Model procurement requirements for water efficiency – stakeholder review

A consultation paper seeking stakeholders’ views on model wording to include in procurement documents in order to cut water use in new and existing buildings

July 2010
WRAP’s vision is a world without waste, where resources are used sustainably.

We work with businesses and individuals to help them reap the benefits of reducing waste, develop sustainable products and use resources in an efficient way.

Find out more at www.wrap.org.uk
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1.0 Introduction

The remit of WRAP (Waste & Resources Action Programme) has expanded to include resource minimisation and the efficient use of resources other than waste materials. We also help to introduce sustainable procurement practices. One objective is to deliver greater water efficiency in the built environment. Building on similar work to address construction waste (www.wrap.org.uk/constructionprocurement), we have drafted a guide and model clauses to help clients and developers ask for good practice in their procurement of design, construction and facilities management services (e.g. for private and social housing, schools and hospitals, offices and retail etc).

We would now like to invite stakeholders and potential users to contribute their views on these proposals, which are set out in the WRAP document “Model procurement requirements for water efficiency” (July 2010).

We are seeking feedback on the following topics:

- **Procurement approach** – to what extent can tender and contract clauses help encourage efficiency savings?
- **Formulating requirements** – how might building and product-level requirements be used most effectively?
- **Practice levels** – what are the appropriate values of water efficiency to act as a guide to project teams?
- **Model wording** – how might the proposed wording be refined?
- **Water Efficiency Plan** – what is the potential benefit from planning water efficiency in a structured way?
- **Overall guidance** – how might the document meet user needs more closely?

This paper provides a brief summary of our proposals and the underpinning rationale (Section 3), and a series of specific questions (Section 4).

2.0 Responding to this stakeholder review

<table>
<thead>
<tr>
<th>Please respond by email to:</th>
<th><a href="mailto:waterefficientprocurement@wrap.org.uk">waterefficientprocurement@wrap.org.uk</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadline for submissions:</td>
<td>3 September 2010</td>
</tr>
</tbody>
</table>

This document has been issued in conjunction with Defra’s stakeholder review of proposed Government Buying Standards for water-using fittings and appliances. Please respond separately to WRAP and Defra.

We plan to publish a summary of stakeholder responses to WRAP and a revised version of the procurement guide on the WRAP web site before the end of 2010.

3.0 Overview

Effective design, construction and management of buildings can deliver major savings in water consumption and associated costs and carbon emissions. The guide therefore aims to help construction clients and property managers to set requirements for water efficiency when procuring such services.

The guide focuses on potable water consumption from ‘domestic-type’ water fittings and appliances (i.e. toilets, taps, etc). Water use in industrial production and construction processes and the water ‘embodied’ in products during the manufacture and supply process are not covered.

As with waste of materials, organisations may wish to define a corporate policy and target, and/or define a target outcome for individual projects. These outcomes are then delivered through procurement requirements and the implementation of a project-specific or building-specific plan for water efficiency actions (see Figure 1).
Figure 1: Summary of the approach
The guide provides options for setting procurement requirements based on whole building outcomes for water use, and/or the efficiency of the major types of fitting or appliance. Previous Government consultation\(^1\) suggests a hybrid approach may be appropriate (particularly for non-domestic buildings), defining target outcomes at both building and component levels.

The guide classifies water consumption of the major types of fitting or appliance against three ‘practice levels’ of efficiency, defined as follows:

- **baseline practice** – "fittings and appliances that meet legal requirements but do not offer appreciable water savings compared to others on the market";
- **efficient practice** – "fittings and appliances offering reduced water consumption in comparison to baseline practice products, without materially impacting cost or performance for most types of use"; and
- **highly efficient practice** – "fittings and appliances offering reduced water consumption in comparison to efficient practice products, but which are not necessarily comparable in cost and flexibility”.

Table 1 (below) gives indicative values for practice levels of consumption. These have been derived from published rating systems and are explained in Appendix C of the guide\(^2\). The values identify what is technically possible; the accompanying notes in Table 1 identify likely constraints on their acceptability for use in certain applications.

<table>
<thead>
<tr>
<th>Fitting / appliance</th>
<th>Baseline practice</th>
<th>Efficient practice</th>
<th>Highly efficient practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shower</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 l/min(^3)</td>
<td>10 l/min</td>
<td>6 l/min</td>
</tr>
<tr>
<td></td>
<td>An aeration device or advanced spray pattern may increase user satisfaction at a given flow rate</td>
<td>This flow rate allows a house to achieve levels 3 &amp; 4 in the Code for Sustainable Homes</td>
<td>This flow rate may be unacceptable in household use, but acceptable in commercial property</td>
</tr>
<tr>
<td><strong>WC</strong></td>
<td>6 l/flush</td>
<td>4.5 l/flush</td>
<td>3.5 l/flush</td>
</tr>
<tr>
<td></td>
<td>6 l single flush is appropriate for male public WCs</td>
<td>Either 6/4 l dual flush or 4.5 l single flush. A low volume single flush may be more appropriate in public buildings.</td>
<td>e.g. 4.5/2.6 l dual flush May be inappropriate for plumbing systems requiring higher flow. A low volume single flush may be more appropriate in public buildings.</td>
</tr>
<tr>
<td><strong>Urinal</strong></td>
<td>1.5 l/bowl/use</td>
<td>3 l/bowl/hour</td>
<td>0 l/hour</td>
</tr>
<tr>
<td></td>
<td>7.5 l/bowl/hour during building occupancy period</td>
<td>maximum during building occupancy with user-presence activated flush</td>
<td>with minimal water use in maintenance</td>
</tr>
<tr>
<td></td>
<td>0 l/hour otherwise with minimal water use in maintenance</td>
<td>0 l/hour outside of occupancy and activation period, with minimal water use in maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flush within the hour if one person activates the sensor</td>
<td>May be inappropriate for high frequency of use (e.g. schools, sports venues)</td>
</tr>
</tbody>
</table>

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2. For housing in England and Wales, building regulations require that total water consumption is less than 125 l per person per day (120 lppd internal and 5 lppd external). Achieving this standard requires the use of at least some efficient practice components.
3. For showers and taps, flow rate refers to the maximum value measured at operating pressures up to 5 bar.
4. The Government’s Enhanced Capital Allowances scheme defines the “effective flush” of a dual-flush action WC as the mean consumption of one full flush and three reduced flushes.
<table>
<thead>
<tr>
<th>Fitting / appliance</th>
<th>Baseline practice</th>
<th>Efficient practice</th>
<th>Highly efficient practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap (basin)</td>
<td>Up to 12 l/min</td>
<td>6 l/min</td>
<td>4 l/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two-stage taps may help to reduce the effective flow rate</td>
<td>Sensor-actuated taps help to reduce consumption in public buildings</td>
<td></td>
</tr>
<tr>
<td>Tap (kitchen)</td>
<td>12 l/min</td>
<td>8 l/min</td>
<td>6 l/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A higher flow rate is typically required for kitchen use than for basins, since kitchen demand is related more to volume than duration of flow</td>
<td>User acceptability would need to be considered</td>
<td>Two-stage taps may help to reduce the effective flow rate</td>
</tr>
<tr>
<td>Bath</td>
<td>200 l capacity excluding body mass within the bath</td>
<td>185 l capacity excluding body mass within the bath</td>
<td>155 l capacity excluding body mass within the bath</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>User acceptability would need to be considered; ergonomically-shaped tubs may be preferable to short or shallow tubs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing machine</td>
<td>11 l/kg dry load</td>
<td>9 l/kg dry load</td>
<td>7 l/kg dry load</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1.2 l/place setting</td>
<td>1.0 l/place setting</td>
<td>0.7 l/place setting</td>
</tr>
<tr>
<td></td>
<td>Older domestic models may use 20 l/cycle</td>
<td>Equivalent to 12 l/cycle in a domestic dishwasher</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Indicative practice levels for water efficiency of common fittings and appliances

The guide also identifies benchmark levels of water consumption per occupant or per unit area for different building types ("standard", "enhanced" and "leading edge" practice), which could inform procurement requirements. To achieve a given design estimate of whole-building water use while satisfying user acceptance, the designer may select a mix of fittings at different practice levels. (However, such decisions should also take account of carbon emissions – for example, offering a highly efficient WC in combination with a higher flow rate shower in new homes may help to achieve level 3 or 4 in the Code for Sustainable Homes, but would increase energy costs and carbon emissions by substituting cold water savings with hot water consumption.)

The approach to water efficiency planning has been designed to be applicable to both new and existing buildings. It bears a strong analogy to a Site Waste Management Plan (SWMP), although currently a Water Efficiency Plan is not common practice.

The guide describes how a Water Efficiency Plan can be used to define and quantify actions to make more efficient use of water and reduce the associated costs and carbon emissions. Key activities in preparing and implementing a Water Efficiency Plan through the project life cycle are outlined in Figure 2. This Plan may either be initiated for an existing building as part of a facilities management contract, or developed as part of the design process for new build projects. The Plan should address user behaviour as well as the selection of fittings and appliances, and should include a specific focus on savings in hot water supply and use.
Figure 2: Approach to water efficiency planning
Typical content of a Water Efficiency Plan

A Water Efficiency Plan should contain the following information:

- description of the project/building, its current or projected installation of water-consuming fittings and appliances and their current or likely usage;
- the client/project **objective or requirement** (e.g. maximum consumption level, or corporate target for improvement), which may have been defined in the Project Brief and/or contract;
- **design estimates of alternative project outcomes** for end-use water consumption\(^5\) arising from the use of components meeting different practice levels of water efficiency (estimates should be on a per person or per m\(^2\) basis, and overall);
- **projected financial, water and energy savings** and associated financial costs from going beyond the minimum requirement for the project [and, if appropriate, the contribution to meeting the project’s target environmental rating for BREEAM or the Code for Sustainable Homes];
- a **project-specific target** for potable water consumption (design estimate or in-use) that meets or exceeds the requirement set for the project – and supporting justification on the basis of cost, acceptability or other relevant criteria;
- **specific cost-effective actions** to:
  - achieve the potable water consumption target by minimising consumption or replacing potable water with water from other sources (e.g. rainwater or greywater);
  - minimise energy and carbon emissions associated with the generation, storage and supply of hot water (within the property);
  - enable monitoring of water use (e.g. submetering on site);
  - reduce the risk of uncontrolled water use (e.g. by installing motion-sensor operated taps);
  - minimise the risk of leakage (e.g. through leak monitoring equipment and auto shut-off of flow to toilet areas when unoccupied);
  - influence user behaviour through design and building management;
  - ensure effective operation of the system over time;
- a **data log of designed-in and actual water consumption** (recorded over time), supported by evidence of actions taken;
- a **procedure for monitoring and review of performance** against the target, together with a timetable for updating the Water Efficiency Plan and capturing lessons learned; and
- the **identity of who “owns” the Plan** at each stage of the project (inception, design, construction, use) and who is responsible for implementing the actions.

The guide (in Section 5.2) provides a checklist of additional design measures (e.g. pipe runs and insulation) to complement the list of fittings and appliances in Table 1.

Figure 3 (below) summarises where to include water efficiency in the procurement of new construction / refurbishment and facilities management. Procurement actions are set by project stage, and the guide provides model wording for Actions 1A to 4C. The wording can be used or adapted as appropriate to fit within an organisation’s tender, contract and related documents.

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\(^5\) For dwellings, consumption should be estimated using the methodology set out in the Water Efficiency Calculator for New Dwellings available at [www.communities.gov.uk](http://www.communities.gov.uk). For non-dwellings, consumption should be estimated using a defined assessment method such as the BREEAM Water Consumption Tool.
The important elements of the model wording for procurement requirements are illustrated below by the Project Brief for a new build project. These elements include:

- the client’s minimum requirement for a building-level and/or component-level outcome;
- a requirement to assess the options for commercially sensible improvements in water efficiency (and associated energy savings), and consequently set a project-specific target; and
- a requirement to develop a Water Efficiency Plan which sets out actions and provides a framework for reporting.

**Model wording to include in the Project Brief:**

As part of our commitment to achieving a low environmental impact in all of our developments, we require that all new buildings/refurbishments use water efficiently.

*If a building-level outcome has been defined, use*  
This project must achieve our minimum design requirement for predicted potable water consumption of [insert: requirement for building-level outcome from policy document, e.g. X m³ per m² Net Lettable Area per year or X litres per person per day].
We require that all of the installed water-consuming fittings and appliances achieve, as a minimum, efficient practice levels as set out in the table below / standards defined by XXX e.g. the Bathroom Manufacturers Association Water Efficient Product Labelling Scheme.

Where appropriate, insert a table of water efficiency practice levels for components here – for example, using the values from Table 1 in this guidance document. If a building-level outcome has been defined, the Project Brief should not normally set minimum practice levels for components, so that the design team has flexibility to mix practice levels across different components.

If an environmental rating is sought, use/add

For this project, we aim to achieve [BREEAM / LEED / Code for Sustainable Homes rating of X]. We require the project to achieve, as a minimum, the mandatory water efficiency standards required for this rating.

In addition, we require the project team to take further steps to reduce potable water consumption and the carbon emissions associated with hot water supply, e.g. by implementing highly efficient components, where these provide value for money.

The project team is required to develop a Water Efficiency Plan for the project commencing at the concept design stage or before. The plan should include:

- alternative design estimates of project-level water consumption arising from the use of components with different practice levels of water efficiency;
- the projected financial, water and energy savings and associated financial costs from going beyond our minimum requirements for the project [and, if appropriate, the contribution to meeting the project’s environmental rating target];
- a project-specific target for the design level of potable water consumption that meets or exceeds the minimum requirements set for the project;
- specific cost-effective actions to:
  - achieve the potable water consumption target by minimising consumption or replacing potable water with water from other sources (e.g. rainwater or greywater);
  - minimise energy and carbon emissions associated with the generation, storage and supply of hot water (within the property);
  - enable monitoring of water use (e.g. submetering on site);
  - reduce the risk of uncontrolled water use (e.g. by installing motion-sensor operated taps);
  - minimise the risk of leakage (e.g. through leak monitoring equipment and auto shut-off of flow to toilet areas when unoccupied);
  - influence user behaviour through water system design; and
  - ensure effective operation of the system over time.

Project teams shall include the Water Efficiency Plan within both Scheme and Detailed design reports [or comparable documents as appropriate] for client RIBA Stage and/or project Gateway reviews, with the final Plan presented within the Contractor’s Proposals. The project team shall ensure that the requirements, including levels of water efficiency for fittings, are applied and clearly communicated to relevant subcontractors.

The project team shall submit evidence that the minimum requirements and any other measures specified in the Water Efficiency Plan have been implemented during design, procurement and installation. This may take the form of the certified post-construction environmental rating for the building or evidence that components meeting the standards specified in the Water Efficiency Plan have been installed.

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6 For dwellings, consumption should be estimated using the methodology set out in the Water Efficiency Calculator for New Dwellings available at www.communities.gov.uk. For non-dwellings, consumption should be estimated using a defined assessment method such as the BREEAM Water Consumption Tool. WRAP’s prototype Water Cost Saving Tool uses a calculation method that is consistent with both these approaches and also enables design estimates to be determined for buildings other than housing and offices.
During the development of the guide, we have generated a prototype spreadsheet-based tool (illustrated in Figures 4 and 5 below) to demonstrate how design teams and FM contractors can quantify the net savings from investing in water-efficient fittings and appliances. The tool is available for user review at [www.wrap.org.uk/waterefficientprocurement](http://www.wrap.org.uk/waterefficientprocurement). We would welcome feedback on the possible further development and publication of this tool.

The tool uses the same parameters as the existing water use calculators for the Code for Sustainable Homes and BREEAM. It goes beyond these tools in estimating potential cost and carbon/energy savings from adopting more efficient fittings and appliances in both new build and refurbishment projects. It also identifies which product changes offer the greatest savings, and provides design estimates for buildings other than housing and offices.

![Screenshot from prototype tool for estimating water cost savings](figure4.png)
Figure 5: User journey for prototype tool for estimating water cost savings
4.0 Questions for stakeholder review

The questions are listed below and are available in MS Word format at www.wrap.org.uk/waterefficientprocurement. We invite you to focus your responses in those areas where you have specific insights and views.

**Overall approach:** The guide sets out the importance of water efficiency (see Section 2) and summarises the opportunities to reduce consumption (in Section 4 and Appendix B). Current regulatory requirements and environmental rating methods (outlined in Appendix A) provide an incentive to take action.

1. **Do you agree that construction clients and developers should have a role in asking their project teams and facilities management (FM) contractors to increase water efficiency – by setting requirements in tender and contract documents?**

**Formulating requirements:** Responses to previous Government consultation indicate a preference for defining outcome-based targets for the water efficiency of a building, and to specify water use for fittings and appliances where more practical and appropriate.

2. **Do you agree with the model wording providing options for setting requirements at a whole building performance level and/or the component level?**

**Practice levels:** a number of assessment schemes define levels of water efficiency practice for components (e.g. Water Efficient Product Labelling Scheme, Association for Environment Conscious Building water standards, Water Technology List for Enhanced Capital Allowances, Government Buying Standards) and for buildings (e.g. Code for Sustainable Homes, BREEAM, LEED, DREAM). The guide provides indicative values to assist users rather than prescribing specific standards.

3. **Do you agree with the guidance provided on practice levels? (If you disagree with any individual values for practice levels, please suggest how and why these values should be revised.)**
Model wording: Experience in setting tender and contract requirements for waste management shows that users generally welcome model wording, which saves time and effort and can be tailored to individual projects.

4. Do you agree that the model wording in the guide is appropriate to each stage of procurement through the project life-cycle (Actions 1A to 4C)? (Please provide specific suggestions for text changes if appropriate.)

Water Efficiency Plan: The concept of a Water Efficiency Plan is an important element of the proposed client requirements, to encourage design teams and FM contractors to assess potential savings and define actions in a structured way at an early stage.

5(a) Do you agree that a Water Efficiency Plan can be beneficial, practical and cost-effective?

5(b) Above what project/contract value would you consider a Water Efficiency Plan to be worthwhile?

□ £200k  □ £500k  □ £1M  □ £2M  □ £5M  □ £10M  □ Other (please state)

5(c) Do you agree with the guidance on the content of a Water Efficiency Plan (see Section 5.2 of the guide)? (Please provide specific suggestions for text changes if appropriate.)
**Overall guidance:** The main purpose of the guide is to provide model wording for procurement, and sufficient supporting explanation – without going into detail on topics (such as design and product choice) which are addressed by other guidance and organisations.

6(a) **Do you find the guidance fit for purpose?**

6(b) **What are your top three recommendations for including additional information in the guide or in other documentation?**

**Quantifying the savings:** The prototype tool (available at [www.wrap.org.uk/waterefficientprocurement](http://www.wrap.org.uk/waterefficientprocurement)) estimates life-cycle cost, water and carbon savings from investments in water-efficient technologies, and helps client teams and facilities managers identify the most significant actions to take.

7. **Do you agree that the tool is worth developing into a publishable format?**
Sector commitment: Procurement practice is a major element of the sector-wide voluntary agreement to halve construction waste to landfill by 2012, which has more than 400 signatories (see www.wrap.org.uk/construction). As another example, the Federation House Commitment aims to reduce overall water usage across the food and drink industry by 20% by 2020 (see http://www.fhc2020.co.uk). Such ‘Responsibility Deals’ or voluntary agreements have Government support.

8. Do you agree that Responsibility Deals could play a role in accelerating the move towards greater water efficiency in the built environment? What would be your top recommendations for any new Responsibility Deals (e.g. in which market segments, with what target outcomes)?

Other feedback: If you wish to comment on other aspects of the guide, please do so.

Thank you for your comments.

Please respond by email to waterefficientprocurement@wrap.org.uk by 3 September 2010, using the template provided at www.wrap.org.uk/waterefficientprocurement.

Please note that information provided in response to this stakeholder review may be published or disclosed in accordance with the Freedom of Information Act 2000. If you want the information that you provide to be treated as confidential, please explain the reasons and we will do all we can to exclude the information.