science summary

Environment Agency

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Towards water neutrality in the Thames Gateway

Summary SC060100/SS

The Thames Gateway could be developed in a way to be 'water-neutral', according to a new study by the Environment Agency, Department for Environment, Food and Rural Affairs and Communities and Local Government. By 2016, the area could be using no more water than that used at present provided that: new homes and offices are built to high standards of water efficiency; a high number of existing homes and buildings are retrofitted with water-saving devices such as low-flush toilets and low-flow taps and showerheads; and water metering becomes compulsory. The introduction of variable water tariffs could also contribute to achieving water neutrality.

The Thames Gateway is Europe's largest regeneration project and stretches for 40 miles along the Thames Estuary, from London Docklands to Southend in Essex and Sheerness in Kent. The area has plans for around 160,000 homes to be built by 2016.

The study explores the feasibility of making the Gateway area 'water-neutral'. It includes two technical reports: on the technical modelling of different demand under different scenarios; and a survey of residents' views on strategies to make their homes more water-efficient. A summary report brings this work together.

Technical report 1: modelling baseline, business-as-usual and pathway scenarios

Entec UK Ltd was commissioned by the Environment Agency to explore the technical feasibility of moving to 'water neutrality' in the Thames Gateway by 2016. The aims of this aspect of the study were to:

- establish current demand for water in the area;
- forecast future water demand under a business-as-usual (BAU) scenario up to 2016;
- model the effects of different strategies leading to neutrality, taking into account financial costs and carbon emissions.

Water neutrality in Thames Gateway would be achieved if the total water used after new development is equal to or less than total water use in the Thames Gateway before the development.

The feasibility of achieving water neutrality was assessed through a series of scenarios using assumptions based around increased standards of water efficiency in new homes (through greater uptake of the Code for Sustainable Homes or CSH) and the retrofitting of water-efficient devices in existing housing. Water efficiency in non-households (such as businesses and public buildings) and compulsory metering and variable water tariffs were also explored.

Total water demand in the Thames Gateway in the baseline year of 2005-06 was found to be 521 million litres per day (Ml/d). Approximately 90 per cent of this demand (461 Ml/d) was for public water supply.

Unmetered households made the largest demand, at 210 Ml/d or 40 per cent of the total. Non-household demand and leakage were the next largest components with 108 Ml/d (23 per cent) and 89 Ml/d (19 per cent) respectively, followed by non-public water supply abstractions at 60 Ml/d (11 per cent). Metered households used 48 Ml/d (nine per cent).

Carbon emissions associated with the provision of water and the treatment of wastewater were estimated to be around 117,085 tonnes CO_2e per year.

The business-as-usual (BAU) scenario forecast how demand for water would be likely to change over the period to 2016, without any intervention to manage it beyond existing policy, behavioural or technological drivers. Forecast demand grew from 521 Ml/d to 563 Ml/d. This increase of 42 Ml/d was the benchmark value used in subsequent scenarios exploring different strategies to meet water neutrality. Carbon emissions were found to increase by nine per cent above the baseline, to about 128,000 tonnes CO_2e in 2016 in the BAU scenario.

Seven scenarios were developed using different combinations of approaches (building new homes to different standards, retrofitting various devices in

existing homes, metering and tariffs). Five scenarios achieved water neutrality, one went beyond neutrality by 20 per cent and one only made a third of the savings needed to meet neutrality:

- Progressive Scenario – Upper limit of what may be possible with current/future regulation.
- Neutrality Scenario 1a – High retrofit, with emphasis on retrofitting existing homes.
- Neutrality Scenario 1b – High retrofit, but with variable tariffs to dampen the need for retrofit.
- Neutrality Scenario 2a – Ambitious CSH.
- Neutrality Scenario 2b – Ambitious CSH, but with tariffs to dampen the need for high CSH.
- Neutrality Scenario 3 – Composite with variable tariffs, less extreme, more even-handed approach than previous scenarios to new homes and retrofitting
- Beyond Neutrality Scenario – Maximum retrofit and all new homes to reach CSH Level 5/6 from 2013/14. Variable tariffs included.

Water neutrality was found to be technically feasible, and could be achieved in a number of ways. However, neutrality is an ambitious goal that will require much effort from all those involved, according to the report.

The total costs for households range from £127 million to £181 million, which accounts for around two-thirds of the water savings needed to achieve neutrality. Costs for the non-household sector (which account for one-third of the water savings needed to achieve neutrality) are far less certain.

The range of costs for new homes is £275 to £765, averaged across all homes built in the Gateway between 2005 and 2016. The cost for existing homes (to pay for retrofitting, fitting a meter and applying tariffs where applicable) is £135 to £154 per house, with costs averaged across all existing households in the Gateway in 2005-06.

Compulsory metering is a fundamental requirement to achieve neutrality, says the report. Variable tariffs are likely to provide further incentives to reduce demand, and could reduce the cost of meeting neutrality.

Scenarios that assume more new homes will be built to the highest CSH standards are more likely to achieve neutrality, with fewer households needing to be retrofitted to offset demand from new ones. However, building high numbers of homes to the highest CSH levels would be expensive. Ambitious retrofit rates are still required to achieve neutrality.

If other areas wanted to achieve neutrality through households only (excluding metering and variable tariffs), the study found that between three and eight existing houses would have to be retrofitted to offset demand from one new home.

Technical report 2: Public acceptability of water efficiency scenarios

The second report found that attitudes to water appear to be evolving. Factors that raised awareness of water use were the presence of meters, publicity over the drought of 2004-06, negative feelings on waste and understanding of how water is valued across the world. Water meters were seen as particularly effective. Other factors included reminders from partners or parents, and action by local councils/water companies to make water efficiency more affordable/convenient.

Factors that discouraged water efficiency included: people's aspirations for homes or lifestyle; teenage children; lack of a sustained media campaign on water use; lack of financial incentive; and a perceived lack of action from Government or water companies to make new homes more water-efficient or reduce leakage.

Participants were given a package of simple retrofit measures to install in their homes, and asked later about savings. A minority (about one in four) felt they had made substantial savings, while about half made minor savings and a quarter did not reduce their water use. Larger savers of water tended to be single-person households and couples with no or young children. Smaller water savers included young couples and families with teenage children. Those who felt unable to save more water tended to be older people with meters.

The key factor that helped participants to become more water-efficient was awareness of how much water household chores use. Barriers to change included the effectiveness of water-saving devices.

Participants found technological (fix-and-forget) solutions appealing, because of their convenience. However, a universal retrofit programme was seen as too interventionist. Education campaigns also had strong appeal. Compulsory metering received broad acceptance, but people had reservations regarding variable tariffs, although they were not familiar with these.

Measures found to be most publicly acceptable were:

- public campaign with 'negative' climate and water stress messages balanced with positive messages of simple steps to save water;
- compulsory water meters;
- all new homes built to a high standard;
- legislation to ban non-water efficient devices;
- grants and incentives to encourage retrofitting;
- free distribution of water efficiency packs.

This summary relates to information from Science Project SC060100 reported in detail in the following outputs:-

Science Report: SC060100/SR1
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