Water Neutrality: An expanded definition

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The need for water neutrality

The concept of water neutrality has arisen as a response to plans for housing growth in areas where water resources are under pressure. Without water neutrality, or a similarly robust response, housing growth will lead to increased demand for water at a time when climate change threatens to reduce water supply. This presents clear risks to the water environment.

Definition

We define water neutrality as where total water use after development does not exceed total water use before development. Water neutrality would be delivered within a pre-defined zone which encompasses the new development and a surrounding area.

A water neutrality strategy will involve a range of measures designed to offset the predicted increase in water that would result from a new development in a business-as-usual scenario. This predicted increase will be limited by implementing water efficiency measures for the *new* buildings. The remaining increase will then be offset by reducing water use in *existing* buildings.

An alternative approach to water neutrality would not relate it so specifically to new housing development. Instead, a water-stressed area would be selected, and a strategy put in place not to exceed water use from the baseline year.

The Environment Agency has now refined the definition of water neutrality by expanding on several issues, as explained below.

What types of water use should be considered?

A strategy of water neutrality should focus on the public water supply as this accounts for the largest sector of licensed abstractions, 48 per cent. The second largest sector, power generation, is regarded as non-consumptive as it discharges most of the water it uses back to the environment with little adverse impact.

In some cases there may be a good argument for water neutrality addressing agricultural or industrial water use in addition to the public water supply. Although these sectors account for a relatively small proportion of overall water use, in some surface water and groundwater catchments they may account for a significant share of total abstraction. Furthermore, water use in these sectors is highly consumptive and abstractions for

agricultural use tend to increase in the summer when the supply-demand balance is most strained.

Alternative methods of achieving water neutrality

The bulk of savings made to achieve water neutrality should be made by using water delivered to households more efficiently. However, some supporting methods could be used in the right circumstances.

Rainwater harvesting and grey water

Rainwater harvesting and grey water systems reduce use of the public water supply. They could be considered as part of a water neutrality strategy on a case-by-case basis, taking into account the following:

- The potential adverse effect of rainwater harvesting on local catchments, as it traps water that would otherwise enter the local environment.
- The potential for grey water use to increase the concentration of pollutants in wastewater.
- The carbon costs of both measures. Some evidence suggests that they are less energy efficient than mains water, especially when embedded energy is considered.

Leakage

On average 23 per cent of the public water supply is lost through leakage (about three quarters of this from companies' pipes and one quarter from customers' pipes). Any leakage reduction which already features in water companies' plans should not be allowed to contribute to a water neutrality target. However, there are two ways that fixing leaks might contribute to water neutrality:

- where new development provides the opportunity for leakage reduction through infrastructure improvements that would not otherwise occur
- reduction in leakage from customer supply pipes.

Wastewater flows

When assessing abstraction licences the Environment Agency considers how discharges of treated wastewater contribute to the water balance. It could therefore be argued that the discharge of treated wastewater from a new development could count towards the water neutrality target. We recommend that this measure could be considered where the discharge would make a positive contribution to the management of river flows, but that this should only contribute to a small proportion of the overall target.

Uncertainty

As a standard part of their planning process, water companies plan for uncertainty in supply and demand. They do this by aiming to keep the level of available water above the level of actual use, a safety margin known as 'headroom'.

Any water neutrality target should take account of uncertainty using standard water industry headroom methodology. The headroom required to account for uncertainties in achieving water neutrality is likely to be large because the measures involved are novel and risky. However, it is not practical for water neutrality to aim to offset all of this uncertainty into the distant future. Instead an acceptable proportion of uncertainty should be planned for and factored in to the neutrality analysis (this will mean a proportion of uncertainty is not planned for).

As an example, if new development is expected to result in an extra demand of 2Ml per day, we would need to offset 2Ml per day *plus* the appropriate level of uncertainty associated the water neutrality measures. So if this uncertainty was estimated at 20 per cent, achieving neutrality would require offsetting in the existing community of 2.4Ml per day.

Water quality

Water neutrality may have an impact on water quality, for example by leaving more water available in the environment or possibly by leading to an increased concentration of pollutants in wastewater. However, it is not recommended that water quality is explicitly considered as part of a water neutrality strategy, as it is sufficiently regulated by the Environment Agency through the discharge consenting process and the Water Framework Directive (WFD).

Spatial scale

In many cases the most appropriate spatial scale for water neutrality will be a water company water resource zone. This simplifies the analysis as the supply and demand data is readily available from water company data. For some developments other spatial scales will be appropriate – for example, where a development overlaps more than one water resource zone, or where the water resource zone is much larger than the development area. In such cases the decision on the spatial extent should take into account the hydrological context and any issues considered by CAMS assessments or other local water resources studies. The choice of area should also support the objective of reducing or removing the need for additional resource development.

The other factor which will influence the spatial scale is the offset potential. In other words there must be enough existing homes to offset the demand from new homes.

Time period

Water companies' plans to balance supply and demand are based on a theoretical dry year, and a similar approach should be followed for water neutrality. The default option should be that water neutrality is achieved on average over the dry year. This approach would accept that there may be periods during the year ('peak periods' - mostly likely summer) when neutrality is not maintained, as long as neutrality is achieved on average over the year.

However, in some circumstances it may be necessary to maintain water neutrality during a peak period if:

- the water resource zone has limited storage capacity; *and*
- the water resource zone is at risk of not being able to meet demand during peak periods.

Offsetting of peak period demand will require specific measures designed to reduce water use such as watering gardens.

Monitoring
As a water neutrality strategy will be based on forecasts, of both projected demand and success of water efficiency measures, its successful delivery will inevitably be uncertain. A programme of monitoring will be required to assess its success. Monitoring should ascertain whether neutrality is achieved by the target date, and secondly whether it is maintained for a period after delivery. Monitoring should also take place during the implementation to verify that the implementation of relevant measures (retrofits, meter installation, new building standards etc) is on schedule.

It is recommended that after the target date for water neutrality, water use is reassessed every five years to ensure that it is maintained. If total demand in the area begins to rise (independently of additional development), new water efficiency measures should be introduced to re-establish water neutrality. This review will probably be the responsibility of the organisations which delivered water neutrality. A practical limit to this period of review (perhaps about 20 years) will have to be agreed.

Setting water neutrality targets

The concept of water neutrality should be seen as a tool which can be used to deliver far-reaching water efficiency measures. The concept should not be viewed inflexibly, and there may be cases where a target lower than 100 per cent neutrality may be appropriate. Two key factors will influence the setting of the water neutrality target:

1. the environmental situation, and
2. the offset potential.

Environmental Need

The key trigger for a strategy of water neutrality is that too much water is already being taken from the environment, or that there is the potential for this to happen following new development in the catchment. A high level indication of water stress can be determined from existing data on the spatial distribution of flow deficits in WFD water bodies across England and Wales. If this initial assessment indicates a potential problem, then:

- For the relevant Water Resource Zone, establish which water bodies will be used to supply the new development and the probable level of abstraction, including during periods of low flow, from each water body.
- Using CAMS assessments, determine the level of water available for abstraction from each water body identified above. The aim should be not to threaten the achievement of good ecological status under the Water Framework Directive.

These two steps may reveal water bodies which would have insufficient water available to supply the new development. The sum of such water body deficits will give an indication of the level of environmental stress that the increased demand for water will cause, and therefore the appropriate level of water neutrality that should be considered.

Offset potential

The water neutrality target will depend not only on the environmental need, but also on the potential to offset water neutrality in a given area. This potential will depend on the following factors:

- Size of new development relative to existing – i.e. how many existing homes are available to offset demand. To achieve neutrality, retrofits must be installed in between three and eight homes (depending on standards of new houses).
- The potential water savings in the non-household sector.
- Current water use per person - the greater the demand the more potential there is to reduce it.
- Extent of metering in existing homes – the lower the coverage the greater the potential to reduce demand by expanding metering
- Standards to which new buildings will be built.

Where the environmental situation demands full water neutrality, but offsetting all the new demand is deemed unrealistic, low impact supplementary measures should be considered. Options include waste water reuse, winter storage or small-scale abstraction from unused sources.