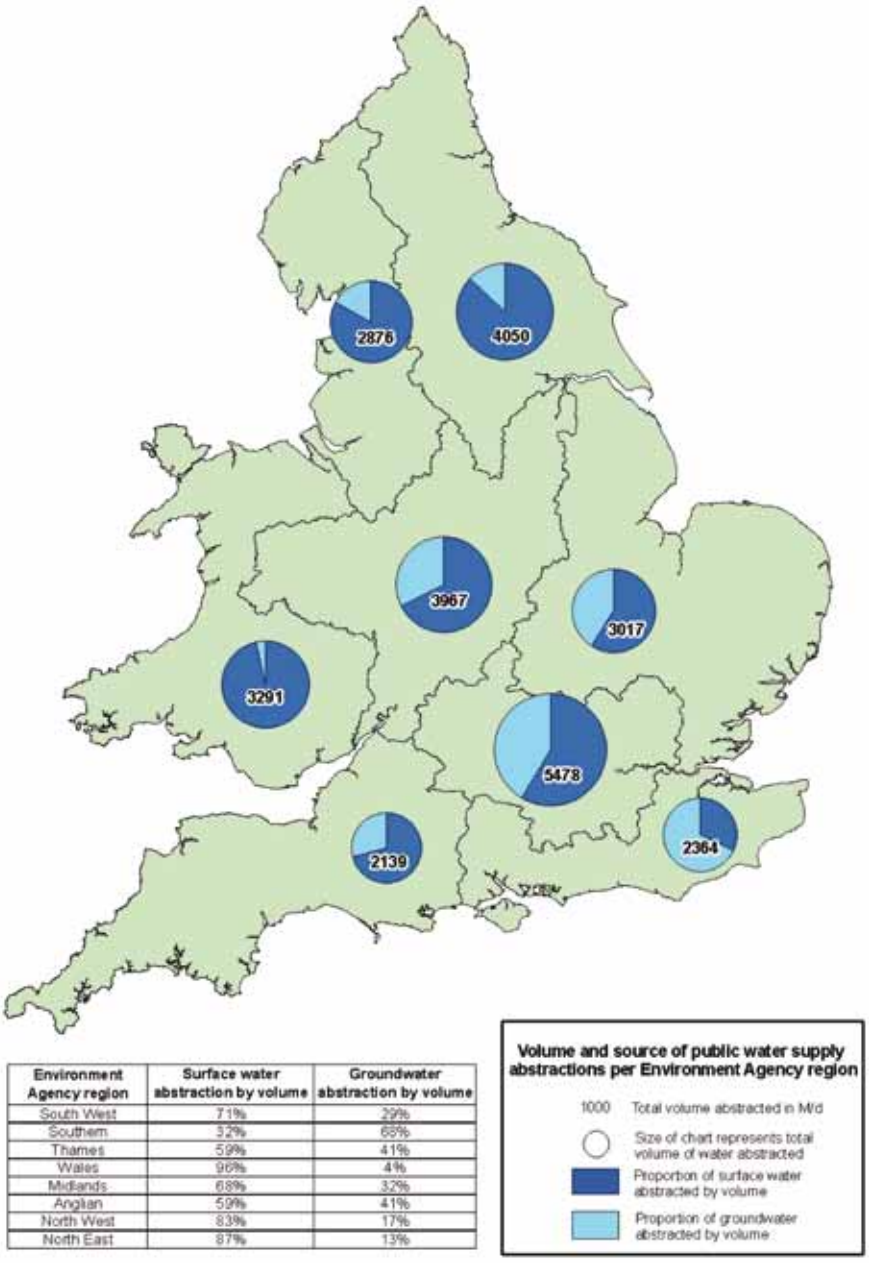
1. The water we drink and which is used by farming and industry comes from three main sources: reservoirs, rivers, and underground aquifers. Every year, around 18 billion tonnes of water are taken from these sources in England. Of this, about 6 billion tonnes are put into the public water supply. Electricity generation uses 9 billion tonnes, industry 2.1 billion, farming 0.2 billion, and other uses, such as fish farming, account for the rest. Figure 6 shows the regional variations in both the amount of water taken for the public water supply and the proportions taken from surface water and groundwater.

2. Water is commonly seen as an unlimited resource. Even after nearly two years of drought in the South East there was a continuous supply of water from our taps in the summer of 2006. In reality however, water is limited and public supplies were maintained as a result of restrictions on non-essential uses and the excellent public response to the situation. Even so, a third dry winter could have caused serious problems for many.

3. To meet water demand, we are already abstracting water unsustainably in certain regions, which contributes to water stress. This can have serious environmental impacts. Reducing river flows and levels can reduce or even interrupt water supplies to homes and the environment, and reduce the oxygen available for plant and animal survival in the water. It can dry out and destroy wetlands, with the loss of the biodiversity and flood protection functions they provide. It can also increase the risk of flooding during heavy rainfall, through blockages due to siltation.

4. Less water in the environment also reduces the ability of rivers to dilute pollutants, leading to poor quality and in some cases foul smelling waters, and increasing the treatment requirements when the water is abstracted for drinking supply. As water treatment is energy intensive (see Chapter 7), this results in increased emissions of greenhouse gases.

Figure 6: Regional abstractions for public water supply (licensed water abstractions, 2005)



Environment Agency region	Surface water abstraction by volume	Groundwater abstraction by volume
South West	71%	29%
Southern	32%	68%
Thames	59%	41%
Wales	96%	4%
Midlands	68%	32%
Anglian	59%	41%
North West	83%	17%
North East	87%	13%

Source: Environment Agency, 2005

Future pressures

5. Pressures on our water resources are set to increase. Population growth and changes in household size mean more houses are needed in some areas where abstraction is not currently sustainable. Climate change is expected to severely worsen the situation with drier, hotter summers and more intense and sporadic winter rain, and some lower river flows even in winter. In addition, rising temperatures and changing precipitation patterns are likely to change the public demand for water. Protecting and in some cases enhancing our water resources is therefore essential.

Vision for the future

Box: Vision for 2030

People, businesses and industry using water resources sustainably, with no interruptions to essential supply during drought

A water sector contributing to the protection and enhancement of the natural environment, with abstraction management consistent with habitat conservation

A water sector planning for the long term and medium term needs of the environment and the community, including resilience and emergency response

Achieving the vision

Strategic approach – abstraction licensing

6. The principal mechanism for achieving sustainable management and development of water resources is the Environment Agency's system of abstraction licensing. The system was introduced in the 1960s and has recently been updated through the phased implementation of the Water Act 2003. An abstraction licence is generally needed for taking water from rivers and aquifers where the quantity taken exceeds the threshold of 20 cubic metres per day. Abstraction rights can be transferred or apportioned within the current licensing regime; the review of competition for water (discussed in Chapter 9) will examine whether the system can be modified to facilitate this further. For historical reasons, many licences were issued to remain in force until revoked and cannot be readily modified. All licences issued since October 2001 have been issued with a time limit. There is a presumption of renewal such that a new licence would be granted, on the expiry of a time-limited licence, subject to a continuing need for, and efficient use of, the abstracted water and so long as the environmental impacts of the abstraction are acceptable.

7. We need to ensure that water resources are allocated efficiently in order to cope with the anticipated impacts of climate change and to achieve water quality objectives. **We intend to consult on further changes to the licensing regime. There is a genuine case for all abstraction licences to be given a time limit within the third cycle of River Basin Management Planning, covering the time period 2021-2027**. The anticipated timing of this change means that users would have a reasonable period in which to adjust. Time limiting all licences would enable the Environment Agency to reassess, through the Catchment Abstraction Management Strategy process, the pressures on each water body alongside the demand for water on a regular basis and take into account the latest climate change information to ensure the environment is adequately protected. This would help us make better use of water in areas of scarcity, allow redistribution of historical allocations of water resources, and also offer opportunities for new abstractors – including new entrants to the water supply market – to gain access to water.

8. We have asked the Environment Agency to take appropriate action, using the mechanisms set out in statute, to deal with abstractions that are adversely impacting designated nature conservation sites. Its Restoring Sustainable Abstraction programme is intended to deal with such impacts at Natura 2000 sites and Sites of Special Scientific Interest in particular.

Box: Public Service Agreement (PSA) Delivery Agreement 27 – leading the global effort to avoid dangerous climate change

In October 2007, the Chancellor of the Exchequer announced a new PSA on climate change. Sustainable abstraction, as measured through the water availability status in catchments, is the chosen indicator of the extent to which we are adapting to climate change. The achievement and maintenance of sustainable abstraction requires that policy is adaptable to changing climatic conditions. This indicator captures efforts to reduce demand and use water efficiently, and long term planning to ensure resilience of water supply. It reflects the totality of abstraction impacts from local to national level.

Strategic approach – water resources management plans

9. The abstraction licensing system is at the heart of water resources management. Because of the importance of the public supply in providing our water, and because its abstractions have the most significant impacts on the water environment, we have put in place systems to ensure supplies can be maintained at an acceptable cost to the environment.

10. Water companies produce water resources management plans (WRMPs), which look ahead 25 years. These plans became a statutory requirement in April 2007 and will now be subject to public consultation. They will therefore provide the opportunity for a broader debate about how sustainable water supplies are to be achieved and maintained, and help identify the optimal combination of demand management and new resource development. The first public consultations will take place later this year, and final plans will be published in summer 2009. The Secretary of State has the power to direct changes to the plans.

11. These plans will become vital to our work on adaptation, as they will include projections of current and future demand for water, based on climate change and other considerations such as population and household size. The Environment Agency has produced guidance to the water companies on how these should be factored into the plans. The plans will identify a range of supply and demand side options and include an assessment of the impact of each of these in terms of greenhouse gas emissions. They will also assess the social and environmental costs of the different options.

12. We also welcome Ofwat's introduction of long term plans and strategic direction statements by water companies into the review of water price limits (PR09), and the development of a new water resources strategy by the Environment Agency to replace its current strategy, *Water Resources for the Future*.

Water supply options

13. The projected need for more water means we must examine supply options more strategically. We do not support the development of a national water grid, as work carried out by the Environment Agency has shown that such a grid would be cost ineffective and highly energy intensive, with significant implications for greenhouse gas emissions. However, there may be real opportunities for water companies to work together on a local or regional grid basis to improve the supply-demand balance and the resilience of supply security through greater interconnectivity.

14. Water companies should consider, in their WRMPs, the full range of options to share water resources with other companies to make more effective use of them, particularly at times of drought. That range of options includes, for example, further bulk transfers of untreated water and potentially includes the development of 'regional water grids' to move water around. For example, in the North West there is a system that allows water to be distributed around Cheshire, Lancashire and Cumbria, and similar arrangements exist in Devon and Cornwall.

15. Sea water and brackish water can be made drinkable through desalination processes, although this is likely to come at a high financial and environmental cost, particularly in terms of greenhouse gas emissions. This option should therefore be carefully assessed before being taken forward as part of a WRMP. Any decisions in relation to the various permissions necessary for the development of desalination plants will continue to be made on a case by case basis.

16. Some non-potable household water demand, for example toilet flushing and garden watering, can be met through alternative water sources. Rainwater can be harvested in water butts or larger systems, and greywater – water from baths, showers and sinks – can be recycled. Similarly, many industrial processes do not require water to be treated to potable quality. There will also be scope for imaginative solutions to specific development projects. For example the use of local boreholes to supply water for a range of non-potable applications.

17. The cost of installing a tank and pipework to capture rainfall is significantly cheaper in new buildings than in existing ones, and in larger premises or small communities as compared to individual houses. There are therefore real opportunities for developers, owners or managers of land and property to create local rainwater storage for both commercial sites and houses. For example, systems on agricultural sites to capture the increased winter precipitation predicted with climate change could make a very positive contribution to the supply-demand balance on farms in the summer.

18. While the current cost of water means installation of some rainwater collection systems for individual households can be hard to justify on purely financial grounds, there are some very simple and cheap options to maximise water savings, such as using water butts to collect and store water for garden use.

19. Recycling water from showers, baths and sinks within households to use for such things as toilet flushing is made somewhat more difficult by the relatively large upfront and maintenance costs, and concerns over potential cross contamination of the drinking water supply.

20. As greywater recycling systems – and some rainwater harvesting systems – require energy for treatment and pumping we do not think it appropriate to mandate these types of systems within all buildings. However, greywater technology continues to be developed. To increase confidence in these developing technologies we will work with others to develop standards for non-potable water use.

Box: Future Water House

New housing will need to be more efficient in the way water is used. A house with the following fittings shows how level 5 of the Code for Sustainable Homes could be achieved. The water use in this house is around 80 litres per person per day (l/p/d), compared to around 150 l/p/d in a standard new house built today.

	Standard new built house (150 l/p/d)		**House meeting Code for Sustainable Homes level 5 (80 l/p/d)**		
Appliance/fitting	**Specification**	**Contribution to daily use**	**Specification**	**Water reuse**	**Contribution to daily use**
WC	6 litre single flush	28.8	4/2.6 litre dual flush (6.33+ 8.36)	14.69	14.69
Washbasin taps	4 l/min	14.11	6 l/min		15.87
Shower	10 l/min	30	7.75 l/min		23.25
Bath	180 litre	28.8	120 litre		19.2
Sink taps	8 l/min	28.22	7 l/min		18.52
Washing machine	49 litre	16.66	40 litre	13.6	13.6
Dishwasher	13 litre	3.9	10 litre		3
Water re-use system	_	0	-100m^2 roof, 0.6m annual rainfall, 0.6 efficient, 3 persons. Water butts could also meet a significant proportion of garden watering demand	collected = 32.88 WC+washing machine use =28.29 Max benefit = 28.29	–28.29
TOTAL		150.49			79.84
	Source: BRE		Source: Code for Sustainable Homes		

Figure 7: Future Water House

underground rainwater tank

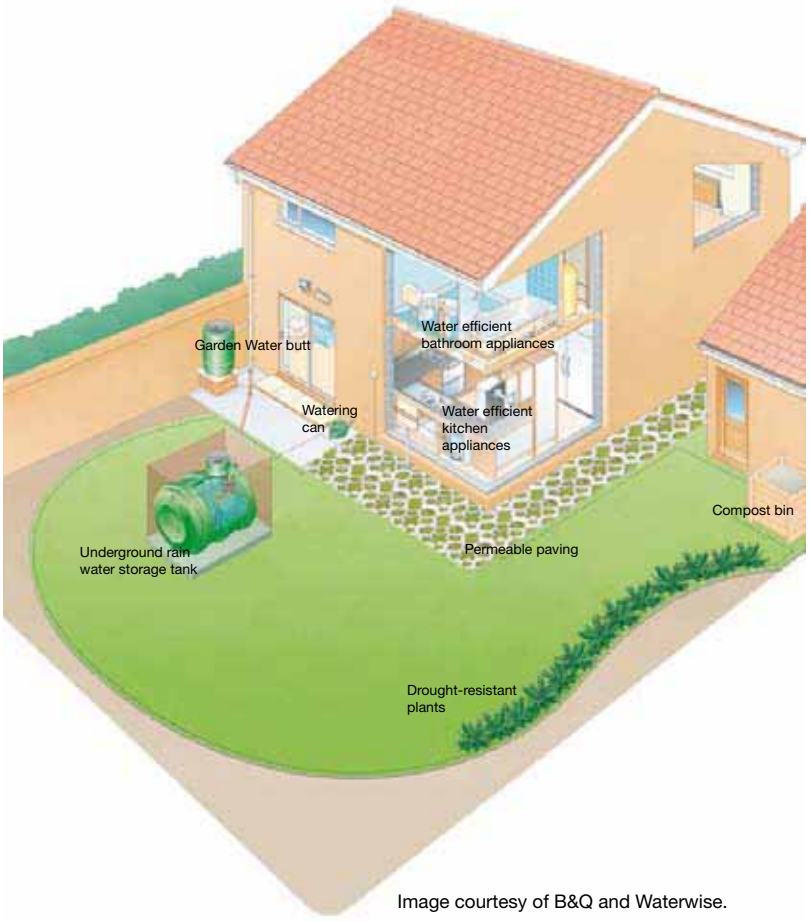
Rainwater can be harvested and used, and greywater from sinks and baths can be recycled and used for toilet flushing and garden watering. This can be done simply, through a water butt in the garden, or through larger local storage tanks and treatment systems.

in the garden

A water butt can store water for garden watering, reducing reliance on the mains water supply for this. Planting drought-resistant plants can help further reduce the demand for water in summer.

permeable paving

Hard surfaces contribute to the surface water flood risk. Permeable paving allows rain to be absorbed by the ground.



in the bathroom

Toilet flushing is responsible for almost one third of total household water use. This can be reduced by fitting low flush or dual flush toilets. Smaller baths and water efficient showers can also be fitted to reduce water consumption, and installing efficient boilers reduces the energy needed to heat water.

in the kitchen

Save water in the kitchen through water efficient dishwashers and washing machines, and water efficient sink taps.

leaks and drips

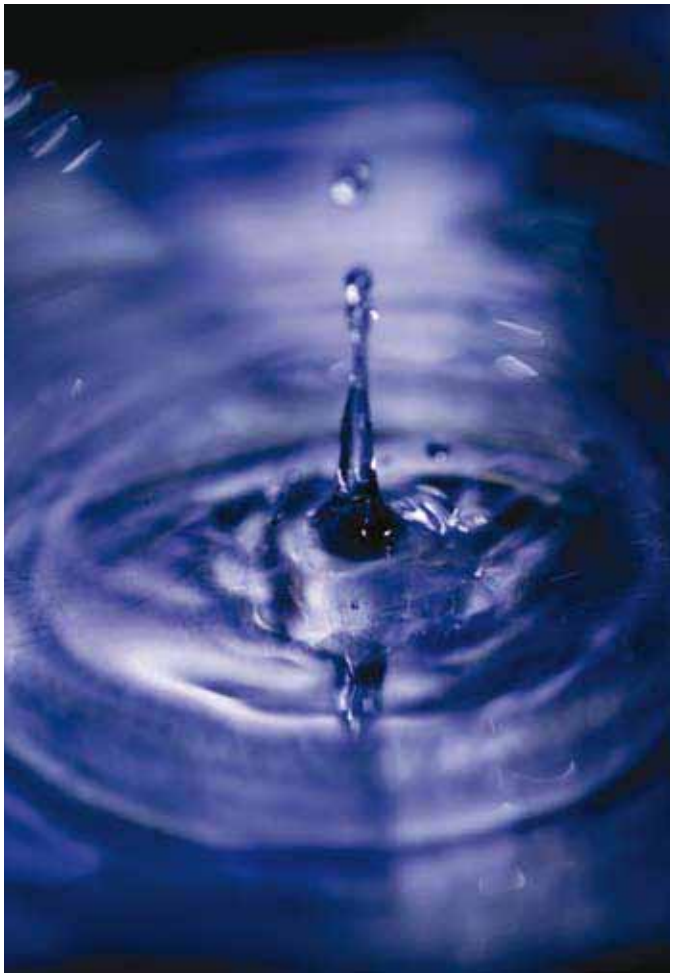
A dripping tap can waste up to 15 litres of water a day, or almost 5,500 litres per year. Replace worn washers for a quick and cheap way of saving water.

Image courtesy of B&Q and Waterwise.

21. There may also be a need for more traditional supply options, such as additional reservoirs. The water resources management planning regime, coupled to **the development of a National Policy Statement for water supply and wastewater treatment infrastructure, as envisaged by the Planning Bill[22], is intended to speed up the process of planning permissions for reservoir development where such development is appropriate**. This will facilitate the provision of new storage facilities such as for capturing increased winter precipitation. However, the National Policy Statement will make clear that such developments must be justifiable within the twin track approach described in Chapter 2.

[22] http://services.parliament.uk/bills/2007-08/planning.html

Drinking water quality



22. Drinking water must be wholesome at the point of supply, that is, from consumers' taps. Wholesomeness is defined in legislation, by reference to drinking water quality standards which relate primarily to human health, but also ensure that water is acceptable for water treatment processes as well as for consumers.

23. Water companies have a duty to test water samples for certain substances and organisms. The Drinking Water Inspectorate (DWI), set up in 1990 as the independent regulator of drinking water quality, checks the accuracy of these tests and publishes summaries of results. Enforcement action by DWI has ensured that nearly all of our water supplies now meet all of the drinking water standards. In 2006, 99.96% of tests met the required standard.

24. It is essential that good quality drinking water, and the investment by companies necessary to achieve it, is maintained into the future. To facilitate this, the Government recently amended legislation to enable ongoing maintenance and investment to be based on individual risk based assessments from the water source to the tap.

Infrastructure resilience and emergency planning

25. Water companies have to meet statutory requirements for dealing with emergencies and carrying out security, protection and surveillance work on their installations and facilities. They must also work with other responders to enhance emergency preparedness. The Government programme identifying hazards that can lead to civil emergencies includes incidents that water companies need to take into account in their emergency plans. These plans include delivery of alternative water supplies in the event of failure of the mains supply. In addition, the Environment Agency provides advice on the flood risk to infrastructure.

26. There is a need to consider further the risks and impacts of floods on water and sewerage infrastructure, particularly in light of recent flooding impacts on infrastructure, and the greater incidence of more extreme weather conditions that climate change is likely to bring. The events in July 2007 which culminated in the temporary loss of supply from the Mythe Water Treatment Works in Gloucestershire were unparalleled. The loss of piped drinking water affected around 350,000 people and constituted a major incident requiring a multi-agency response to deliver alternative water supplies to the affected areas.

27. Work has been put in place to take forward lessons from the flooding at Mythe. In particular, the Government has welcomed the interim report *Learning Lessons from the 2007 Floods*[23], published as part of the independent review being led by Sir Michael Pitt, and other reviews into the summer floods of 2007. Our response includes a **review of the current minimum requirement for the amount of water to be provided in an emergency**. In the draft Social and Environmental Guidance to Ofwat issued for consultation with this strategy, we emphasise the importance of ensuring that water companies carry out essential works to ensure resilience against natural hazards and the predicted effects of climate change. To meet the recommendations on business continuity and on complete loss of assets, we are considering issuing new guidance to the water industry under Security and Emergency Measures Direction 1998.

[23] www.cabinetoffice.gov.uk/thepittreview.aspx

Water quality today

1. The quality of the water in our rivers, lakes and estuaries is of crucial importance as an indicator of how well we look after our environment. Good quality waters also have great amenity and recreational value, enhance biodiversity and help reduce the costs and environmental impacts, such as from energy use, of treating water to make it fit to drink. The more polluted the water is, the more it costs to treat, and the greater the carbon footprint of the treatment.

2. Over the last few decades, legislation has increasingly addressed pollution, driving large-scale investment targeting the most polluting processes in industrial sectors. This has brought substantial improvements in the biological and chemical quality of rivers, as some of the most acute sources of pollution – such as sewage treatment works and sewer overflows – have been addressed.

3. For example, the river Thames, which fifty years ago was so polluted it was declared biologically dead, now supports over 120 fish species. Otters have returned to stretches of river from which they were absent for many years, and a recent British Waterways survey included 300 records of kingfishers. The quality of our bathing waters has also improved significantly, with almost all bathing waters in England consistently reaching mandatory standards.

Box: Did you know…? Anglers and water quality

Anglers are often the first to report pollution incidents – whether they involve dead fish or traces of sewage fungus – to the Environment Agency. Because fish are near the top of the aquatic food chain, their type, size, health and numbers tend to be good indicators of the health of water bodies. Angling clubs and the owners of land adjacent to watercourses contribute significantly to the protection and enhancement of the aquatic environment through the fisheries management projects they fund.

If you want to report a pollution incident, you can call the Environment Agency's incident hotline on 0800 807060.

4. But much remains to be done. Government has a target to deliver 95% of Sites of Special Scientific Interest (SSSI) by area into favourable or recovering condition by 2010. Many SSSIs are important for their freshwater and wetland interest. Of the 20% of sites still in unfavourable condition at the end of 2007, 8.6% (18,548 hectares) were affected by diffuse water pollution from agriculture. We need to do more to address chronic sources of pollution, especially those which accumulate from a range of small sources – diffuse pollution – rather than from a single point source.

Key pressures on water quality

5. A recent assessment of water quality looked more broadly at all of our water bodies (rivers, lakes, estuaries, coastal waters and groundwater) and assessed a much wider range of activities to see whether they were damaging the quality of the water bodies and the plants and animals that depend upon them. From these assessments, it is clear that we still have significant water quality problems to address (Table 1).

Table 1: Water bodies at risk of failing to meet good status in 2015 (%)

		Rivers	Lakes	Estuaries	Coastal waters	Ground water
Pressures	**Overall**	**93**	**84**	**99**	**85**	**75**
	Diffuse pollution	82	53	25	24	75
	Physical changes	48	59	90	78	n/a
	Point source pollution	23	20	49	18	4
	Alien species	21	9	37	46	n/a
	Abstraction	11	2	14	n/a	26

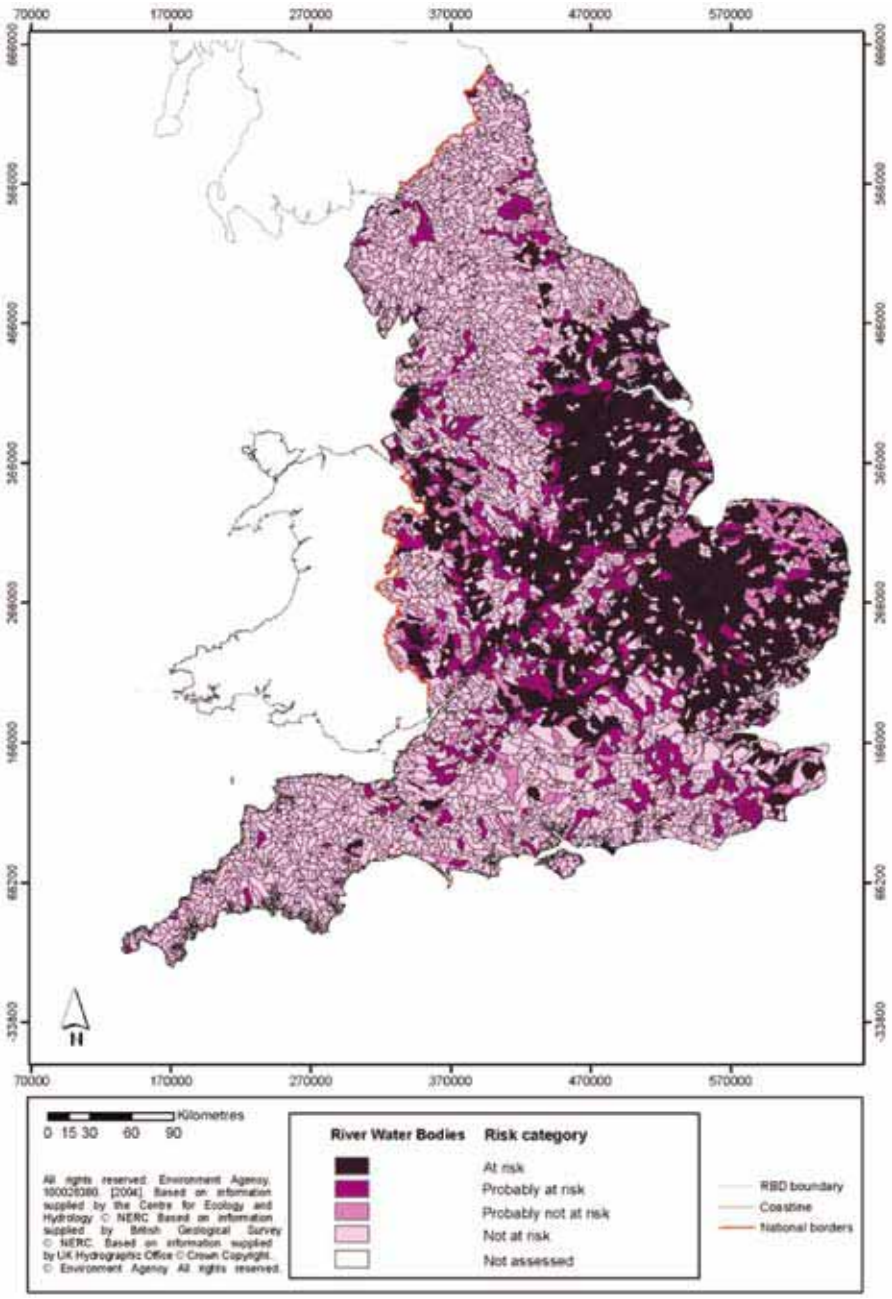
Source: Environment Agency, 2005

6. We must also take into account how new pressures are going to impact on water quality in the natural environment. For example, population growth will lead to new residential and industrial developments. And climate change will have some serious impacts: low flowing rivers will have reduced capacity to dilute pollution, and extreme weather events liable to produce problems such as sudden run-off will occur more frequently.

Improving our waters

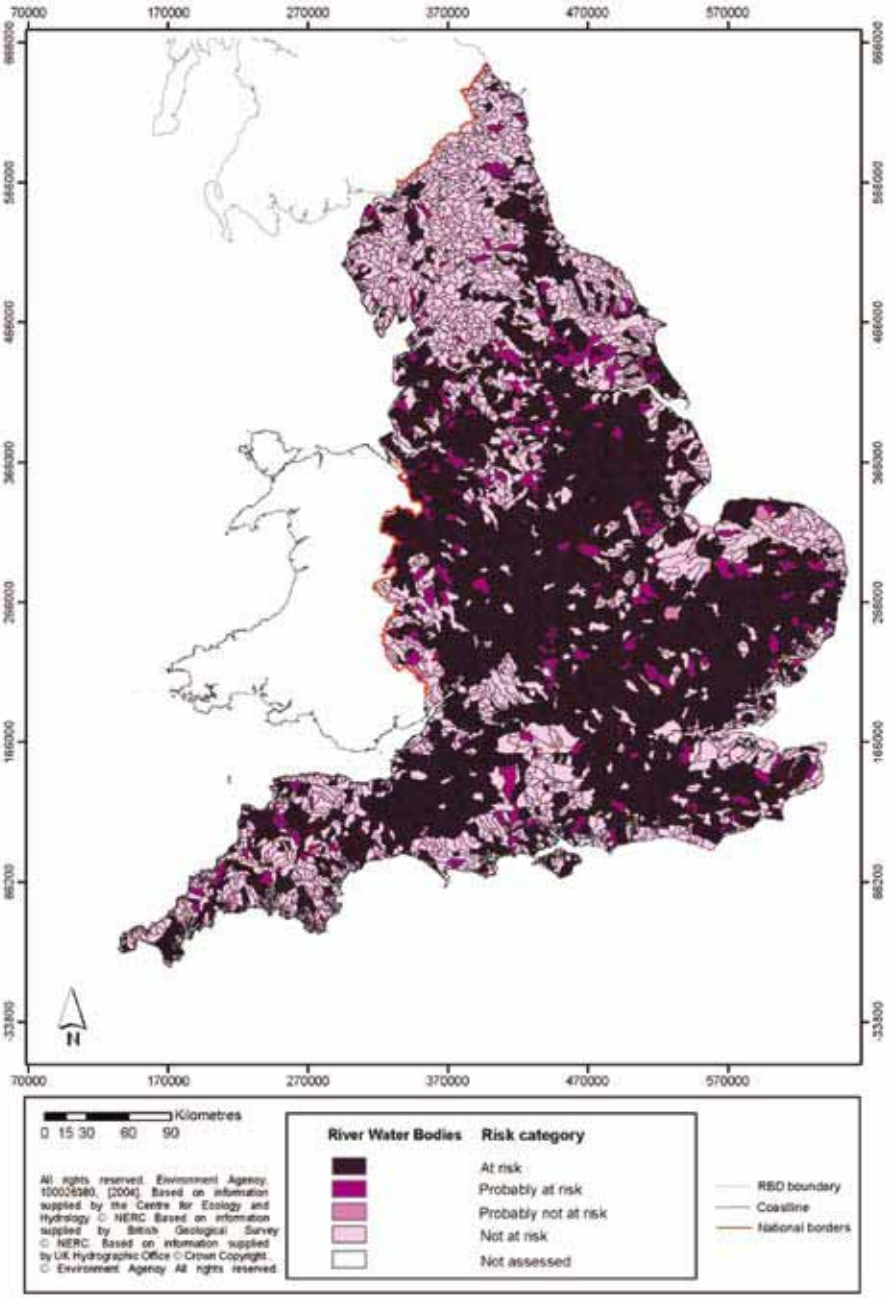
7. Proper management and treatment of discharges, for example from sewage treatment works or industrial effluent, will continue to be important. But we need to do more to address at source directly polluting discharges that enter sewers, such as phosphates from domestic laundry cleaning products, or which directly enter the water environment, such as when rain washes polluted run-off from highways or manure and fertiliser from farms and into rivers. Issues also arise from physical changes to water bodies, for example from development, and from abstraction, litter, microbial contamination and non-native (alien) species.

Figure 8: Oxidised nitrogen from combined sources in rivers



Source: Environment Agency, 2007
Map shows 2007 levels of oxidised nitrogen in rivers and current number of rivers at risk of failing to meet good ecological status by 2015 as required by the Water Framework Directive

Figure 9: Phosphorus from combined sources in rivers



Source: Environment Agency, 2007
Map shows 2007 levels of phosphorus, biochemical oxygen demand and total ammonia in rivers and current number of rivers at risk of failing to meet good ecological status by 2015 as required by the Water Framework Directive

8. Two important groups of pollutants that cause water quality problems are nutrients and hazardous chemicals, many of which come from diffuse sources. Excess nutrients – nitrates and phosphates – in rivers and lakes favour certain plant and animal species to the detriment of wider biodiversity, and in certain conditions toxic algal blooms can develop. Nitrates are also of continuing concern in groundwater, where they are the most widespread pollutant. Chemicals which are toxic and which may persist or accumulate in the water environment and living organisms are of particular concern. Scientific evidence associates sex changes of fish and other species with exposure to substances known as endocrine disruptors, which include human hormones and industrial chemicals. There is some concern about the possible impacts these chemicals could have on future fish populations and a demonstration project is underway to help assess the issues.

Box: Public Service Agreements and water quality

Public Service Agreements (PSAs) are key priorities for the Government for the period April 2008 to March 2011. Two of these PSAs are:

1. **Secure a healthy natural environment for today and the future; and**

2. **Lead the global effort to avoid dangerous climate change**

The first of these has indicators relating to water quality, biodiversity, and marine and land management. Progress on water quality is assessed using the Environment Agency's river water quality monitoring data. Water quality is also an important contributing factor to help meet biodiversity targets – such as the target to have 95% of Special Sites of Scientific Interest in favourable or recovering condition by 2010. Defra is the lead department for both of these PSAs.

9. Development, dredging and traditional flood management have changed profoundly the natural shape of river beds, banks and shores of estuaries. Such changes can cause erosion, affect sediment deposition, and alter the habitats available for aquatic plants and animals. They can also exacerbate or reduce the nature and seriousness of flood and drought events by changing volume, velocity and direction of flow.

10. Use of water resources, in particular over-abstraction of water, can lead to low river flows, and concentrate existing nutrient and chemical pollution threatening the survival of plants and animals that live in these rivers. Tackling water resource use is discussed in Chapter 3.

11. In addition to nutrients and chemicals, microbes from sewage and agricultural sources are present in some of our waters and, in high numbers, can make the waters unsafe for bathing. Invasive non-native species such as American signal crayfish, Japanese knotweed and Chinese mitten crab can threaten native species or their habitats, causing damage to economic activities such as forestry, agriculture and fisheries. As winters become warmer, the survival chances of non-native species, and therefore the threat from them, might increase.

Vision for the future

Box: Vision for 2030

Large majority of water bodies in England having good ecological and chemical status

People maximising sustainable use and amenity benefits gained from safe, healthy and attractive waters and water environments

Healthy rivers, lakes, estuaries, coasts and groundwaters that provide maximum resilience to climate change and sustain biodiversity

Major improvements achieved from tackling problems of nutrient pollution, chemical pollution, water resources, litter and microbial contamination

Land increasingly flexibly managed for flood storage

Reduced adverse impact of agriculture on the water environment through continued evolution of the EU's Common Agricultural Policy to deliver more environmental benefit

Achieving the Vision

A joined-up approach

12. Pollutants move with water, flowing in groundwater and along rivers and estuaries. Physical changes have upstream and downstream effects. Abstracting water or building a dam upstream reduces water flow in the rest of the river. Invasive non-native species can spread both upstream and downstream. As water quality problems are caused by a wide range of activities, we must consider improvements in a joined-up way, looking at the whole water catchment, from groundwater, upland streams, rivers and flood plains, through to estuaries and coasts. The Water Framework Directive (WFD) is an important instrument for achieving this.

Box: Water Framework Directive 2000/60/EC

The Water Framework Directive (WFD) provides the means to achieve our vision of improving water quality in a way that integrates financial, social and environmental considerations. It contains a strong economic component, requiring member states to look at costs and benefits when determining what measures to introduce and to encourage active involvement of stakeholders in the implementation process.

The Environment Agency must ensure that River Basin Management Plans are developed through consultation with stakeholders in each river basin district and that the measures in the plans are delivered. This requirement for integrated river basin planning and management will help deliver the necessary collaborative approach and achieve improved water quality.

The WFD requires that all polluters of the water environment should pay, and that implementation of the directive is achieved in a fair and proportionate way across all sectors. The Polluter Pays Principle (PPP) is difficult to apply in practice, particularly in the case of agriculture where farmers' activities have both positive (producing necessary food) and negative (contributing to diffuse water pollution) effects. It will be some time before PPP can be applied fully in this area. In the meantime, solutions still need to be found to tackle diffuse pollution at source.

13. One example of a novel and successful approach to joined up working is the Collaborative Research Programme for River Basin Management Economics. Through this four-year programme, Government and stakeholders from across the UK have developed and agreed the methodologies, tools and databases for comparing the costs and benefits of different actions to deliver the Water Framework Directive objectives.

14. The UK Technical Advisory Group (UKTAG) is developing environmental standards and conditions for the implementation of the Water Framework Directive on behalf of the UK administrations. UKTAG membership comprises the Environment Agency, Environment and Heritage Service of Northern Ireland, Scottish Environment Protection Agency and the UK conservation agencies and aims to ensure a consistent and joined-up approach across the UK.

Tackling pollution

Pollution into sewers

15. By reducing the amount of pollution entering sewers in the first place, we can reduce the amount that has to be removed at sewage works. This is a priority for us. We are working in close consultation with stakeholders to identify the best areas to tackle, but already know we must build on the work already done by the cleaning sector in eliminating phosphates from domestic laundry cleaning products: it is estimated that in England 5-10% of phosphate pollution to water comes from detergent use. A number of other member states, for example Germany, Belgium and the Netherlands, as well as significant parts of the US, have already introduced controls, and we are working with the UK Cleaning Products Industry to effectively phase out phosphates as an ingredient in domestic laundry cleaning products by the end of 2015. **The Government will consult on the way forward, including the case for regulation**.

Pollution from sewage

16. Nutrient pollution from sewage effluent is mainly tackled by the water industry at sewage treatment works, but this is not an area we can ignore: we have recently announced 24 more nutrient sensitive areas where additional action will be taken at sewage treatment works to tackle nutrient pollution problems. There are also ways to address problems by natural means. For example, water can be passed through reed beds to reduce sediment and help absorb run-off. Retaining wetland habitats such as peat bogs also helps prevent flooding and soil erosion and assists in building up groundwater supplies.

17. The Thames Tideway scheme, consisting of large scale infrastructure improvements to London's combined sewer system and treatment works, will address pollution from sewage, which affects the tidal river Thames and the river Lee. It is expected to be completed by 2020, and will make significant improvements to water quality and the natural environment in London, where there are currently between 50 and 60 overflows per year. The National Policy Statement on water and wastewater treatment infrastructure will include major infrastructure projects such as the Thames Tideway scheme.

18. Charges for pollution from industry into the sewer system – trade effluents – are calculated on the basis of a formula that aims to recover the costs of treatment and disposal, known as the Mogden formula. We recently reviewed this formula to assess whether it is fit for purpose as we implement the WFD, and whether it correctly recovers the costs of investments likely to be required to meet WFD standards.

19. We found that it can recover the costs associated with treatment in an appropriate way, however, there is scope for sharpening incentives and application of the polluter pays principle. Given that there is flexibility in interpreting the formula, we encourage Ofwat to work with water companies to ensure the formula sends the most appropriate price signals for minimising pollution.

Diffuse water pollution from agriculture

20. The other main cause of nutrient pollution arises from manures and fertilisers as a result of day to day farming activities. The England Catchment Sensitive Farming Delivery Initiative (ECSFDI) has, over the last two years, provided advice to farmers in the most nutrient and pesticide sensitive areas and encouraged them to take early voluntary action to tackle the causes of water pollution.

Box: Catchment Sensitive Farming

Catchment Sensitive Farming (CSF) is land management that keeps diffuse emissions of pollutants to levels consistent with the ecological sensitivity and uses of rivers, groundwaters and other aquatic habitats, both in the immediate catchment and further downstream. It includes managing appropriately the use of fertilisers, manures and pesticides; promoting good soil structure and rain infiltration to avoid run-off and erosion; protecting watercourses from faecal contamination, sedimentation and pesticides; reducing stocking density; managing stock on farms to avoid compaction and poaching of land; and separating clean and dirty water on farms.

The England Catchment Sensitive Farming Delivery Initiative has shown how stakeholders can work in partnership, as farmers, water companies, Natural England and the Environment Agency are doing in this case, to achieve important environmental improvements.

21. We are pleased with what has been achieved in the first two years of the England Catchment Sensitive Farming Delivery Initiative. **We will roll out initiatives, over a further three years, to continue to support farmers on catchment sensitive farming**. Responsible use of fertilisers can make a major contribution to improving water quality as well as to reducing farmers' costs, so we welcome the work that the National Farmers' Union is doing to encourage and promote this.

22. We also encourage water companies to work with farmers to tackle pollution at source, for example where this is more cost effective than treating raw drinking water at the point of abstraction.

Box: Sustainable Catchment Management Programme (SCaMP)

SCaMP has been developed by United Utilities on its own land in the Bowland and Peak District areas. It aims to apply an integrated approach to catchment management, and is a good example of an alternative to end-of-pipe solutions which is taking a broader view of the importance of water resources in the wider ecosystem.

Through the encouragement of desirable farming and land management practices, this programme combines sustainable catchment management with the improvement of the condition of SSSI land and the achievement of Biodiversity Action Plan targets.

23. We need to do more to tackle nutrient pollution from agriculture at source. We have recently consulted on the extension of the Nitrate Vulnerable Zones (NVZs) and associated restrictions, and on how best to tackle other pollutants from agriculture, phosphates in particular. Early in 2008 we will announce our conclusions, both in relation to NVZs and to the best combination of regulatory (water protection zones) and other measures to deal with the other pollutants from agriculture. We will take these issues forward in a way which complements the parallel action we are taking to deal with

diffuse pollution from various non-agricultural sources. This seeks to identify and avoid undesired effects such as reducing the effect of one pollutant only to exacerbate that of another, or to reduce water pollution only to increase air pollution.

24. The UK's long term vision is for a sustainable agricultural sector which is environmentally-sensitive, maintains and enhances landscape and wildlife, and tackles pollution. **We will continue to work with farmers to reduce the adverse impacts of agriculture on the water environment, through the provision of advice, guidance and funding of good farming practices**.The Rural Development Programme for England explicitly provides for the achievement of WFD objectives, and its Environmental Stewardship scheme has resource protection as a specific objective and provides funding for the environmental management of farmland which helps reduce diffuse water pollution from agriculture. As part of the current review of the Environmental Stewardship scheme's progress, we are considering how the contribution to achieving WFD objectives might be improved within the context of the existing budget.

Pollution from other sources

25. We will also do more to prevent pollution of water bodies from dangerous substances. We aim, subject to considerations of technical feasibility and disproportionate cost, to achieve good chemical status in water bodies by 2015 and to cease emissions of the most persistent, toxic and bio-accumulative substances over a longer period.

26. With many chemicals, however, effects are less severe and alternatives not cost effective. For these, our aim is to reduce use where sensible and prevent them as far as possible from getting into water. In particular we are considering how to reduce the contribution to water pollution from highway run-off and wrong connections of foul drainage to surface water sewers, and how to improve take up of sustainable drainage systems (see Chapter 5).

Groundwater protection

27. Groundwater is a vital element of the natural water cycle, helping to sustain rivers and wetlands in times of drought, and is a source for much of our drinking water. Pollution from the surface can take a long time to travel through the ground to reach groundwater but, once it becomes polluted, it is often impractical to remediate it artificially. Natural recharge and recovery can take many decades to clean the groundwater. For these reasons, a preventative approach to groundwater pollution is essential and in the long term the most cost effective solution. Implementation of a new Groundwater Directive, which clarifies certain groundwater objectives in the WFD, will be an important vehicle for reviewing and improving the protection currently in place.

Physical changes

28. We manage physical changes to water bodies, through for example the planning system, in the way we issue marine consents and through freshwater dredging and disposal. **We will widen the Environment Agency's powers to require the provision of fish passes in obstructions which prevent the passage of fish, so that these apply to all types of fish and eels**. We also need to tackle situations where physical changes which took place many years ago are causing water quality problems. **We will undertake further work to investigate options to address such situations**. For example, Catchment Restoration Funds have been suggested as a way of drawing in money from various sources to help address situations where the person responsible for a long-standing obstruction cannot be identified.

29. There are opportunities for local councils and others to address aquatic litter through increased use of existing legislation including fixed penalty notices, beach signage and clean up campaigns. We will also continue to fund Encams[24], which runs the Keep Britain Tidy campaign, to undertake research and campaigns to tackle local environmental issues, including aquatic litter.

Biological issues

30. We will strengthen action to tackle faecal contamination of bathing waters, to meet the new more stringent European standards, by the end of the 2015 bathing season. This too will require reductions in diffuse water pollution from agricultural and urban sources as well as further water industry improvements.

31. We will encourage Natural England, the Environment Agency and other stakeholders to tackle problems caused by invasive non-native species, through prevention, early detection and carefully considered appropriate action, as agreed under the Convention on Biological Diversity and the draft Invasive Non-Native Species Framework Strategy for Great Britain[25]. Several invasive non-native species are among those proposed for a ban on sale, detailed in a consultation[26] which closed on 31 January 2008.

[24] www.encams.org
[25] www.nonnativespecies.org/07_Public_Consultations.cfm
[26] www.defra.gov.uk/corporate/consult/wca-schedule9/index.htm

Box: Did you know…? Peat bogs, water quality and greenhouse gas emissions

Peat forming ecosystems are typically wetlands, fens, blanket bogs and mires, where cold and waterlogged conditions inhibit the natural decay of the organic matter. This makes peat bogs significant stores of carbon and water, as well as important habitats. Most peat soils support ecosystems that are sensitive to pollution and human activities. When dried out or otherwise degraded, peat releases carbon into the atmosphere and water, contributing to climate change and water discolouration, which increases the cost of water treatment. Peat degradation can also speed up the flow of water across the landscape, potentially increasing the risk of flooding downstream. It will also lead to loss of important biodiversity that relies on healthy peat habitats.

We recognise the value of peat soils as a significant carbon store, and the implications of peat degradation on climate change, water biodiversity and flooding. A number of the initiatives mentioned in this strategy – Catchment Sensitive Farming, Environmental Stewardship, targets for Sites of Special Scientific Interest – help to protect and restore peat bogs. In addition, we have just started a new project to coordinate activity within Defra and with stakeholders, to protect, restore and adapt peat soils and habitats. The project will compile knowledge and understanding on practical and cost effective peat restoration and management practices, and provide practical advice.

Surface water drainage today

1. Large amounts of surface water run-off can lead to serious flooding of property and possessions where it flows and collects. The Foresight Future Flooding report[27] estimates that currently 80,000 properties are at very significant risk from surface water flooding (10% annual probability or greater), causing on average £270 million of damage each year.

2. Flooding is always unpleasant and stressful, but for some the effects are made even worse by the addition of sewage to the flood waters. Water companies could potentially have to spend around £1 billion per year to stop sewer flooding getting worse, given increased intensity of rainfall events due to climate change[28].

3. These problems were exemplified in the floods of June 2007, when extreme rainfall over the Midlands and the north of England led to large-scale urban flooding, with over 55,000 flooded properties. The Environment Agency estimates that one third of these were flooded from rivers, and two thirds from other sources, predominantly surface water run-off overloading drainage systems. Combined damages from the June and July floods are estimated to be around £3 billion. In response, the Government set up a lessons learned review, chaired by Sir Michael Pitt, whose interim findings[29] have informed the policies set out in this chapter.

4. Under natural conditions, a high proportion of the water that falls as rain soaks into the ground and/or is carried away by rivers. But in urban areas, properties and roads alter the natural drainage of water through the catchment, as hard surfaces increase both the rate and amount of rainwater that turns into run-off. In rural areas, soil compaction, for example by overgrazing or inappropriate use of machinery, can also lead to damaging run-off[30].

5. Large amounts of surface water run-off cause water quality problems. As water runs over land, it picks up pollutants and transports them into watercourses. Run-off from roads will contain heavy metals and hydrocarbons, run-off from farmland is more likely to contain nutrients and sediment. As discussed in Chapter 4, these can have serious implications for water quality.

6. Drainage infrastructure helps to manage surface water run-off by conveying rainwater away from properties and other receptors, such as roads. This piped infrastructure, which is primarily below-ground, has only a limited capacity to cope with surface water. Heavy rainfall events generate surface water run-off, causing flooding when the capacity of one or several parts of the drainage system are exceeded (Figure 10).

Elvetham Pond, part of the SUDS drainage scheme at a housing development in Fleet, Hampshire. Image courtesy of the Environment Agency.

7. Sustainable drainage systems (SUDS) provide an alternative approach to piped systems. Whereas piped systems are characterised by a limited capacity, fast conveyance and no reduction in volume, SUDS mimic

[27] www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence

[28] ICF International (2007), *The potential costs of climate change adaptation for the water industry*, Report for the Environment Agency, www.environment-agency.gov.uk/commondata/acrobat/icf2007_cc_report_1920959.pdf.

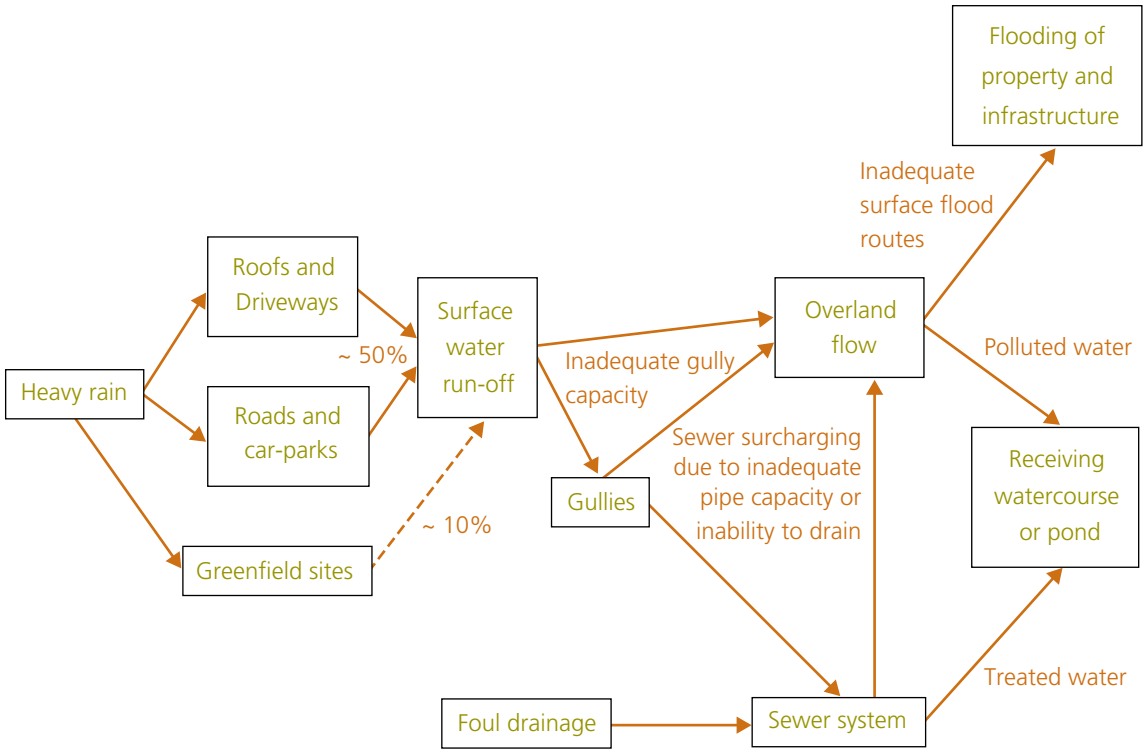
[29] www.cabinetoffice.gov.uk/thepittreview/interim_report.aspx

[30] Some of these issues are highlighted in the EU Thematic Strategy on Soil Protection, http://ec.europa.eu/environment/soil/index.htm.

natural drainage processes with the characteristics of storage, slow conveyance and some volume reduction. There are a number of techniques that encompass the essential elements of SUDS such as green roofs, porous paving and ponds. There are now some examples where SUDS infrastructure has been implemented in the UK over the past few years[31].

8. Arrangements for managing surface water drainage are split between the Environment Agency, local authorities, water companies, and other agencies, with no one organisation having overarching responsibility. As a result, decisions about new drainage or development investments are often taken without a complete understanding of surface water risks and the most effective solutions.

Figure 10: Surface water main flood routes



9. Additional water quality problems can occur where surface water and sewage are transported in the same pipes, as in about 40% of the sewerage system. These combined sewers help protect properties from flooding in heavy rainfall, through overflows into watercourses, but may significantly increase pollution from untreated human, commercial and industrial waste.

10. The Thames Tideway scheme, mentioned in Chapter 4, will be built to limit pollution from sewer overflows and provide a river Thames fit for the 21st century. This is an appropriate solution for London, due to the density of the built area and the underlying geology. Different and less intrusive options may be possible in other areas.

[31] Further information on examples of SUDS can be found on the CIRIA website, www.ciria.org/SUDS.

Future pressures

11. With climate change, winter rainfall could increase in some regions by as much as 30% by the 2080s, while rainfall intensity could increase both in winter and summer. The rising risks of flooding and diffuse pollution from a drainage system ill equipped to cope with more intense rainfall are particularly important in adapting to climate change.

12. With more properties, built at higher densities, the amount of hard standing in urban areas is increasing. The London Assembly has estimated that around two-thirds of front gardens in the London area – equivalent to an area 22 times the size of Hyde Park – are already at least partially paved over, primarily to provide off-road parking spaces.

13. The magnitude, impacts and costs of rainfall events could rise sharply in the future. The Foresight Future Flooding report estimates that the number of properties at very significant risk from surface water flooding could rise to 300,000-400,000 per year by the 2080s, potentially leading to several billion pounds of economic damage each year. The experience of 2007 suggests that surface water flooding may be more of a problem than was once thought to be the case.

Vision for the future

Box: Vision for 2030

More adaptable drainage systems delivering reduced flood risk, improved water quality, and decreasing burdens on the sewer system

Better management of surface water drainage, allowing for the increased capture and reuse of water; slow absorption through the ground; and more above-ground storage and routing of surface water separate from the foul sewer system

Better public appreciation of the causes and consequences of surface water run-off and the actions we can all take to minimise the risks

Achieving the vision

14. This strategy puts forward a suite of policies to encourage more effective and sustainable management of surface water. We propose using surface water management plans as a tool to improve co-ordination between stakeholders involved in surface water drainage, and promoting sustainable drainage systems by clarifying responsibilities and improving incentives for property-owners and developers.

Integrated planning for new development and investment

15. As part of our new strategy for flood and coastal erosion risk management, *Making Space for Water*, we are currently funding 15 pilot studies around the country to explore how the different organisations in urban drainage can work in partnership to promote a more strategic and integrated approach to surface water management.

16. The pilots are already highlighting that the key to achieving a more integrated approach is a shared view of risks by the main decision-makers. Planning Policy Statement 25 recently clarified the role of Strategic Flood Risk Assessments in developing such a shared view, but to date surface water issues have not featured strongly.

17. Water companies need to engage proactively in the planning process, offering support, expertise, data and models to local authorities, where possible, through Drainage Area Plans or overland flow models. Local authorities can then robustly assess surface water flood risks. The Environment Agency should also provide input and quality assure the results of such assessments. Where these are inadequate, the Environment Agency should object to local plans and planning applications on drainage grounds.

18. In critical drainage areas, where the risk from surface water drainage is significant, the local authority should prepare a Surface Water Management Plan. This would be an action plan, agreed by all local stakeholders with drainage responsibilities, to clarify responsibilities and manage these risks.

19. Given the potential risks posed by surface water flooding around the country, **we are now consulting separately on how to give Surface Water Management Plans a stronger role in coordinating development and investment planning.** We see local authorities in a central leadership role, with the Environment Agency advising on and potentially quality-assuring the plans. We are asking stakeholders for views on how local authorities and water companies can work together in preparing such plans and using them to guide investment decisions on solving local drainage, including options for above-ground storage and routing.

Better management of surface water drainage

20. Managing surface water more sustainably will involve increased reuse of water, through rainwater capture and harvesting; more absorption of water by the ground and also through increased use of green roofs; and increased above-ground storage before routing of surface water separate from the foul sewer system. Below-ground piped systems can never be built large enough to cope with the most extreme rainfall events.

Green roofs can play a key part in climate change mitigation and adaptation. As well as enhancing biodiversity in urban areas, their benefits include: improved building insulation; improved stormwater management, through reducing the volume and rate of rainwater run-off; reduction of the urban heat island effect; improved air and water quality; and a prolonged roof life.

Capture and reuse of water

21. Increasing the opportunities for capturing and reusing water, for example through rainwater harvesting in water butts in individual gardens, is discussed in Chapter 3. In addition to making a positive contribution to the supply-demand balance in areas or periods of water scarcity, such capture could also have benefits for flooding and water quality in the natural environment, by reducing the amount of excess run-off in urban areas.

Absorption of water into the ground

22. In the past, householders have faced few barriers to increasing the amount of hard standing in their property. Paving front gardens was a permitted development right, and therefore could generally proceed without planning permission. Given the contribution of hard standing to surface water flood risk, **the Government will change householders' permitted development rights to allow them to pave over their front garden without planning permission only if the surface is porous, such as by using permeable paving or gravel. We will introduce legislation with the effect of requiring planning permission for impermeable surfaces in front gardens late in 2008**[32].

23. Initial costs of some types of permeable paving may be higher than for traditional forms but there remain cheaper, readily available permeable options, such as gravel. As more households start to use permeable materials for paving, the market price is likely to drop, since the materials are not inherently more costly. Permeable paving can cost less to maintain, so costs over the lifetime of the paving may be lower. Any additional costs would be more than offset by the benefits of reducing flood risk and improving water quality.

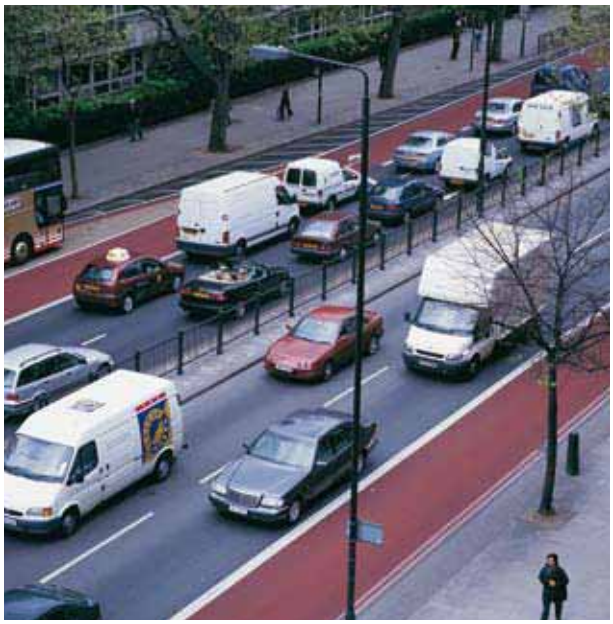
[32] Further details can be found in the Impact Assessment published by CLG. Last year Government consulted on proposals for reforming the system governing what householders can do to their own property without the need to apply for planning permission. There were strong negative responses to the proposal that there should be no national restriction on hard surfaces. More information is available at www.communities.gov.uk/publications/planningandbuilding/developmentrights.

Box: Slowing water down – infiltration and soakaways

Infiltration is an important measure in managing surface water in a more sustainable way by mimicking natural processes. However, implementation requires careful consideration and it is not applicable in all situations, depending on soil and ground conditions. In general, infiltration techniques are more appropriately located close to the source of run-off, before flows have concentrated into large volumes. There are a number of infiltration techniques, including:

- **Soakaways:** These may take the form of stone filled trenches or porous chambers. They can be used for draining surface water from roofs, or run-off from roads and other surfaces. Building Regulations set out in detail where and how soakaways can be used.
- **Porous surfacing:** This can consist of concrete blocks, porous tarmac or loose gravel. All are applicable to situations within private properties. Blocks and porous tarmac may also be applicable to public highways.
- **Unlined open conveyance and storage features:** These include swales and detention basins which work by conveyance, storage and infiltration. They are applicable to both private and public situations.

24. Those who increase the amount of impervious surface area, and therefore the speed and volume of run-off, do not face the full consequences of their actions. This does not always encourage responsible management of surface water. The system of charging for surface water drainage should be more transparent and reward organisations that place a smaller load on the surface water drainage system. **We will consider whether funding for surface water drainage should be changed to better reflect the polluter pays principle**. This is further discussed in Chapter 8.



25. Also, good soil management during construction is an important factor in maintaining the capacity of land in the urban landscape to absorb and convey water. We are developing a new code of practice in this area under the Soil Strategy for England[33].

26. The ability of developers and property owners to connect surface water run-off directly to the public sewerage system has been identified as a potential barrier to the implementation of SUDS. Below-ground piped systems have a role to play in surface water management but the ability to connect surface water drainage can result in the system being overwhelmed despite the availability of options to control run-off. **We are now launching a review looking at alternatives to the ability automatically to connect surface water drains and sewers to the public sewerage system**. This should help ensure the hydraulic capacity of the sewer system is not exceeded and

[33] www.defra.gov.uk/environment/land/soil/index.htm

promote an integrated approach to surface water management. The right to connect foul drains and sewers to the public sewerage system will remain.

Above-ground storage and removal of surface water

27. Good surface water management will involve increased use of SUDS and surface water flow routes, through the design and planning of the whole urban fabric, as the capacity of the landscape to store and convey water is much greater than the below-ground system.

28. There are a wide range of structures and techniques for surface water drainage, which are considered more sustainable than conventional piped systems, because they can offer improvements in environmental water quality, reduced flood risk and amenity benefits. Carbon savings could also be significant, as it is estimated that around 6% of the energy consumed by water companies is used to pump and treat surface water.

29. These measures seek to mimic natural drainage processes and reduce the impacts of urbanisation on downstream watercourses. These can operate at the level of individual properties (green roofs, water butts, soakaways in garden areas and porous paving of driveways), within neighbourhoods (swales, detention basins and porous paving of highways); and at the strategic level (through features such as large balancing ponds).

30. The nature of SUDS means that their implementation and management does not readily sit within established water industry structures. The major obstacles to their wider uptake and implementation have to do with ownership, maintenance and funding arrangements. **We are now consulting separately on options for resolving these barriers to take up, including options for ownership and adoption of SUDS across the main agencies involved in urban and land drainage**.

Private sewers review

31. Our vision for the future includes more adaptable drainage systems delivering reduced flood risk, improved water quality and decreasing burdens on the sewerage system. Currently however, the sewerage system does not fully benefit from integrated management. The proposed transfer of existing private sewers and lateral drains that are connected to the public system into the ownership of water and sewerage companies, as announced in February 2007, will provide clearer responsibility for the wider sewerage network. We are currently considering how and when the transfer will take place[34].

32. We also propose that future piped sewers and laterals connecting to the public system should automatically be vested in these companies and that there should be a national build standard to ensure that they are designed and built reflecting changes in climate and housing.

[34] www.defra.gov.uk/environment/water/industry/sewers/index.htm

Current situation

1. English towns and cities are located close to rivers and coasts. Although some of the historical reasons for this are no longer important, there are still obvious amenity and commercial benefits from being close to water. Unfortunately, it also makes flooding a problem when high water flows or levels affect property, infrastructure or other assets on the flood plain. As a densely populated and highly urbanised coastal country, we have a serious flood risk. As discussed in Chapter 5, the trend towards increasing the hard standing of our surfaces reduces the capacity of the ground to absorb water, further increasing the flood risk. All of this means we have an ongoing challenge of defending our homes and businesses from flooding and making them more resilient to flooding when it occurs.

2. Anyone who has experienced flooding will appreciate the devastating effects it can have. Since April 2003, Government has invested around £2.2 billion in managing risks from flooding and coastal erosion, with a further £600 million planned to be invested in 2007/08. We are on target to have improved defences for nearly 190,000 properties between April 2003 and March 2008. This funding will increase to £800 million in 2010/11 as the Government remains committed to reducing flood risk through a range of different approaches.

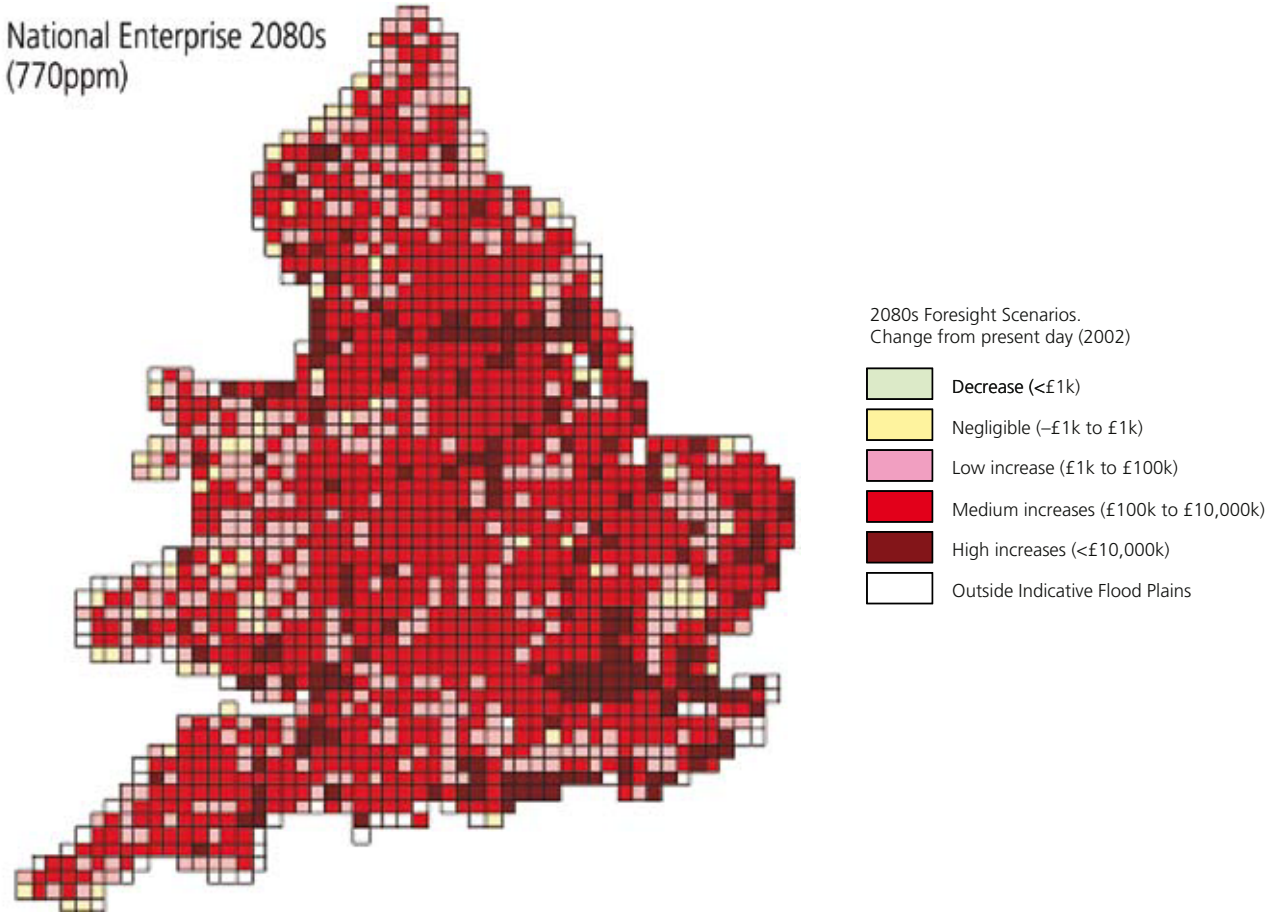
3. Following public consultation in 2004, we committed to *Making Space for Water*[35], a holistic approach to managing flood and coastal erosion risks in England over the next 20 years. We have progressed policy development and research to enable and guide flood risk management, as described in the summer 2005 *Making Space for Water* delivery plan[36]. Following last summer's floods, the Prime Minister asked Sir Michael Pitt to lead an independent review looking at flood risk management, the emergency response and the initial moves towards recovery. The Government has agreed with the urgent recommendations of the interim report and is considering its interim conclusions.

[35] www.defra.gov.uk/environ/fcd/policy/strategy.htm
[36] www.defra.gov.uk/environ/fcd/policy/strategy/mswdp.pdf

Future pressures

4. Our flood risk is likely to worsen. The Future Flooding report found that flood damages could increase in real terms by between 2 and 20 times by the 2080s, due to a combination of climate change, primarily through changes in storm patterns and sea levels, and increased wealth in flood risk areas putting more assets in harm's way.

Figure 11: Future forecast of flood damages



The map illustrates a forecast of the distribution of annual average flood damages for the 2080s, under the Foresight Report high emissions 'National Enterprise' scenario. Darker shades of red show progressively greater increases in damage.

Source: Evans, E. et al (2004), *Foresight Future Flooding. Scientific Summary: Volume 1 – Future Risks and their Drivers,* Office of Science and Technology, London.

5. The flooding in summer 2007, which tested both our flood management policy and response, was in line with predicted increases in scale and intensity of flood events. We experienced the wettest June on record in England, and these extreme conditions led to large scale urban flooding in the North, a lot of which was from surface water run-off rather than from rivers. In July, up to 160 mm of rain fell in 24 hours on already saturated ground, rapidly entered rivers and drainage systems, overwhelming them and causing serious flooding across central England.

Future Water
The Government's water strategy for England

6. The new set of future climate change projections, UKCIP08, expected later this year will indicate the likelihood of different changes in precipitation and other climate variables across the UK up to 2100, and will help decision makers assess flood risks better.

Box: Thames Estuary 2100

The Thames Estuary is one of the UK's major east coast estuaries. It is part of the country where large numbers of people and properties, and significant national assets, are protected by a very large network of existing defences. Yet the tidal Thames is subject to coastal processes, tidal surges and sea level rise as well as the inflow of freshwater rivers and urban drainage. The future effects of climate change can only increase these risks, meaning that the standard of protection of these defences will gradually diminish. At the same time, pressure for further development in the estuary is very high.

Thames Estuary 2100 is an Environment Agency project to develop a tidal flood risk management plan for the estuary through to the end of the century. The final plan will recommend what flood risk management measures will be required in the estuary, where they will be needed and when over the coming century, based on the climate change and sea level rise projections we might face. This is the sort of long term strategic planning that is so important in developing truly sustainable policies for managing risk and, in development terms, delivering truly sustainable communities.

Vision for the future

7. *Making Space for Water* sets out the direction of travel for flood and coastal erosion risk management in England. The overall high-level vision is summarised in the box below.

Box: Vision for 2030

Flood and coastal erosion risk management which contributes to sustainable development, combining the delivery of social and environmental benefits with the protection of economic assets

An understanding of the future risks of river and coastal flooding fully embedded into the spatial planning system, including planning for new settlements and other new developments

Consistent and holistic management of urban flood risk, with strategic planning, partnerships of responsible bodies and clear understanding of various flood risk responsibilities

Public understanding of the risks we face and the actions we can take to help manage flood and coastal erosion risk

Community resilience to flooding from improved development planning, emergency planning and response, and resilience of homes, buildings, services and utilities

Achieving the vision

8. We have already made good progress on implementing *Making Space for Water*, which is being developed in close consultation with stakeholders and with full public consultation on major policy proposals. The Environment Agency will have strategic overview of all forms of flooding and coastal erosion risk management, as announced in June 2007[37]. Arrangements for the coastal overview should be substantially in place by April 2008 while work is in hand to define the nature of the overview for the more complex areas of inland flooding. We are fast-tracking implementation of some aspects of the inland overview in 2008, as set out in Chapter 5. We have also been working with Internal Drainage Boards (IDBs) to ensure they are able to deliver coherent water level management through reforming the IDB structures around sub-catchment units[38].

Planning Policy Statement on development and flood risk

9. CLG has strengthened the policy on development and flood risk, through Planning Policy Statement (PPS) 25. This new guidance:

- promotes a more strategic approach, emphasising the need to consider flood risk as early as possible in the planning process;
- clarifies the sequential test that matches types of development to degrees of flood risk;
- introduces a new exception test where continuing development is needed in extensive flood risk areas; and
- emphasises the need to assess flood risk at all levels of the planning process.

10. In addition, the Environment Agency is now a statutory consultee for planning applications in flood risk areas, and developments in other areas that might affect flood risk. Powers have also been introduced to allow the Secretary of State for Communities and Local Government to call in major planning applications for determination if the Local Planning Authority is minded to approve an application despite sustained Environment Agency objection on flood risk grounds. **A Practice Guide Companion to PPS25, already accessible as a 'living draft', will be published in spring 2008, to help planning authorities implement the new policy**.

[37] www.defra.gov.uk/environ/fcd/policy/strategy/ha1.htm
[38] www.defra.gov.uk/environ/fcd/studies/idbrev/default.htm

Making Space for Water

11. *Making Space for Water* is intended as a living document, as we are constantly improving our knowledge base. We are committed to continually develop and improve our approaches to managing flood risk, including through a number of pilot studies. These include six pilots for a building resilience grants scheme and 15 pilot studies for integrated approaches to urban drainage (see Chapter 5). These pilots will report in the spring and will inform policy development on which we will consult later in 2008. We have also established an innovation fund which is supporting projects to promote innovative approaches to delivering flood risk management.

12. Government will publish new national outcome targets for the flood and coastal erosion risk management programme, which have been defined following public consultation. These are supported by new guidance on the policy and practice for individual flood project appraisal. The Environment Agency is rapidly improving its knowledge and prioritisation of flood defence maintenance.

13. During 2008 we will develop an adaptation toolkit. This will include a range of measures to facilitate the adoption of sustainable flood and coastal erosion risk management. We will publish further guidance on the role of land use management in controlling flood risk, and as part of our work to protect critical national infrastructure from natural hazards we are, with the water industry, already seeking to improve the resilience of water and sewerage infrastructure to hazards.

The Pitt review – *Learning Lessons from the 2007 floods*

14. Sir Michael Pitt published his interim report on the summer 2007 floods in December 2007, and this has been welcomed by the Government. The interim report contains 15 urgent recommendations for action to prevent or mitigate flooding in the short term. These relate to three main areas:

- monitoring of and sharing information on specific flood risks, including those from groundwater and surface water, and on the flood risk to critical infrastructure;
- the practicalities of emergency response, including water rescue arrangements, resilience to flooding of emergency facilities such as rest centres, emergency supplies, identification of vulnerable people, and enhanced flood warning arrangements, and;
- better information for communities at risk, including measures individuals can take to prepare for flooding.

15. We agree with all of the urgent recommendations, and we are working with all organisations involved in taking them forward as quickly as possible. This strategy in particular is concerned with the monitoring of specific flood risks, including those from surface water.

16. The report also contains 72 interim conclusions. These include the proposal that the Environment Agency take a strategic direction to managing inland flood risks, while local authorities should adopt a new leadership and scrutiny role overseeing flood risk management in their local area. The Government will respond to the interim conclusions, as positively as possible, by the end of March. This will help Sir Michael produce his final report later this year.

17. **We will work with the Environment Agency and other operating authorities to respond constructively to Sir Michael Pitt's recommendation that Government should commit to a strategic long term approach to investment in flood risk management**. In Sir Michael Pitt's vision, this should give certainty as to which strategies will be delivered and enable fuller consideration of longer-term options and outcomes. It should also encourage local authorities and other partners to think across the longer term and consider what further adaptation and resilience strategies are required for their communities.

18. The Environment Agency is constantly seeking to improve its mapping of flood hazards, and is investigating the possibility of developing maps which could show areas at risk from surface water and groundwater flooding. The Environment Agency has been liaising with a number of organisations to ascertain the feasibility of collating data from a range of sources. We will ensure that we provide the best and most reliable information available and seek ways in which the nature and likelihood of any hazard and the related uncertainties can be better communicated.

19. When Sir Michael Pitt's final report and the next set of UK Climate Impacts Programme climate change projections (UKCIP08) are published, **Government will host a major conference on floods to consider Sir Michael Pitt's findings and the UKCIP08 projections, reflecting on the new challenges that these identify and pose**.

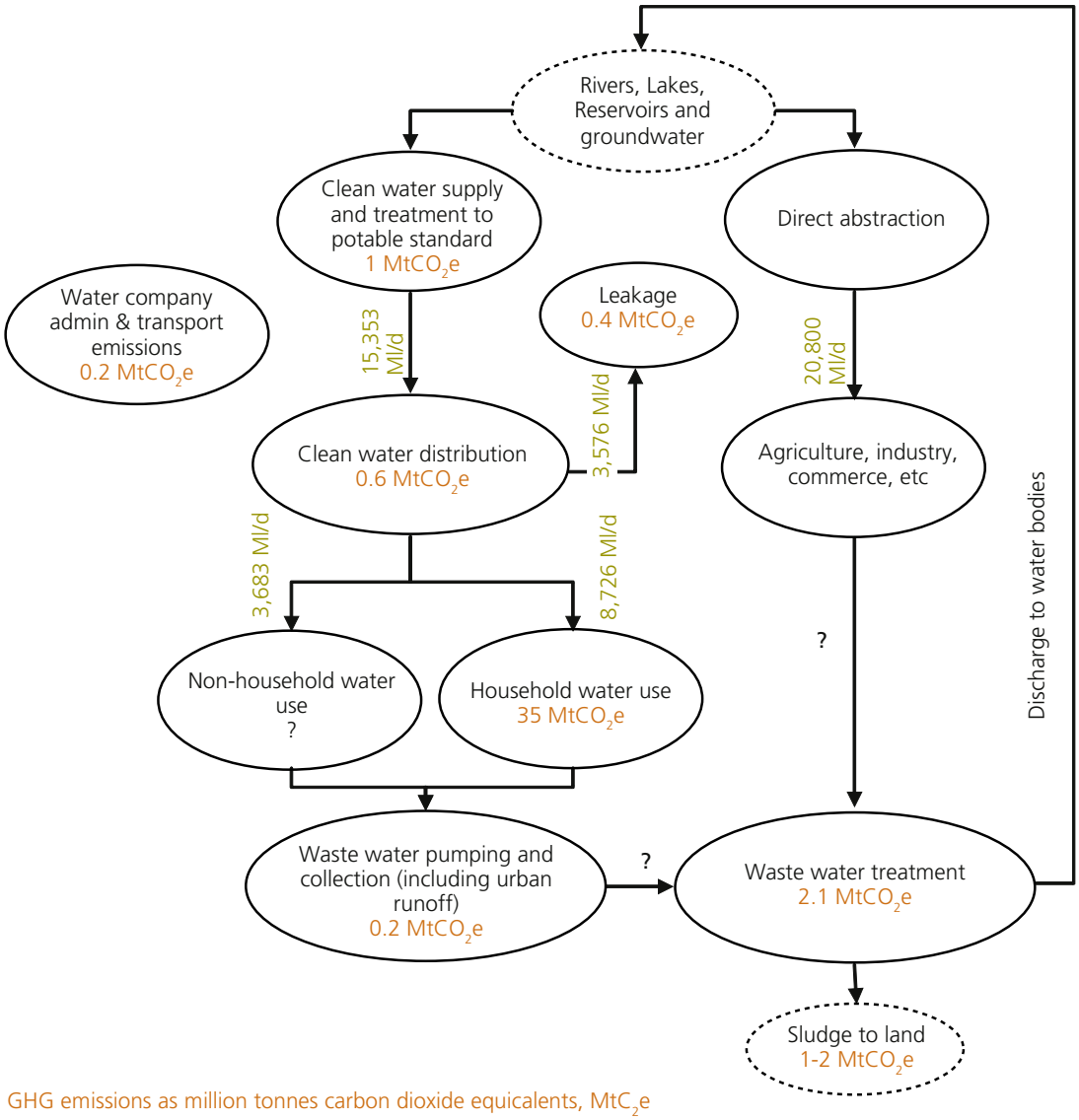
Water sector greenhouse gas emissions

1. Abstracting, pumping, treating and heating water and treating and pumping wastewater consumes energy and releases greenhouse gas emissions. In order to avoid dangerous impacts, we must mitigate climate change by reducing our greenhouse gas emissions throughout all sectors of society.

2. The UK water industry used almost 7,900 GWh of energy in its total operations during 2006/07, and emitted over 5 million tonnes of greenhouse gases, as carbon dioxide equivalents (CO_2e).

3. The UK greenhouse gas emissions from the water sector, which have previously been unmapped, are illustrated in Figure 12. This shows that in 2005/06 around 56% of the water industry's emissions came from wastewater treatment, 39% from clean water supply and treatment, and 5% from administrative and transport emissions.

Figure 12: Water sector greenhouse gas emissions, 2005/06



GHG emissions as million tonnes carbon dioxide equicalents, MtC_2e
Water flow figures for 2005/06 in million litres per day, Ml/d (Ofwat)

4. But the use of hot water in our homes for such things as personal and household washing, cooking and cleaning, but excluding that for space heating, contributes roughly another 35 million tonnes of greenhouses gases (CO_2e) per year. This is seven times as much as that emitted by the industry itself, and amounts to over 5% of total UK greenhouse gas emissions.

5. As mentioned in Chapter 2, water efficiency measures are a real win-win solution: they reduce water use as well as energy use, and therefore greenhouse gas emissions. Water efficiency measures that focus on reducing hot water use would result in much larger greenhouse gas reductions. In addition, there would be savings on customers' water and energy bills. This is one reason why water efficiency and water saving work should be extended beyond areas of water stress. Government is taking action to help people understand this important link between hot water usage and greenhouse gas emissions, as part of the Act on CO_2 campaign.

6. We are also currently consulting on how to improve the energy performance of domestic heating and hot water systems, to support delivery of our objectives for energy efficiency and sustainable consumption and production[39]. Such performance improvements can also have positive impacts on water efficiency.

Future pressures

7. While the water industry's own greenhouse gas emissions are less than 1% of UK annual greenhouse gas emissions, there is still a compelling case for action. There is a real risk that this figure will continue to rise as water demand is likely to increase with population growth, new developments, and lifestyle changes. In addition, more wide-ranging and in some cases more ambitious environmental quality standards may further raise treatment requirements and put additional pressure on the water industry's energy use.

[39] www.defra.gov.uk/corporate/consult/climatechange.htm

Future Water
The Government's water strategy for England

Box: Did you know…? Tap versus bottled water

Tap water quality is at record levels, is as healthy as bottled water, does far less damage to the environment and is at least 500 times cheaper, according to the Consumer Council for Water. Yet, in 2004, over 1.7 billion litres of bottled water were sold in the UK. While this accounts for a very small proportion of total water use, because of the transporting and packaging involved, bottled water has a much higher carbon footprint per litre than water supplied via the tap – more than 300 times the CO2 emissions per litre in the case of some imported brands. Further information on the energy requirements per litre of water is available in the Defra 2006 report *The Environmental Impact of Food Consumption and Production*, available at www.defra.gov.uk/science/project_data/DocumentLibrary/EV02007/EV02007_4601_FRP.pdf.

'Water@work' is an initiative created by Unison to promote the benefits to people and business of drinking tap water. Just a 2% loss of body water can result in a 10% drop in physical and mental performance, but by increasing water intake it is possible to keep energy levels up, prevent headaches, maintain concentration, reduce stress and mood swings, and even reduce the risk of chronic diseases such as heart disease. To find out more about water@work and the benefits of drinking more tap water, see the web pages at www.wateratwork.org.

Vision for the future

Box: Vision for the future

A water industry contributing fully to the achievement of national emission reductions targets and maximising its potential for renewable energy use and generation

A water industry fully meeting its drinking water, environmental quality and other objectives while minimising its greenhouse gas emissions

All sectors of society working collaboratively to remove pollutants at source to minimise the need for energy intensive end-of-pipe clean up treatment

Householders aware of the link between water use in their homes and greenhouse gas emissions, and acting accordingly to minimise water wastage and maximising water efficiency

Achieving the vision

8. This strategy together with the Government's recent draft Climate Change Bill are key initiatives for delivering this vision.

Climate Change Bill

9. The main framework for responding to climate change will be provided by the Climate Change Bill, which was introduced into Parliament in November 2007[40]. It will make the UK the first country to set a long term legal framework for reducing emissions and adapting to climate change and will significantly enhance the transparency and accountability of UK action on this.

10. The Bill proposes to put into statute the UK's targets to reduce carbon dioxide emissions by at least 60% by 2050 and by 26-32% by 2020, against a 1990 baseline. As the Prime Minister announced in autumn 2007, the Government recognises that a 60% reduction in 2050 may not be ambitious enough and will ask the Committee on Climate Change, which will be established by the Bill, to consider whether the target should be tightened up to 80%.

11. The Bill requires Government to set binding limits – known as carbon budgets – on emissions over five-year periods, starting with the period 2008-12. The carbon budgets will be set three periods ahead, representing 15 years, to help business planning and investment.

12. A new independent expert body, the Committee on Climate Change, will be established to advise Government on the pathway to the 2050 target and to provide specific advice on the level of carbon budgets. This will include advice on reduction effort needed by sectors of the economy covered by trading schemes and other sectors, and on the optimum balance between domestic action and use of international credits.

13. The Bill also contains new powers to introduce domestic emissions trading schemes. This will increase the range of policy options which Government could use to stay within budgets and meet the emission reduction targets while maintaining the need for thorough analysis, consultation and scrutiny of proposals before a new scheme is introduced. The first use of these powers is expected to be to implement the Carbon Reduction Commitment (see below).

14. In terms of adaptation to the impact of climate change, the Bill requires Government to assess regularly the risks to the UK and to report to Parliament. Government is also required to publish and regularly update a programme setting out how we will address this likely impact. This adaptation programme will be based on the principles of sustainable development, to ensure that environmental, economic and social issues are all fully considered. The Government has brought forward an amendment to create new powers to require a public authority, when requested by Government, to report on their assessment of the risks of climate change on the exercise of their functions and set out what action they need to take in response.

Carbon Reduction Commitment

15. The Carbon Reduction Commitment (CRC)[41] is a new mandatory emissions trading scheme, announced in the Energy White Paper (EWP) 2007, designed to deliver carbon emissions savings of 1.1MtC (4MtCO_2e) per year by 2020.

[40] At the time of going to print the Climate Change Bill is continuing its progress through Parliament. The details provided in this section are therefore subject to the outcome of the Parliamentary process.

[41] www.defra.gov.uk/Environment/climatechange/uk/business/crc/index.htm

16. This trading scheme, as proposed in the EWP, will include up to 5,000 large business and public sector organisations which use more than 6,000 MWh of mandatory half hourly electricity each year – roughly equal to electricity bills of £500,000. Most water companies should be included. Once included, participants will be required to purchase allowances to cover non-transport CO_2 emissions from all energy sources, not just electricity.

17. The scheme will spread the burden for reducing carbon emissions across the UK economy by covering direct emissions that are not captured by the EU Emissions Trading Scheme, or energy use emissions not covered by Climate Change Agreements (CCAs). CCA participants will be completely exempt from the CRC, providing their CCA energy uses exceeds 25% of total organisation energy use.

18. The scheme will be revenue neutral to the Exchequer. The auction revenue will be recycled back to participants by means of a simple, direct annual payment proportional to participants' average annual emissions during the scheme, with a bonus or penalty depending on the organisations' position in the CRC league table.

19. The scheme will feature an introductory phase of three years, beginning in January 2010, to allow participants to become familiar with participating in the trading scheme. We consulted last year on implementation of the scheme, and will publish our response to the consultation in spring 2008. We will issue a detailed consultation on the scheme regulations this summer.

Voluntary targets to cut emissions

20. The Climate Change Bill and the CRC will bring about reductions in carbon emissions across the economy, including from the water industry. However, the CRC only covers CO_2. The water industry is energy intensive and emits CO_2 as well as other greenhouse gases such as methane and nitrous oxide.

21. Former Environment Minister Ian Pearson MP challenged the water industry to come up with voluntary emissions reduction targets and we have received a commitment from Water UK that **the water companies will seek to ensure that at least 20% of all energy used by the UK water industry comes from renewable sources by 2020**. The water industry will also undertake research to better understand, measure and manage non-CO_2 greenhouse gas emissions from processes related to wastewater treatment over the next few years.

22. The average reduction in greenhouse gas emissions per water company due to renewable energy usage, both self-generated and bought, is currently 5% and increasing. There is however considerable further potential for onsite renewable generation by the water industry, both from water and wastewater processes, largely from combined heat and power (CHP), water turbines, and by setting aside land for wind power generation. The use of renewable energy by the water industry has already achieved a significant reduction in its greenhouse gas emissions.

Box: Carbon and water projects

The Environment Agency is funding a two-year science project into increasing energy efficiency and carbon reductions in the water industry. The project aims to:

- identify opportunities for improving energy efficiency in the water and wastewater sectors through different initiatives;
- identify barriers and potential solutions for improved energy efficiency in the sector, especially any created by regulation; and
- ensure that the Environment Agency's approach to sustainable water resource management and climate change objectives are aligned.

The water industry, through UK Water Industry Research (UKWIR) and Water UK, in conjunction with the Carbon Trust, has recently revised its common carbon accounting tool. This incorporates CRC and Defra greenhouse gas guidance, as well as industry specific process emissions into one tool, with clear and well-defined reporting boundaries.

23. The Renewables Obligation (RO)[42], introduced in 2002, is our main policy measure for stimulating the growth of renewable electricity generation, for example from wind or water turbines. The RO creates an obligation on electricity suppliers to source a rising percentage of electricity from renewable sources: the level is 7.9% in 2007/08, rising incrementally to 15.4% in 2015/16. Suppliers meet this obligation by presenting Renewables Obligation Certificates (ROCs) as evidence of renewable generation, by paying the "buyout" price, or by a combination of the two. Water companies that source electricity from renewables also receive exemptions from the Climate Change Levy.

24. Sewage gas produced from sewage sludge can be used to reduce greenhouse gas emissions through the generation of electricity and as such qualifies as a renewable energy source under the RO. Water companies and other generators can sell the ROCs they are issued for the generation of electricity from sewage gas to suppliers, and gain additional income beyond the market price it receives for the associated electricity. The gas can also be used to produce heat and transport fuel, the latter supported by the Road Transport Fuel Obligation (RTFO)[43].

25. At present, properly controlled spreading of sewage sludge to agricultural land offers the best practical environmental option in most circumstances. However, sustainable alternatives may be needed to address projected shortfalls of land suitable for sludge recycling.

26. Defra Ministers will convene a high level meeting of stakeholders from all the relevant sectors to discuss how we can work together to make best use of anaerobic digestion to contribute to our climate change and wider environmental objectives in a way that is cost effective and beneficial to the environment. The meeting will build on earlier discussions to examine the blockages to progress, and the realistic scale of ambition for anaerobic digestion across the economy. The aim would be to identify specific issues for early attention and a process of ongoing collaboration to ensure their effective resolution.

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[42] The Government's response to the Renewables Obligation response, published in January 2008, can be found at www.berr.gov.uk/files/file43545.pdf.
[43] www.dft.gov.uk/pgr/roads/environment/rtfo/aboutrtfo

27. **The draft Social and Environmental Guidance includes a request for Ofwat to consider both the costs and the environmental and social benefits of water company proposals to increase their uptake of renewable energy and reduce their non-CO_2 greenhouse gas emissions**. Ofwat has additionally volunteered to collect data on carbon emissions and renewable energy usage from water companies. This will help water companies monitor and compare performance in reaching their voluntary targets for reducing carbon emissions and increasing renewable energy generation. We will also work with other stakeholders to see what needs to be done to help the water industry achieve its voluntary targets.

Thames Water sewage treatment works, sewage incinerator

Shadow price of carbon

28. We have published guidance on how to value greenhouse gas emissions in Government appraisals[44]. This is for use across Government in all policy and project appraisals with significant effects on carbon emissions. The guidance adopts the concept of the Shadow Price of Carbon (SPC) as the basis for incorporating carbon emissions in cost benefit analysis and impact assessments.

29. Our draft Social and Environmental Guidance confirms that Ofwat is expected to use the SPC as set out in the Government's guidance. In addition, Ofwat has recently consulted on its approach to setting price limits for PR09. This proposed that each water company should include the SPC in carrying out cost benefit analysis across its business plans. The Environment Agency has asked water companies to use SPC in options appraisal in their water resources management plans.

[44] www.defra.gov.uk/environment/climatechange/research/carboncost/step1.htm

1. Improving our water environment, securing our supplies and protecting our homes and infrastructure from flooding will bring huge benefits to society and the environment. But even the most cost effective solutions will cost money to implement and may have an impact on customers' water bills.

2. Fair charging and affordability are key concerns for Government. Most of the recommendations from the last cross-Government review of water affordability, which reported in December 2004, are now nearly complete. Progress on the recommendations from this report is outlined below.

3. There is also some assistance with bills available to vulnerable households through the vulnerable groups tariff. For qualifying households – those that are metered, on income related benefits and have three or more children or a medical condition that causes significant additional use of water – the tariff caps the bill at the average for a company area. The tariff's aim is to ensure that households do not cut down on essential use of water because of affordability concerns.

4. However, more fundamental issues remain to be addressed within the current system and we must take a more holistic view that will provide for fairer charging in the future.

Charging for water today

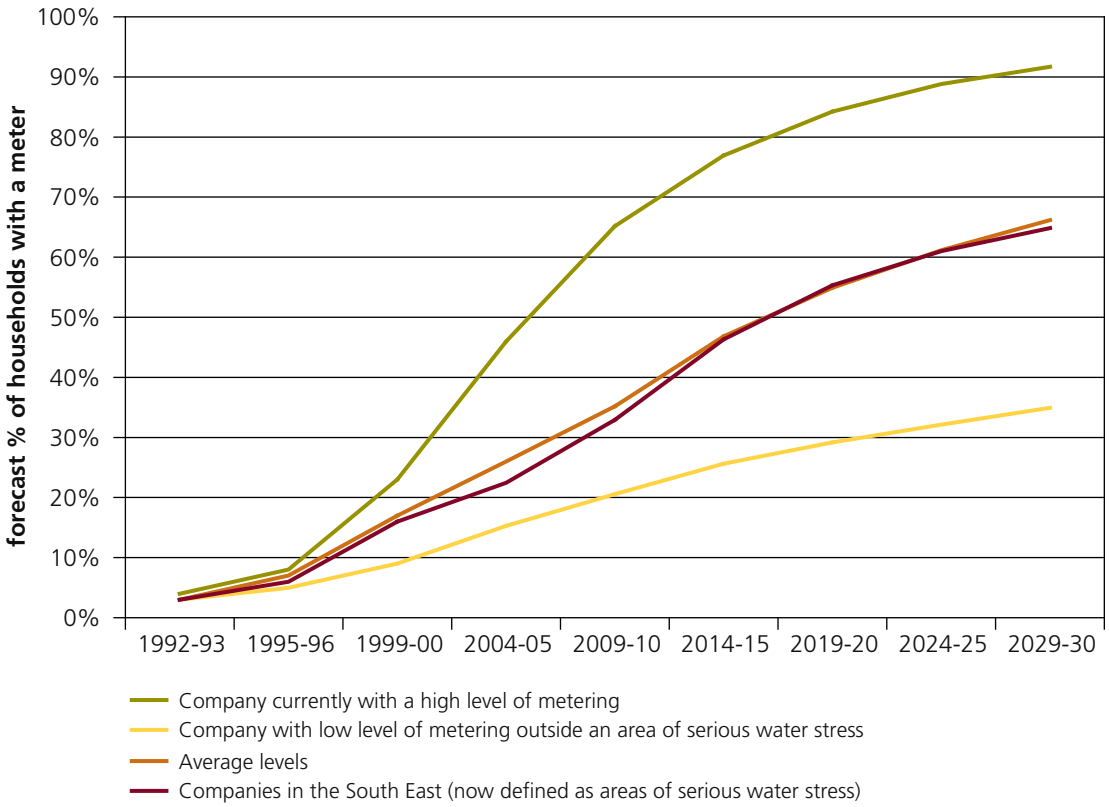
5. The last review of household water charging in 1997 introduced a ban on disconnection, gave households the right to opt for a free meter, and water companies the right to fit meters in households on change of occupancy. It also kept rateable values as the basis for unmeasured charging.

6. Ten years on, some of the elements of the current system, such as the protection from disconnection, remain fully valid, though others need to be reviewed because:

- switching to meters on a household by household basis is costly – alternative ways of metering can bring the cost per meter down significantly;
- as more unmetered customers switch to meters, there can be transitional problems for those who remain unmetered, including large families in properties with low rateable values;
- for environmental reasons, particularly in water stressed areas, there are benefits to relating water charges to household water use; and
- unmeasured charging is based on rateable values which have in most cases not been updated since 1973, are only used for water charging, and are not aligned with the actual value of a property or its household size.

7. Metering is the generally accepted method of charging in most European countries. In 2006/07, metering levels in England were at 30%, although this varied from 7% to 66% between different water company areas. The proportion is increasing, predominantly through customers' own choice. The timeline and the way in which this is done can help to actively manage the impacts of this transition. These impacts will become more acute as metering increases.

Figure 13: Current projections of growth in household metering



Source: Ofwat, 2006. The projections do not include likely increases in metering under new powers granted to water companies in areas of serious water stress.

8. Metering offers a number of benefits. It is fair in that customers pay for what they use and it can support the introduction of a choice of tariffs. Metering has also been shown to reduce average household demand by about 10%. The growth in metering also helps companies identify the leakage for which they are responsible and the estimated 25% of total leakage that is thought to derive from customers' supply pipes. In addition to saving water, meters could also deliver carbon savings both in the home through reduction in hot water use and for the water industry through less need to treat and pump water.

9. However, there are costs associated with metering, as with any method of charging, which are paid for by customer bills. Installing a meter currently costs just over £200, although in each case this cost is shared across the whole of the water company's customer base. Meter reading and maintenance also have associated costs. Research[45] and experience have shown there are ways of reducing the unit cost of installation. The majority of meters being fitted are for households that have chosen a free meter as they are likely to benefit financially from having one – for example single households or couples. This, in combination with metering on change of occupancy, has led to companies having to adopt a cost inefficient 'one here, one there' approach to meter fitting rather than a more efficient

[45] WRc 222a (2006), *Cost and benefits of approaches to metering*, www.wrcplc.co.uk.

street-by-street approach. There is some evidence that the savings of a more efficient approach could be 30%. Equally it would be important to ensure that the speed of change does not drive up costs by creating problems of capacity in the supply or installation of meters.

10. We have recently amended legislation on resource management grounds, to allow water companies in areas of serious water stress to use their water resources management plans to make the case to compulsorily meter household customers, where this is a cost effective option. We welcome the commitment to metering that these water companies have now made in their strategic direction statements in advance of their water resources management plans.

Affordability and fairness of charges

11. Within the current charging system, households pay on either an unmeasured (based on rateable value) or measured (metered) basis. Like all charging systems, this benefits some and disadvantages other customers, some of whom may be vulnerable. The balance between measured and unmeasured charges is changing, faster in some areas than in others. Unmetered bills are rising at a faster rate than metered bills.

Box: Addressing consumers' water concerns

We know from extensive consumer research carried out by the Consumer Council for Water and water companies that consumers' top priority is a safe, reliable supply of tap water. They also want their sewage dealt with effectively. Increasingly, many consumers are also concerned about the environment.

But consumers do not want to pay more for their water and sewerage services. While most are generally satisfied with the services they get, many have concerns about value for money and resent price increases. A growing number of domestic customers find it difficult to afford their water bills. Some business customers feel they do not get the choice and service they enjoy from other sectors.

This strategy seeks to address the long term needs of consumers and the environment. Consumers will want to know what is being done to secure water and sewerage services and what specific benefits or improvements they will see from any future price increases. Water companies will need to deliver high quality, reliable services which are valued by their customers. Government, regulators, the Consumer Council for Water and, in particular, water companies will need to communicate well with consumers to build trust in the industry.

Source: Consumer Council for Water

12. We are also concerned about affordability more widely. Bills have increased above the rate of inflation since 2005. The water affordability review estimated that by 2009/10, 40% of households on the lowest incomes would be paying more than 3% of their income on water and sewerage charges, compared with 29% in 2004/5 (3% being used as a water affordability indicator).

Box: The consequences of meter switching

Within the current rateable value based system of charging, water and sewerage bills of poorer households are to some extent cross subsidised by those with a larger income, as lower income families are more likely to live in homes with low rateable values. As households with low water use switch to meters the existing cross subsidy is progressively broken down and the remaining unmetered households start paying a greater contribution to the total water company cost of providing the water and sewerage services they use.

This effect on unmeasured charges could have potentially serious affordability impacts on some unmetered households, such as large families on low incomes which do not qualify for assistance under the vulnerable groups tariff. Many households with high water use and/or low rateable values, would lose out by switching and may choose to remain unmetered. However, some low income householders, such as pensioners, may benefit financially from having a meter installed.

13. Furthermore, bad debt has been an increasing issue for the water industry since privatisation. Household revenue outstanding for more than 12 months increased by £67 million between 2005/6 and 2006/07, from £508 million to £575 million. The industry also wrote off £105 million worth of household debt in 2006/07 – equivalent to 1.7% of revenue billed that year. Water companies' efforts to recover this revenue adds on average £11 onto customers' bills. However, this is not just an issue for the water industry. Data collected by Ofgem suggest that 1 million gas customers and 1.2 million electricity customers have a long term debt, that is a debt that takes more than three months to repay.

14. While water affordability is a serious problem for many households, water bills remain considerably lower than fuel bills. The average gas bill in England is around £570 a year, the average electricity bill is around £370, while the average water and sewerage bill is £304 for 2007/08.

15. Since the 2004 report on water affordability:

- we have extended the protection available through the vulnerable groups regulations by widening the eligibility criteria;
- we have completed a local pilot scheme on water affordability in the South West, and South West Water has extended access to the pilot measures due to its success;
- we have identified and encouraged best practice in administrating the vulnerable groups tariff; and
- we have worked closely with water companies and Ofwat in examining the likely distributional consequences of a range of tariffs for water consumers.

16. There is now a good case for examining the costs and benefits of metering and appropriate tariffs outside areas of water stress, in the context of a wider review of charging that will look at issues of efficiency and fairness.

Box: South West Affordability Pilot Study

The South West Affordability Pilot Study was designed to help those on low incomes with their water bills. The measures tested were:

1. Benefit entitlement checks;
2. Switching to a meter;
3. Eligibility for the vulnerable groups tariff; and
4. Water audits and water efficiency devices.

The pilot finished in October 2007 after over two years of experimental measures and analysis of their costs and benefits. Analysis showed most of the measures to be cost beneficial, and that the combination of measures had a positive impact for a lot of households, particularly those switching to meters.

The measures used in the pilot have already been followed up by South West Water under the name WaterCare. We encourage other water companies to consider providing a similar service to their customers. More information on the pilot is available at www.defra.gov.uk/environment/water/industry/affordability/index.htm.

Social and environmental protection tariffs

17. Tariffs provide a mechanism to manage the way different types of customers benefit within the current and any future system of charging. They also have the potential to incentivise customers to manage their demand, particularly at peak times.

18. We are undertaking work with Ofwat and water companies that is looking at the effects on customers of a range of unmeasured, measured and social tariffs. This includes simple tariffs that could help manage demand, and assist poor households, such as rising block tariffs. However, more complex tariffs, such as seasonal tariffs with higher charges in summer than winter, could require more intelligent metering technology. This is clearly a key issue for the future, as raised in the recent report by the Commission on Environmental Markets and Economic Performance (CEMEP)[46].

19. We believe the right combination of metering and tariffs has the potential to save significant additional amounts of water beyond that saved by metering alone. Companies are already capable of formulating new tariff structures using knowledge of their customer base. Ofwat approve these tariffs if they are soundly formulated and not unduly discriminatory. However, we believe that companies, particularly those with high levels of metering, can do more to implement innovative tariffs and that in the future more companies should develop tariffs that will incentivise customers to manage their demand.

[46] The Commission on Environmental Markets and Economic Performance (CEMEP) was established in 2006 to advise Government on how the UK could make the most of the potential economic benefits of the transition to a low carbon, sustainable economy. More information and the final report is available from www.defra.gov.uk/environment/business/commission/index.htm.

Future Water
The Government's water strategy for England

Box: Rising block tariffs

In a rising block tariff water use is divided into blocks. For each successive block the unit price of water increases and this can incentivise more careful water use. This type of tariff structure will most clearly benefit low use households, simply on the grounds that they are less likely to attract the higher block charges associated with high discretionary water use such as garden sprinklers and swimming pools.

However, higher use households may also benefit, depending on the proportions of overall annual use that attract each block rate. The key influences on the overall gainers and losers of rising block tariffs are how the size of each block is defined and at which point each block rises. It is this adaptability which could prevent undue impacts on large families.

20. We welcome the work that is being on innovative tariffs by a number of water companies, including the recent announcement to pilot a rising block tariff, with protection for vulnerable households, by Folkestone and Dover Water Services.

Surface water charging

21. As discussed in Chapter 5, the true costs of surface water flooding, and subsequent water quality impacts, are rarely factored into household and business decisions. Ofwat recommends that water companies implement charges for surface water drainage based on drainable surface area, particularly for non-household customers. Four of the nine water and sewerage companies in England use this tariff structure. All companies offer a rebate of surface water drainage charges for customers whose surface water is not connected to the public drainage system, but uptake is limited (typically 2–5% of household customers).

22. Highway authorities, who manage the run-off from roads, are able to connect into a public sewer, but only pay a connection charge (typically around £250) and do not contribute to maintenance costs. They therefore have little incentive to control the volume of water making its way into the sewerage system.

Vision for the future

Box: Vision for 2030

Fair, affordable and cost-reflective water and sewerage charges which incentivise environmentally responsible behaviour. We believe we will need near universal metering before 2030 in water stressed areas

Targeted and appropriate protection for vulnerable customers and those least able to pay

Customer appreciation of services and benefits paid for through water bills

Achieving the vision

23. The challenges and drivers for change are different to those which shaped charging policy when changes were last made, following the review initiated in 1997. In particular, we now have more acute pressure on supply and demand and a greater awareness of the wider environmental pressures and of the increasing inequities of the existing system. Now is the right time to re-examine the issue of charging. This year **we will commission an independent review to advise on how metering and charging should progress beyond the application that water companies may wish to make in their water stressed areas, including as part of their water resources management plans, as well as looking at charging more generally. The review will look in particular at social, economic and environmental concerns**.

24. In areas of serious water stress we believe that we will need near universal metering by 2030 and we welcome the commitments that water companies have now made in their strategic direction statements in advance of preparing and consulting on their draft water resources management plans.

25. The review will:

- assess the effectiveness and fairness of methods of charging, given current trends in water metering;
- consider the effectiveness of different types of social and block tariffs, following trials, paying particular attention to how these can help vulnerable households;
- assess the appropriate pace of change to near universal metering needed to ensure continuity of supply in areas of water stress, taking into account the current projections of growth in metering, the proposals brought forward in water resources management plans, the fact that all new homes are metered, and the importance of environmental protection;
- assess the cost of metering, including smart metering, taking into account the full social cost of carbon, and the cost effectiveness of different options; and
- recommend whether legislation is needed on either charging or metering.

Box: Smart meters

The vast majority of meters currently fitted are 'dumb' meters which measure water usage and have to be read manually. 'Smart' or 'intelligent' meters have a range of capabilities beyond that. Some provide more information for companies, for example providing for remote reading of meters rather than manual reading, or reading peak usage, both of which can provide companies with the ability to introduce more innovative tariffs. More advanced meters can provide detailed information to customers, with display units inside the property so that householders can monitor their water usage and see how different behaviours affect their usage.

Smart meters will be more expensive for companies, and therefore customers, but the benefits could also be greater. Potential benefits include reducing companies' operating costs through remote reading and incentivising customers to save water by making information more easily available.

26. Any change in the basis of charging will benefit some and disadvantage others. However, we will work closely with stakeholders to ensure adverse consequences are minimised and vulnerable customers are protected.

27. We will also work with other stakeholders to encourage the recording and sharing of best practice in corporate social responsibility activities among water companies, to ensure they are aware of good work outside of their own areas, and enable them to investigate whether they should take up alternative approaches. This includes targeting assistance to vulnerable households as a cost effective way of addressing affordability and fairness concerns, and where possible addressing the issue of bad debt in the water industry.

28. In addition, **we will also consider whether funding for surface water drainage should be changed to better reflect the polluter pays principle**. This may involve strengthening requirements by Ofwat for water companies to vary their charges to reflect more accurately the true cost of surface water drainage, including, for example, consideration of how to take account of impervious surface areas.

Current situation

1. Government sets the regulatory framework to ensure that water customers benefit from fair and affordable bills, that a clean, safe and reliable water supply is maintained, and that the environment is protected. This system has delivered real benefits to the water environment, and the work to realise efficiency improvements and innovation in the industry must continue. As the water industry has monopoly characteristics, there will always be a role for regulation.

2. Regulation is delivered through three bodies: the economic regulator Ofwat, the Drinking Water Inspectorate, and the Environment Agency.

3. Ofwat regulates with a view to protecting consumers for example by setting price limits that enable efficient companies to deliver the services customers need. Given the challenges facing the water sector, innovation will be essential to ensure the long term sustainability of the water industry. The Government expects Ofwat to play a key role in fostering and incentivising innovation in the water industry. The Government will consider this in its response to the CEMEP report which made recommendations on the role of economic regulators in relation to innovation. We will also consider innovation in the forthcoming review of competition in the water industry.

4. The Drinking Water Inspectorate needs to ensure that water companies continue to provide drinking water that is safe and acceptable to consumers. As the public cannot readily choose water supplier or indeed compare quality between suppliers, this is a particularly important function.

5. The Environment Agency needs to continue to regulate to ensure water abstractions and discharges are undertaken in ways which protect the environment.

Box: Water industry since privatisation

The average household bill in 2007/08 is £312 for water and sewerage. This is a real terms increase of 42% since privatisation in 1989

Annual average capital investment (based on 2002/03 prices), was £1.5 billion for the period 1980-85, and £3.2 billion for 2005-10

Between 1989 and 2010 more than £67 billion will have been invested in improved drinking water quality and higher environmental standards

Vision for the future

6. Across all these regulators, we want to see the promotion of innovation. In the case of Ofwat this includes following up the recommendations of the recent CEMEP report. The Government needs to ensure that the regulatory framework is fit for purpose. Customers will respond to water saving messages but want to see Government, water companies and regulators all playing their part. In particular, the water industry needs to be sufficiently flexible and innovative in order to address climate change mitigation and the many uncertainties associated with climate change adaptation.

Box: Vision for 2030

A strategic framework for the water industry which incentivises innovation, sustainability, demands long term planning and ensures short-term efficiency savings to reduce customers' bills

Modern, effective and risk-based regulation

Water service companies helping customers become more water efficient

An efficient, flexible and innovative water industry playing its full part in addressing challenges from rising demand, pollution and climate change

Achieving the vision

7. A world class water industry now and in the future is key to delivery of many of our water policies. We will provide the framework for a modern and efficient water industry. This will combine high environmental standards and protection of consumer interests, with a proportionate and effective approach to regulation.

Consumer interests

8. Consumers are at the heart of policy making. Their interests will continue to be a priority for the Government. The review of charging set out in Chapter 8 will help ensure fair and affordable water charges.

9. The Consumer Council for Water (CCWater) was created by statute in 2005. To ensure consumers are represented by the strongest possible voice, **Government will consult on whether there are benefits in reorganising consumer representation with regard to water and sewerage services**.

Box: Consumer representation in water and sewerage services

Consumer representation could be reorganised using existing legislation, to bring about the following potential changes:

- Complaints handled by Consumer Direct
- Consumer Council for Water merged into the new National Consumer Council
- Consumer redress scheme for water and sewerage companies

10. Statutory guaranteed service standards (GSS) will continue to ensure customers get an appropriate level of service from their water and sewerage companies. The GSS set out minimum standards of service delivery, such as handling of complaints and supply interruptions and payment levels when these are not met. The GSS will remain central in the consumer protection regime regardless of any changes to it.

11. **We will act on Ofwat's recommendations[47] on the level of payments that customers affected by sewer flooding should receive from their water and sewerage company. We will lay legislation in April** that will:

- set a minimum payment level of £150 for each incident of internal sewer flooding;
- include a new standard for customers materially affected by external sewer flooding; and
- set external sewer flooding payments at 50% of the annual sewerage charge for each external sewer flooding incident (minimum payment of £75 and maximum payment of £500).

12. We are also asking Ofwat in our draft Social and Environmental Guidance to subject the GSS to regular reviews in order to ensure minimum standards and payments contribute to service improvements.

[47] www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/gss_con211105

Ofwat's contribution to wider policy goals

13. It is vital that regulation remains independent of Government, to reduce the risk of regulatory uncertainty and to retain confidence and consistency in the decision making process. To ensure that economic regulation continues to function as effectively as possible, the Government encourages Ofwat to work with other regulators to co-operate and benchmark on areas of mutual interest and learn best practice from each other, including on policy development and corporate governance.

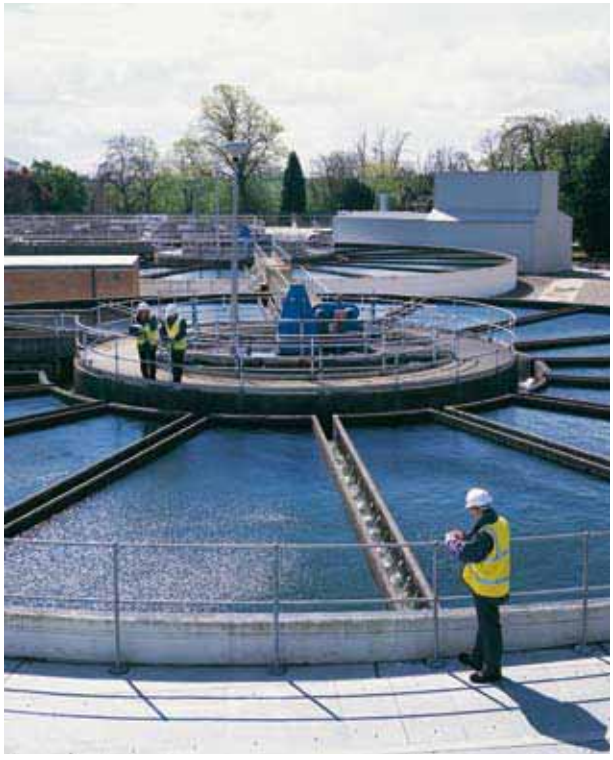
14. While economic regulation must remain independent, Government will always have a clear role in ensuring regulators contribute to wider social and environmental policies. Ofwat has a duty to contribute to the achievement of sustainable development and to have regard to the main principles of better regulation when carrying out its functions. The Government also needs to ensure water companies meet their statutory obligations.

15. To support this, we have recently issued a Statement of Obligations[48] to water companies and regulators. This compendium of legislation brings together and describes the key environmental and drinking water legislation applying to water companies and it will need to be reflected in their forward planning and business plans to Ofwat.

16. We are issuing draft Social and Environmental Guidance to Ofwat for consultation, in time to influence PR09. This guidance will give the strategic steer on how Government expects Ofwat to consider making a wider contribution to key social and environmental policies. It will, among other things, set out how we envisage Ofwat pursuing its sustainable development duty, and how regulation of the water industry might contribute to the Government's wider policy on climate change adaptation and mitigation. The guidance will be subject to a statutory consultation and Parliamentary scrutiny.

17. In effect, Ofwat must consider future consumer and environmental needs. It will challenge water companies in their water resources management plans and business plans, to establish how benefits will be delivered for consumers and the environment over a 25 year period. The challenge will cover companies' approaches to management and operation of assets, innovation, climate change, sustainability, and the impact of these on customers' bills.

18. We believe this approach to long term planning will be vital for the necessary climate change adaptation efforts in the water sector, with sufficient flexibility to allow for an improved science and evidence base.



Broken Scar water treatment works, Darlington. Drinking water inspector checking clarifier performance

[48] www.defra.gov.uk/environment/water/industry/review/pdf/soo-0712.pdf

19. The recent CEMEP report recommended a review of Ofwat's duties to give greater prominence to the importance of environmental innovation in meeting sustainability goals, and back this up with guidance as to how a more complex set of duties might be interpreted. A Government response to this report will be published later this year. The Sainsbury Review of Science and Innovation made a similar recommendation to all economic regulators in its report on the Government's science and innovation policies[49].

Better regulation

20. The Water Act 2003 introduced a number of measures under a better regulation banner to improve the regulatory system. We will strive to maintain consumer protection and the environment without placing unnecessary burdens on water companies. We will also review our stock of existing legislation in order to contribute to the 25% target set by the Government to reduce administrative burdens on UK business by 2010[50], and encourage increased use of market based instruments and voluntary action where appropriate. In this context, the Government will consider extending its new streamlined Environmental Permitting system, which will replace Waste Management Licensing and Pollution, Prevention and Control permitting from April this year, to also include in due course existing permitting systems for water. In addition, the draft Social and Environmental Guidance to Ofwat includes an expectation that better regulation principles will be applied.

21. Ofwat, the Environment Agency, the Drinking Water Inspectorate and CCWater have all worked together on reviewing their information requirements from water companies. The aim is to reduce the burden on companies and cut duplication of requests. This will mainly be achieved by Ofwat collecting relevant information for all regulators in its June returns. Defra, Welsh Assembly Government, the regulators and CCWater will also agree bilateral memoranda of understanding to promote effective co-operation and share information. Defra and its agencies have published a widely welcomed simplification plan that is on target to deliver a net reduction of 25% in Defra regulation. The Government looks forward to the publication of Ofwat's simplification plan and encourages Ofwat to continue strategic and proactive thinking around better regulation.

[49] www.hm-treasury.gov.uk/media/5/E/sainsbury_review051007.pdf
[50] www.defra.gov.uk/corporate/regulat/better/simplify/index.htm

Water company structure

22. The regulatory regime for water in England and Wales allows significant scope for flexibility in business models and different ownership structures. The water industry in England currently comprises 9 water and sewerage companies, 11 water only companies, and 7 water supply licensees. We welcome the recent entrants to the water industry, Scottish & Southern and IWNL, who were granted inset appointments by Ofwat last year.

23. Successive Governments have indicated support for the continuation of vertically integrated water and sewerage companies. This policy has contributed to the ongoing success of the sector. However, we have to examine whether companies are in a position to react to future challenges and provide customers with the services they want.

24. Ofwat is considering whether efficiency gains and benefits to customers could arise by requiring companies to separate their accounts to introduce greater transparency in costs. We welcome this and believe that companies that wish to go further, by voluntarily de-merging parts of their businesses, can do so within the current economic framework, where this brings benefits for customers and where the costs of such a reorganisation can be justified.

25. In response to an Ofwat exercise, we are considering the arrangements for dealing with the situation in which a water company is unable to carry out its functions, for example if it runs into severe financial problems. In consultation with main stakeholders, we are currently considering Rules for Special Administration and the procedures for obtaining funds to maintain company functions. The special administration regime is a procedure only of last resort, to ensure there is no break in continuity of supply of water and sewerage services to the public. We are also considering how best to update the Water Industry Act 1991, to align with modern insolvency practice and legislation in other sectors.

Competition and innovation

26. The Water Act 2003 introduced provisions for commercial premises using large quantities of water to change supplier to new entrant licensed water suppliers. However, so far no customer has switched suppliers. We are committed to developing a framework that brings real benefits for those customers that are able to switch suppliers but does not disadvantage those that are not eligible. We welcome the changes Ofwat has made to its guidance and its ongoing review into the wider competition framework. We also welcome the joint Ofwat and CCWater research into business customers' views on the competitive market.

27. We believe that there are benefits for business customers who wish to switch and we would urge them to do so when all the necessary access agreements are in place. In order to facilitate this we expect incumbents and licensed water suppliers to work effectively and openly together to iron out any difficulties. We also expect Ofwat to use its powers to pursue any anti-competitive behaviour.

28. Increasing opportunities for competition in the water industry can bring benefits to customers through keener prices, better services, improved efficiencies and innovation. There are already some opportunities for bringing competitive pressures to the industry, although these tend not to increase choice for the final consumer.

29. **We will commission an independent review of competition in the water and sewerage sector**. This fulfils a commitment to bring forward a review of the 50 megalitre a year eligibility threshold and a wider review of the competition framework, and to consider the recommendations made by Ofwat in its review of competition[51].

30. The review will have two principal goals: increasing efficiency of water use and delivering benefits to customers. It will consider the scope to deliver benefits and drive innovation through developing competition and contestability in all aspects of the supply chain from abstraction through to retail services. It will include an assessment of the costs, benefits, risks and feasibility of extending competition and contestability in water and sewerage services by looking at potential models in liberalised markets, best practice in other industries and demand from stakeholders. The reviewer's recommendations will include changes that can be made to the current regime through secondary legislation as well as changes that would require primary legislation.

31. It is very important to Government that the interests of household customers are protected in general, and vulnerable customers in particular as we develop the competition regime.

Box: Ofwat's main recommendations on competition in water

- The removal of the Costs Principle from the statute
- Replacing the Costs Principle with a set of general criteria for access pricing and requiring Ofwat to decide the specific method(s) for access pricing having regard to these criteria
- The eligibility threshold should be reduced to zero, but with an interim step to allow all involved to develop appropriate processes, and with a clear commitment to a zero threshold at a firm point in the future
- The interim step reduction in the threshold to be set at 5Ml. The initial step reduction to take place within a year and the reduction to zero within two years of that
- That in-area trading is permitted as soon as possible
- Government should pursue the changes to the strategic supply regime to allow further supplier of last resort protection for combined licensees and their customers
- That Government should allow retail competition for the sewerage regime as soon as possible

32. We also believe there is scope for incumbent water companies to extend their focus from being providers of basic water and sewerage services to becoming water service companies – providers of water efficiency goods and services, alongside and in partnership with new entrants and other third parties. This follows the concept of energy service companies, which provide customers with a combination of energy saving advice and equipment, renewable generation, planned maintenance, fuel and finance as well as electricity and gas.

[51] www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/marketcomp_waterind_part1.pdf/$FILE/marketcomp_waterind_part1.pdf

33. We would like to encourage water service companies to think more innovatively by putting their customers first and providing them with the services they want, as well as the essential services that they need, in a way similar to the energy service companies.

34. For example, Ofwat and CCWater research has indicated that 60% of business customers would like to be offered water efficiency audits (at the time only 14% of the business customers surveyed received such a service) and would be prepared to switch suppliers if this service were to be offered by other companies. For household customers, there is likely to be growing demand for goods and services that will help save and reuse water and avoid wastage as the uptake of meters increases.

35. We intend to consider what actions might be needed to encourage water companies to look more innovatively at the benefits of operating as water service companies. We will also consider this in the context of our review of the competition framework.

36. Like many others, the water industry will need to innovate to respond to the future challenges and opportunities presented by climate change, demographic change and globalisation, and to generate efficiencies for the benefit of consumers. Ofwat already has tools to incentivise innovation, and will do more as part of PR09. However, as pointed out in Ofwat's consultation on competition, while regulation can and does stimulate innovation, competition is more effective. As a result, the importance the Government attaches to innovation will be set out in the draft Social and Environmental Guidance to Ofwat, and the impact of competition on innovation will also be considered as part of the competition review.

37. The Council for Science and Technology[52] is currently benchmarking the rates of innovation within the water industry and identifying where the greatest potential benefits could be gained from increased innovation. This work is expected to be completed in the summer.

[52] http://www2.cst.gov.uk/

Vision for 2030

Water demand	Water supply	Water quality in the natural environment	Surface water drainage	River and coastal flooding	Greenhouse gas emissions	Charging for water	Regulatory framework, competition and innovation
Consumers using water wisely, appreciating its value and the consequences of wasting it A sustainable supply-demand balance across England with no seriously water stressed areas. Reduced per capita consumption of water through cost effective measures, to an average of 130 litres per person per day by 2030, or possibly even 120 litres per person per day depending on new technological developments and innovation Water companies actively encouraging demand management to protect customer and environmental needs Low levels of leakage, with targets set and met at the optimum balance of economic, environmental and other costs Water efficiency playing a prominent role in achieving a sustainable supply demand balance, with high standards of water efficiency in new homes, and water-efficient products and technologies improving standards in existing buildings Pro-active industrial and commercial sectors leading by example through initiatives such as voluntary agreements	People, businesses and industry using water resources sustainably, with no interruptions to essential supply during drought A water sector contributing to the protection and enhancement of the natural environment with abstraction management consistent with habitats conservation A water sector planning for the long term and medium term needs of the environment and the community, including resilience and emergency response	Large majority of water bodies in England having good ecological and chemical status People maximising sustainable use and amenity benefits gained from safe, healthy and attractive waters and water environments Healthy rivers, lakes, estuaries, coasts and groundwaters that provide maximum resilience to climate change and sustain biodiversity Major improvements achieved from tackling problems of nutrient pollution, chemical pollution, water resources, litter and microbial contamination Land increasingly flexibly managed for flood storage and water quality Reduced adverse impact of agriculture through continued evolution of the EU's Common Agricultural Policy to deliver more environmental benefit	More adaptable drainage systems delivering reduced flood risk, improved water quality, and decreasing burdens on the sewer system Better management of surface water drainage, allowing for the increased capture and reuse of water; slow absorption through the ground; and more above-ground storage and routing of surface water separate from the foul sewer system Better public appreciation of the causes and consequences of surface water run-off and the actions we can all take to minimise the risks	Flood and coastal erosion risk management which contributes to sustainable development, combining the delivery of social and environmental benefits with the protection of economic assets An understanding of the future risks of river and coastal flooding fully embedded into the spatial planning system, including planning for new settlements and other new developments Consistent and holistic management of urban flood risk, with strategic planning, partnerships of responsible bodies and clear understanding of various flood risk responsibilities Public understanding of the risks we face and the actions we can take to help manage flood and coastal erosion risk Community resilience to flooding from improved development planning, emergency planning and response, and resilience of homes, buildings, services and utilities	A water industry contributing fully to the achievement of national emission reductions targets and maximising its potential for renewable energy use and generation A water industry fully meeting its drinking water, environmental quality and other objectives while minimising its greenhouse gas emissions All sectors of society working collaboratively to remove pollutants at source to minimise the need for energy intensive end-of-pipe clean up treatment Householders aware of the link between water use in their homes and greenhouse gas emissions, and acting accordingly to minimise water wastage and maximising water efficiency	Fair, affordable and cost-reflective water and sewerage charges which incentivise environmentally responsible behaviour. We believe we will need near universal metering before 2030 in water stressed areas Targeted and appropriate protection for vulnerable customers and those least able to pay Customer appreciation of services and benefits paid for through water bills	A strategic framework for the water industry which incentivises innovation, sustainability, demands long term planning and ensures short-term efficiency savings to reduce customers' bills Modern, effective and risk-based regulation Water service companies helping customers become more water efficient An efficient, flexible and innovative water industry playing its full part in addressing challenges from rising demand, pollution and climate change

Overall vision: Continuous adaptation to climate change and other pressures embedded across the water sector, resulting in sustainable delivery of secure water supplies, and an improved and protected water environment

Summary of actions

	Actions
Water demand	Government will continue to work with CCWater, Waterwise, other members of the Water Saving Group and wider stakeholders to use co-ordinated messages to raise customer awareness of the need to save water
	Energy Saving Trust will launch the new Green Homes Service in April, to help people move toward greener lifestyles
	Government will amend the Building Regulations to include a requirement for a minimum standard of water efficiency in new homes
	All social housing funded through the Housing Corporation to be built to level 3 of the Code for Sustainable Homes, 105 l/p/d, from April
	Defra, CLG, the Environment Agency and others working together to identify measures to improve the water efficiency of existing homes
	Government to review the Water Supply (Water Fittings) Regulations 1999 later in 2008
	Industrial and commercial sectors to undertake voluntary agreements and to lead by example in order to implement water saving measures
	Government to extend the work of the Water Saving Group in 2008 to review the arrangements for promoting water efficiency in the industrial and commercial sectors and consider whether there is a case for further measures
	Government to consider whether, in light of Ofwat's water efficiency targets, some form of water efficiency obligation is required on the water industry
	Ofwat to inform water companies they will be expected to update their methodologies to take account of the technical recommendations for per capita consumption estimates and the guidance on the social and environmental costs
	Ofwat and the Environment Agency reviewing suggested refinements to the Economic Level of Leakage and to research further the viability and likely impact of the frontier approach

	Actions
Water supply	**Government to consult on further changes to the water abstraction licensing regime, as there is a case for all abstraction licences to be given a time limit within the third cycle of River Basin Management Planning, covering the time period 2021-2027**
	Environment Agency to take appropriate action to deal with abstractions that are adversely impacting designated nature conservation sites
	Water companies to consider in their water resources management plans the full range of options to share water resources with other companies to make more effective use of them, particularly in times of drought
	Developers and owners or managers of land and property to consider creating local rainwater storage for both commercial sites and houses
	Government to work with others to develop standards for non-potable water use
	Government to develop a National Policy Statement for water supply and wastewater treatment infrastructure, as envisaged by the Planning Bill, to speed up the process of planning permissions for reservoir development where such development is appropriate
	Government to review the current minimum requirement for the amount of water to be provided in an emergency

	Actions
Water quality in the natural environment	**Government to consult on the way forward for phasing out phosphates as an ingredient in domestic laundry cleaning products, including the case for regulation**
	Ofwat to work with water companies to ensure charges for industrial pollution sends the most appropriate price signals for minimising pollution
	We will roll out initiatives, over a further three years, to continue to support farmers on catchment sensitive farming
	Water companies to work with farmers to tackle pollution at source, where this is more cost effective than treating raw drinking water at the point of abstraction
	Government to announce in early 2008 conclusions in relation to Nitrate Vulnerable Zones and to the best combination of regulatory and other measures to deal with other pollutants from agriculture
	Government to continue to work with farmers to reduce the adverse impacts of agriculture on the water environment, through the provision of advice, guidance and funding of good farming practices
	Government to widen the Environment Agency's powers to require the provision of fish passes in obstructions which prevent the passage of fish, so that these apply to all types of fish and eels
	Government to undertake further work to investigate options to address situations where physical changes which took place many years ago are causing water quality problems
	Local councils and others to address aquatic litter through increased use of legislation including fixed penalty notices, beach signage and clean up campaigns
	Government to strengthen action to tackle microbial contamination of bathing waters to meet the new more stringent European standards, by the end of the 2015 bathing season.
	Government to encourage Natural England, the Environment Agency and other stakeholders to tackle problems caused by invasive non-native species, though prevention, early detection and carefully considered appropriate action, as agreed under the Convention on Biological Diversity and the draft Invasive Non-Native Species Framework for Great Britain
Surface water drainage	**Government consulting on how to give Surface Water Management Plans a stronger role in coordinating development and investment planning**
	Government to change householders' permitted development rights to allow them to pave over their front garden without planning permission only if the surface is porous, such as by using permeable paving or gravel. Government will introduce legislation with the effect of requiring planning permission for impermeable surfaces in front gardens in 2008
	Government consulting on alternatives to the ability to automatically connect to surface water drains and sewers to the public sewerage system
	Government consulting on options for resolving the barriers to take up of sustainable drainage systems (SUDS), including options for ownership and adoption of these systems across the main agencies involved in urban and land drainage
	Government considering how and when the transfer of existing private sewers and drains into the ownership of water and sewerage companies will take place

	Actions
River and coastal flooding	Environment Agency to have strategic overview of all forms of flooding and coastal erosion risk management
	Government to publish in spring 2008 a Practice Guide Companion to Planning Policy Statement on development and flood risk (PPS 25), to help planning authorities implement the new planning policy
	Government to develop in 2008 an adaptation toolkit including a range of measures to facilitate the adoption of sustainable flood and coastal erosion risk management
	Government to publish further guidance on the role of land use management in controlling flood risk
	Government together with water industry undertake work to improve the resilience of water and sewerage infrastructure to hazards
	Government to respond to the interim conclusions of Sir Michael Pitt's *Learning Lessons from the 2007 floods* review, as positively as possible, by the end of March
	Government to work with the Environment Agency and other operating authorities to respond to Sir Michael Pitt's recommendation that Government should commit to a strategic long term approach to investment in flood risk management
	Government to host a major conference on floods to consider Sir Michael Pitt's final findings and the UKCIP08 climate change projections, reflecting on the new challenges that these identify and pose
Greenhouse gas emissions	Water companies to seek to ensure that at least 20% of all energy used by the UK water industry comes from renewable sources by 2020
	Water industry to undertake research to better understand, measure and manage non-CO_2 greenhouse gas emissions from its own processes
	Defra Ministers to convene a stakeholder meeting on anaerobic digestion
	Ofwat to consider both the costs and the environmental and social benefits of water company proposals to increase their uptake of renewable energy and reduce their non-CO_2 greenhouse gas emissions
	Ofwat to use the Shadow Price of Carbon (SPC) as set out in the Government's guidance, and water companies to include the SPC in carrying out cost benefit analysis across its business plans
	Water companies to use the SPC in options appraisal in their water resources management plans

	Actions
Charging for water	**Government to commission an independent review to advise on metering and charging, looking in particular at social, economic and environmental concerns**
	Government to consider whether funding for surface water drainage should be changed to better reflect the polluter pays principle
	Government to work with other stakeholders to encourage the recording and sharing of best practice in corporate social responsibility activities among water companies
	Following the South West Affordability pilot study, water companies to consider providing a similar service to their customers
Regulatory framework, competition and innovation	**Government to consult on whether there are benefits in reorganising consumer representation with regard to water and sewerage services**
	Government to act, by laying legislation in April, on Ofwat's recommendations on the level of payments that customers affected by sewer flooding should receive from their water and sewerage company
	Ofwat to subject the guaranteed service standards to regular reviews to ensure minimum standards and payments contribute to service improvements
	Ofwat to consider future consumer and environmental needs and challenge water companies in their water resources management plans and business plans, to establish how benefits will be delivered for consumers and the environment over a 25 year period
	Government to publish later in 2008 a response to the Commission on Environmental Markets and Economic Performance (CEMEP) report, which recommended a review of Ofwat's duties to give greater prominence to environmental innovation in meeting sustainability goals
	Government to review existing legislation in order to contribute to the 25% target set to reduce administrative burdens on UK businesses, and encourage increased use of market based instruments and voluntary action where appropriate
	Government to consider extending the new streamlined Environmental Permitting system, which will replace Waste Management Licensing and Pollution, Prevention and Control permitting from April 2008
	Government to commission an independent review of competition in the water and sewerage sector
	Government to consider what actions might be needed to encourage water companies to look more innovatively at the benefits of operating as water service companies

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