

BN DW BATHS: Actions to improve bath design and efficiency - Briefing Note relating to Policy scenario objectives in Policy Brief

Version 3.0

This Briefing Note and referenced information is a public consultation document and will be used to inform Government decisions. The information and analysis form part of the Evidence Base created by Defra's Market Transformation Programme.

1 Summary

This Briefing Note sets out the information, rationale, assumptions and methods used within the demand forecasting model for bath water consumption reported in the Policy Brief for baths. Market Transformation Programme (MTP) targets relating to the outputs of the model are then discussed and action plans to reach these targets are formulated.

2 Demand forecasting model

Predictions for domestic water demand are based upon the output of a model consisting of a spreadsheet and embedded macros. The model generates estimates of annual water demand for domestic baths, showers and WCs until 2020. Stock information is used to derive the average water consumption per appliance usage.

The main variables for each appliance are:

- Ownership (stock) - the number of appliances established in UK houses.
- Sales volume - the number of appliances sold annually.
- Replacement factor - the proportion of sales that accounts for the replacement of existing appliances and therefore not adding to ownership. This is based on a product life expectancy.
- Volume per use - the volume of mains water consumed at each use.
- Frequency of use - expressed as uses per appliance per year.

The equation for annual water demand is as follows:

$$\text{Annual water demand} = \text{ownership} \times \text{frequency of use}_{app} \times \text{volume per use}$$

3 Product types

The main factors affecting the amount of water used per household for bathing are the type of bath and its capacity, and the usage pattern of the bath. Key product types included are as in Table 1¹.

Table 1 Product types included in MTP modelling

Bath type	Capacity to overflow (litres)	Usage (litres)
Undersized, 1,600 mm primarily	165	65
Corner baths	140	65
Shower baths	250	100
Standard baths	225	88
Roll-top baths	205	80
Whirlpool/spa baths	225	88
Large outdoor spa baths		1,500

The total number of bathing facilities includes only baths in domestic dwellings and does not include chemical baths or baths not intended for human use. Saunas and steam baths are also not included in the model.

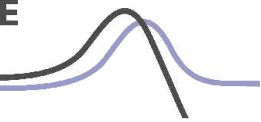
4 Reference scenario

4.1 Key factors influencing the market²

- The demand for additional housing, in line with changing demographic factors including a higher proportion of single-person households, will stimulate the new-build sector.
- The growth of the new-build sector, with an estimated 4 million homes required over the next 20 years. Plans for around 1.2 million new homes by 2016 in the South East have been announced by the Government and this will influence growth in the market.
- The growth of additional bathroom facilities in existing homes will support the growth of the sanitary-ware sector in particular, but not necessarily baths.
- There has been growth in specialist products to meet the needs of niche sectors and fulfil design requirements. Some manufacturers have made a shift to smaller baths.
- The emphasis on design and style has prompted refurbishment projects and increased the replacement rate.

¹ AMA Research (2004), *Microcomponent research into water conservation in domestic products* on behalf of the Building Research Establishment.

² MTP Report and Model (2006), *Water Appliances Data Acquisition*.



- The growth of showering and the wide range of showers and enclosures now available may reduce the sales of baths, particularly for smaller homes. The need for additional housing has prompted the growth of flats and three-storey townhouses, while the growing proportion of single-person households is driving demand for one or two bedroom houses.
- The significant cost of replacing a bathroom means that the purchase is more likely to be deferred during times of economic uncertainty.
- There is a trend away from corner baths.
- There is a shift to composite baths, though steel and cast iron are set to retain their relatively low share.
- The increase in product purchasing online could influence the choice and availability of bathroom fittings and products on the UK market.
- The availability of products for users with special needs could encourage bath use in that sector (eg the elderly or infirm).

4.2 Key trends influencing the established base, usage and consumption³

Trends likely to influence the established base are primarily driven by the population mix and the household size structure. A trend towards smaller properties is being observed, meaning that bathroom space is at a premium and therefore smaller baths are likely to be more popular in the future. Coupled with this, in larger properties baths are regarded as more of a luxury item which could lead to a slight increase in the number of oversized baths, thus creating polarisation of the market. Product trends include a shift to larger baths in the up-market niche sectors. Spa and whirlpool baths for internal or traditional bathroom use are increasing in number and these features can easily be added to an existing bath with various valves, recirculating pumps etc without necessarily resulting in any additional water use. Alternatively, specifically designed whirlpool spa baths can be purchased. These products are included in the model, though there is not necessarily any additional water use. A shift to specialised baths such as whirlpool spa baths in niche sectors such as executive housing is also expected.

The British and Irish Spa and Hot Tub Association (BISHTA) estimates there are currently about 100,000 hot tubs installed in the UK. Market growth over the last eight years has been rapid, with the majority being bought by retired people⁴.

There is also a trend for steam baths and sauna baths used within the home, but sales are considered to be very low and likely to remain low for the foreseeable future, with little impact on water consumption. It has not been possible to establish estimates for these baths. Trade commentators consider that the impact of such models on water consumption in the bath sector will be limited, even over the long term.

It is presently not possible to calculate the established base of combined bath and showering facilities. It is estimated that a significant majority of showers in principal bathrooms within UK homes are installed over baths (roughly 80%) and, given that

³ MTP Report and Model (2006), *Water Appliances Data Acquisition*.

⁴ MTP Report RPWAT0108 Hot tubs and spas scoping study.

67% of all households have at least one shower, this would suggest that 13.5 million households have combined bath and shower facilities (54% of all households).

4.3 Establishment

Ownership of baths is assumed to reduce from 96% in 2007 to only 91% in 2020. This is based on the fact that household penetration is expected to fall and certain smaller households are expected to use showers more widely. As such, trade indications are that the market will not increase significantly. Despite this, replacement levels will continue to support the market, with around 1.7 million new baths expected to be sold each year. Total stock in 2007 is estimated to be approximately 25 million installed, responsible for consumption of 559,141 million litres over 2007.

The lifespan of internal baths is estimated at 15 years, in line with market estimates of the frequency of bathroom replacement.

The mix of the different types of bath assumes that there will be growth in the shower bath sector. This reflects the demand from consumers to have a more secure footing for their shower, rather than the sloping traditional bath shape. The mix of products (% of sales) in any given year to 2020 is given in Table 2.

Table 2 Sales mix of products expected under the Reference scenario

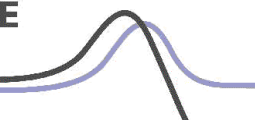
	Reference					
	Undersize	Corner	Shower	Standard	Rolltop	Whirlpool
2008	6.0	10.0	4.0	74.5	4.0	1.5
2009	6.0	10.0	4.0	74.5	4.0	1.5
2010	6.0	10.0	4.0	74.5	4.0	1.5
2011	6.0	9.0	5.0	74.5	4.0	1.5
2012	6.0	9.0	5.0	74.5	4.0	1.5
2013	6.0	9.0	5.0	74.5	4.0	1.5
2014	6.0	9.0	5.0	74.5	4.0	1.5
2015	6.0	9.0	5.0	74.5	4.0	1.5
2016	6.0	9.0	6.0	73.5	4.0	1.5
2017	6.0	9.0	6.0	73.5	4.0	1.5
2018	6.0	9.0	6.0	73.5	4.0	1.5
2019	6.0	9.0	6.0	73.5	4.0	1.5
2020	6.0	9.0	6.0	73.5	4.0	1.5

4.4 Consumption

Water consumption per bath varies according to the type of bath.

Estimates from the water utilities suggest that the level of usage of water per bath is significantly lower than the capacity to overflow at around 80 -110 litres. Using data from several utilities, an average of 88 litres has been calculated for the standard bath type⁵. The average volume per use of baths in 2007 was estimated to be approximately 85 litres.

⁵ MTP Report and Model (2006), *Water Appliances Data Acquisition*.



Following this, the assumption has been made that water consumption will remain stable to 2020.

The outdoor hot tub consumption is estimated at 1,500 litres, in line with a recent MTP study into hot tubs⁶.

4.5 Frequency of use

Frequency of use data have been sourced primarily from surveys carried out by water utilities.

It has been assumed that changes will reflect the slow shift to showering and therefore the frequency of use of internal baths is expected to drop from 265 uses per bath per year in 2007 to 255 uses by 2020 under the Reference scenario. Changing attitudes towards bathing to regard it as a leisure activity are expected, though this will not be balanced by the shift from bathing to showering, and there will still be a net decrease in the frequency of use.

5 Policy scenario (P1)

The impacts of all policies⁷ in the Policy Action Plan have been assessed with respect to the ownership, frequency of use and volume per use of internal baths and outdoor hot tubs.

5.1 General assumptions

No changes have been assumed for garden hot tubs relative to the Reference scenario. It is assumed that the market for these luxury products will continue to be small and little can be done to change the behaviour of those who wish to buy, install and use them. There are currently no policies likely to affect the total consumption by hot tubs.

No policies are thought to be likely to affect the ownership levels of baths over and above any trends already being seen under the Reference scenario.

5.2 Frequency of use

A small negative change across all bath types is anticipated following the promotion by the water industry of a policy to switch from bathing to water-efficient showering.

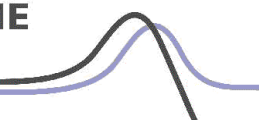
The frequency of use of baths is expected to decrease from 265 uses per year in 2007 to only 219 uses per year in 2020.

5.3 Volume per use

No policies are thought likely to impact on the volume per use for any bath type under the P1 scenario.

⁶ MTP Report RPWAT0108 Scoping Study on Hot Tubs.

⁷ Note, it is assumed that any policy implemented by government to cover England and Wales will be similarly implemented by the appropriate bodies in Scotland and Northern Ireland. MTP modelling covers UK water consumption.



5.4 Sales mix of new products

The sales mix of new baths sold under the P1 scenario is given in Table 3. The proportions of shower-baths, whirlpool and roll-top baths are assumed to remain unchanged from the Reference scenario, as it is thought the majority of sales of these types of bath are in the retrofit and refurbishment sectors which will not need to comply with the proposed revised Building Regulations. The main changes are an increase in the proportion of undersize and corner baths, to the detriment of standard baths, as both these categories have a smaller volume per use than the standard bath, which will help to meet the requirements of the proposed revised Building Regulations from 2009 onwards.

Table 3 Percentage sales mix of new baths sold under the P1 scenario

	P1					
	Undersize	Corner	Shower	Standard	Rolltop	Whirlpool
2008	6.0	10.0	4.0	74.5	4.0	1.5
2009	8.0	12.0	4.0	70.5	4.0	1.5
2010	10.0	14.0	4.0	66.5	4.0	1.5
2011	12.0	16.0	5.0	61.5	4.0	1.5
2012	14.0	18.0	5.0	57.5	4.0	1.5
2013	14.0	18.0	5.0	57.5	4.0	1.5
2014	14.0	18.0	5.0	57.5	4.0	1.5
2015	14.0	18.0	5.0	57.5	4.0	1.5
2016	14.0	18.0	6.0	56.5	4.0	1.5
2017	14.0	18.0	6.0	56.5	4.0	1.5
2018	14.0	18.0	6.0	56.5	4.0	1.5
2019	14.0	18.0	6.0	56.5	4.0	1.5
2020	14.0	18.0	6.0	56.5	4.0	1.5

6 Earliest Best Practice scenario

The Earliest Best Practice (EBP) scenario differs from the Policy scenario in two main ways: the shift from bathing to showering is more aggressively pursued, as is the promotion of undersized baths in favour of larger models. This has the net effect of bringing forward the reduction in consumption seen in the Policy scenario.

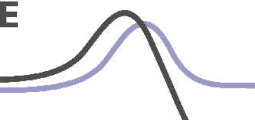
In addition, a reduction in the average volume per use of standard baths is effected from 88 litres to 80 litres in 2009, reflecting the possibility of a major change instigated by either amendments to the Water Supply (Water Fittings) Regulations or the proposed revised Building Regulations.

7 Market transformation targets

7.1 Market transformation target 1

At least 75% of baths installed by 2008 to be less than 200 litres in volume when measured to the middle of the overflow.

Policies: Water Product Information Scheme; common test methodologies; minimum standards; incentives; raising awareness.



7.1.1 Action Plan (potential action owner)

1. Agree a test method for assessing the water usage for baths as proposed in Briefing Note BNWAT07⁸ (MTP/Defra, manufacturers).
2. Define water-efficient bath performance criteria (MTP).
3. Develop a Water Product Information Scheme to provide better point of sale information including performance targets (MTP/Defra).
4. Propose and implement, when required, future revisions to the Water Supply (Water Fittings) Regulations 1999⁹, reducing threshold bath volume (eg from 230 to 200 litres). The 230-litre limit was initially introduced to provide a guide for the maximum floor loading exerted by a full bath. In addition, according to the 2004 AMA Research report, *Microcomponent research into water conservation in domestic products*, all baths sold (with the exception of outdoor spa-type baths) have a capacity of less than 230 litres (MTP/Defra, WRAC).
5. Encourage manufacturers to produce a greater range of smaller/low-volume baths, and encourage the development of strong 'low-volume' brands that are attractive to the consumer (MTP, BMA).
6. Encourage stakeholders to promote the replacement of large baths by improving the awareness of homeowners (MTP, retailers, suppliers).
7. Propose and agree guidance for developers and specifiers indicating the benefit of designing bathrooms with small-volume baths in achieving the levels set out in the Code for Sustainable Homes (MTP, NHBC).
8. Explore options for developing economic incentives or funding streams to support a large-scale programme for high-volume stock replacement (MTP).
9. Produce a best practice register to underpin further improvements in retrofitting and distribution methods (Ofwat, water companies, MTP).
10. Monitor the online sales of bathroom products (BMA, MTP).

7.1.2 Related issues

1. There is no accepted test or criteria for baths and therefore performance tests need to be defined. The total volume of the bath is an inappropriate measure, as any body being immersed would displace a significant amount. However, there is no 'standard body' that is currently used for displacement. Reference is made to Briefing Note BNWAT07¹⁰.

7.2 Market transformation target 2

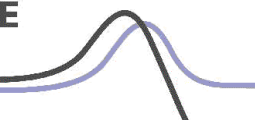
Maintain the current trend of the move away from bathing to showering.
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Policies: raising awareness.

⁸ <http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=362>

⁹ www.opsi.gov.uk/si/si1999/19991148.htm

¹⁰ <http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=362>



7.2.1 Action Plan (potential action owner)

1. Encourage key stakeholders to promote water savings which could be achieved in shifting from baths to water-efficient showers (MTP, Ofwat in conjunction with other parties).

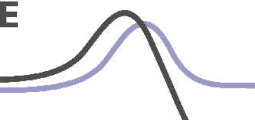
7.2.2 Related issues

1. The total volume of water used for bathing and showering accounts for around 25% of the domestic consumption. However, the balance between the use of baths and showers has been gradually moving towards a preference for showers over the past 15 to 20 years¹¹. Although the initial trend was gradual (since older shower models were expensive and had relatively poor performance), in recent times the shift has become significant.
2. The increase in the number of centrally heated houses has resulted in warmer bathrooms. This increase in ambient temperature has made showering more comfortable. Improvements in the temperature control and stability of showers specifically designed for UK water systems have aided market penetration.
3. The various uses for a bath need to be explored (eg washing, relaxation or entertainment). The volume of water used and the occupation period will vary depending on the nature of use. For example, the 'washing' category covers the bathing of small children (which requires a shallow depth of water) and the bathing of adults (which usually requires a greater depth of water). The degree of cleansing required may also influence the volume, or volumes, of water required. Hence, determining the volume of water used on average by a bath will not relate directly to its geometrical dimensions.
4. Refer to Briefing Note BN DW Shower¹² about the increasing uptake of water-efficient showers.

¹¹ BNWAT28 Water use in new and existing properties

http://www.mtprog.com/ApprovedBriefingNotes/PDF/MTP_BNWAT28_2008May7.pdf

¹² <http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=339>



7.3 Market transformation target 3

Promote the uptake of ergonomic/profiled baths.

Policies: Water Product Information Scheme; common test methodologies; best practice - replacing existing high-volume stock; raising awareness.

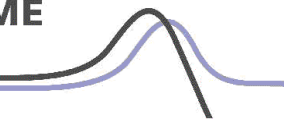
7.3.1 Action Plan (potential action owner)

1. Agree a test method for assessing the water usage for baths as proposed in Briefing Note BNWAT07¹³ (MTP/Defra, manufacturers).
2. Define water-efficient bath performance criteria (MTP).
3. Encourage manufacturers to research, develop and produce baths with ergonomic designs and encourage the development of strong 'low-volume' brands that are attractive to the consumer (MTP working with other parties (eg BMA)).
4. Review technology and its potential for the UK market (MTP working with other parties (eg BMA)).
5. Propose and agree guidance for developers and specifiers indicating opportunities presented by ergonomically designed baths in achieving the levels set out in the Code for Sustainable Homes (MTP, NHBC, DCLG).
6. Encourage stakeholders to promote ergonomically designed baths to consumers and specifiers (MTP, retailers, suppliers).

7.3.2 Related issues

1. British and European standards might need to be amended to include these types of bath.
2. Ergonomic baths that promote lower water use whilst maintaining functionality and comfort through improved design are already available on the market in Australia and other countries.
3. The relationship between size of bath and comfort is not straightforward. However, the National Water Conservation Group recognises that there is a lower limit that will offer comfort to the user. Changing various bath dimensions is an opportunity to reduce this lowest limit of comfort volume, and could be an important option for improvement. Policy needs to be supported by clear statements that present the rationale for each measure, and this is particularly important where interventions aim to have an effect on the design and styling of baths.

¹³ <http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=362>



Related MTP information

- Briefing Note BN DW Shower: Actions to improve shower design and efficiency - Briefing Note relating to Policy scenario objectives in Policy Brief.
- Briefing Note BNWAT07: Baths - water efficiency performance tests.

Changes from version 2.2

Updated to reflect 2007-2008 modelling.

Consultation and further information

Stakeholders are encouraged to review this document and provide suggestions that may improve the quality of information provided, email **info@mtprog.com** quoting the document reference, or call the MTP enquiry line on +44 (0) 845 600 8951.

For further information on related issues visit **www.mtprog.com**