# Appendix A: WR25B spreadsheet tool for AIC

*Step 1: Target households*

Populate the spreadsheet with data in order to achieve the desired customer participation.

## Target Households

- Identify up to four target households within your area (e.g. metered, unmeasured & social housing) and enter the expected number of households (in 1000s) in each group.
- Uncertainties are entered by inputting the Maximum and Minimum expected household numbers where indicated.
- Household number data need only be entered for the implementation period if the scheme is to be assessed as 'One-off' scheme. However, if the scheme is to be assessed under the 'Periodic Implementation' method the data must be entered for the whole 25 year period.
- Each population can be treated individually with regard to scheme uptake and water savings. However, the total scheme yields and AISCs are required each population group should be mutually exclusive.

Guidance

| | Target Households (000s) | | Year 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pop 1 for Scenario 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Best Estimate Predicted Households | 000s | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Uncertainty in Household Numbers - Maximum | 000s | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | Uncertainty in Household Numbers - Minimum | 000s | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Pop 2 (Not used) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Best Estimate Predicted Households | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Maximum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Minimum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Population 3 (Not used) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Best Estimate Predicted Households | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Maximum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Minimum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Population 4 (Not used) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Best Estimate Predicted Households | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Maximum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Uncertainty in Household Numbers - Minimum | 000s | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TOTAL POPULATION (000s) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Best Estimate Predicted Households | 000s | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Maximum Predicted Households | 000s | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| | Minimum Predicted Households | 000s | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |

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## Estimating Expected Uptake Rate & Uncertainties

- Check the relevant box below to identify the scheme as a 'One-off' scheme, i.e. the scheme is implemented just once or a 'Periodic' scheme which assumes the scheme is implemented more than once over the 25 year period.

(•) **Implement as a 'One Off' Scheme**

( ) **Implement as a 'Periodic' Scheme**

Guidance

| | *Best Estimate* | *Best Case* | *Worst Case* | |
|---|---|---|---|---|
| **Half Life of Scheme Savings** | 5 | 20 | 2.5 | **Years** |

Guidance

**NB: Inputs must be Integers**

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### One Off Implementation

- Enter the 'Best Estimate' (most likely), Best and Worst Case **Total** expected uptakes for each household group. Enter the number of years over which these uptake rates are estimated to be achieved.

NB: a 15% uptake implemented over 3 years is treated as a 5% uptake rate for 3 years.

| | Uptake Rate (%) | *Best Estimate* | *Best Case* | *Worst Case* |
|---|---|---|---|---|
| 1 | *Pop 1 for Scenario 1* | 80.0% | 90.0% | 70.0% |
| 2 | *Pop 2 (Not used)* | | | |
| 3 | *Population 3 (Not used)* | | | |
| 4 | *Population 4 (Not used)* | | | |
| | **Total** | **80.0%** | **180.0%** | **56.0%** |

**Period Scheme Implemented**

1 **Years**

**NB: Input must be an Integer up to a maximum of 10 years**

Guidance

*Step 2: Uptake rates and uncertainties*

This includes an estimation of what type of scheme it will be: a one-off or a periodic over a set amount of years. Input assumption of half-life and the best, most likely and worst case assumptions.

## Estimating Capex & Opex Costs & Uncertainties

- Enter the 'Best Estimate' (most likely), Best and Worst Case Capital Costs associated with the scheme and enter the number of years this money is likely to be spent starting in Year 1. NB: the 'Best Case' will be when the Capex costs are the lowest and vice versa for the 'Worst Case'.

| | | *Best Estimate* | *Best Case* | *Worst Case* | |
|---|---|---|---|---|---|
| **Capital Costs** | | | | | |
| 1 Set Up Costs | £ | | | | Guidance |
| Number of Years CAPEX covers | | 1 Years | | | Guidance |
| | | **NB: Input must be an Integer** | | | |

**Operational Costs**

- Enter the 'Best Estimate' (most likely), Best and Worst Case Operational Costs associated with the scheme on a per household basis. NB: the 'Best Case' will be when the Opex costs *per household* are the lowest and vice versa for the 'Worst Case'. It should be noted that *overall* Opex cost are likely to be highest in the 'Best Case' situation as the uptake is most likely to be highest uptake estimate.

| | | *Best Estimate* | *Best Case* | *Worst Case* | | |
|---|---|---|---|---|---|---|
| **Opex Cost per household where scheme taken up** | | | | | | |
| 1 Equipment | | £10.00 | £8.00 | £10.00 | £/household | Guidance |
| Installation | | £10.00 | £8.00 | £12.00 | £/household | |
| Admin | | £0.10 | £0.00 | £0.50 | £/household | |
| Recruit | | £0.50 | £0.00 | £1.00 | £/household | |
| | | | | | £/household | |
| **Opex Cost per household** | Installed | *£20.60* | *£16.00* | *£23.50* | £/household | |
| **Opex Cost per household where scheme NOT taken up** | | | | | | |
| Admin | | £0.00 | £0.00 | £0.00 | £/household | |
| Recruit | | £0.50 | £0.00 | £1.00 | £/household | |
| | | | | | £/household | |
| | Not Installed | *£0.50* | *£0.00* | *£1.00* | £/household | |

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*Step 3: Costs*

Input costs derived from best available information from previous studies. Assumptions regarding efficiencies of scale, scaling-up costs from small trials to large schemes, and project management costs must all be referenced.

## Estimating Water Savings & Uncertainties

- Identify the 'Best Estimate' (most likely), Best and Worst Case Water Savings associated with the scheme on a litres per household per day basis. It should be noted that water savings per household should be highest in the 'Best Case' situation.

| | Water Savings | Best Estimate | Best Case | Worst Case | |
|---|---|---|---|---|---|
| 1 | Pop 1 for Scenario 1 | 31.40 | 45.00 | 24.00 | l/Household/day |
| 1 | Pop 2 (Not used) | | | | l/Household/day |
| | Population 3 (Not used) | | | | l/Household/day |
| | Population 4 (Not used) | | | | l/Household/day |

Guidance

- Enter the costs associated with production of water in pence per cubic metre in this demand zone - monetary savings will be made by implementing this scheme by not having to abstract/treat the water saved.

OPEX cost of water: 0.0 p/m$^3$

Guidance

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*Step 4: Water savings*

Data inputted derived from the water savings achieved by the trials in the Phase II interim report. All assumptions should be referenced and documented. The water saving will have best case, best estimate and worst case limits. Opex cost can be accounted for during this stage of the AIC calculation.

## Estmating Social & Environmental Costs & Uncertainties

- Identify the 'Best Estimate' (most likely), Best and Worst Case ***Net*** Social and Environmental Costs and Savings associated with the **water saved** on £/Ml basis. It should be noted that Social and Environmental Costs should be lowest in the 'Best Case' situation. **Note that savings should be entered as a negative number.**

| Costs & Savings associated with the water saved | *Best Estimate* | *Best Case* | *Worst Case* | |
|---|---|---|---|---|
| Net Environmental Costs per Megalitre of water saved | 0.00 | 0.00 | 0.00 | £/Ml |
| Net Social Costs per Megalitre of Water Saved | 0.00 | 0.00 | 0.00 | £/Ml |

Guidance

- Identify the 'Best Estimate' (most likely), Best and Worst Case ***Net*** Social and Environmental Costs and Savings associated with the **installation of the scheme** on £/installation basis. It should be noted that Social and Environmental Costs should be lowest in the 'Best Case' situation. **Note that savings should be entered as a negative number.**

| Costs & Savings associated with Installation | | | | |
|---|---|---|---|---|
| Net Environmental Costs per Installation | 0.00 | 0.00 | 0.00 | £/Installation |
| Net Social Costs per Installation | 0.00 | 0.00 | 0.00 | £/Installation |

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*Step 5: Social and environmental costs* An AIC calculation must evaluate costs and benefits of environmental and social impacts. This has not been possible at this stage of the project due to a lack of data.

# *Assumptions for assessing carbon emissions and energy savings in the scenarios*

**WATERWISE**
**Evidence Base for Large-scale Water Efficiency**

Spreadsheet from UKWIR project WR25B 'A Framework for valuing the options for managing water demand' Ref. No. 07/WR/25/3
For further guidance refer to WR25B report, Appendix I

The results for each are in sheets: Results, AISC cht

Changes made to this sheet:

Cells G32 to AE 32 changed to sum uncertainties correctly
Cells G33 to AE 33 changed to sum uncertainties correctly

## Assumptions Carbon and Energy Calculations

**FOR Projects that include showers**

**CARBON**

Domestic Hot water emissions s = 0.008 kgCO2/l l = 8 tCO2/Ml hotwater

Energy indirect emissions saved 0.000747 kgCO2e/ = 0.747 tCO2e/Ml

If shower retrofit is included in project we assume 45% of total savings are hot water savings.

1 ML of water savings contains 0.45 Ml of hot water savings

so 2.2 Ml of water savings are required to save 1 Ml of hot water

and for every 2.2 Ml of water saved we save 2.2*0.747 = 1.64 tCO2 (energy indirect emissions)
and we also save 8 tCO2 (from hot water)
total carbon saved from 2.2Ml of water saved 10 tCO2
For every 1ML of water saved we save 4.38 tCO2

**ENERGY**

Domestic Hot water emissions saved = 0.044 kWh/l ho = 44000 kWh/Ml hotwater

Using the same assumption as above, 45% of savings are hot water

So 2.22 ML need to be saved to save 44000 kWh

So 1 ML saved would give us 20000 kWh

**FOR Projects that do NOT include showers**

If shower retrofit is not included in project we assume 2% of total savings are hot water savings.

1 ML of water savings contains 0.02 Ml of hot water savings

so 50 Ml of water savings are required to save 1 Ml of hot water

and for every 50 Ml of water saved we save 50*0.747 37.35 tCO2 (energy indirect emissions)
and we also save 8 tCO2 (from hot water)
total carbon saved from 50Ml of water saved = 45.35 tCO2
For every 1ML of water saved we save 0.91 tCO2

**ENERGY**

Domestic Hot water emissions saved = 0.044 kWh/l hotwater = 44000 kWh/Ml hotwater

Using the same assumption as above, 2% of savings are hot water

So 50 ML need to be saved to save 44000 kWh

So 1 ML saved would give us 880 kWh

AIC and AISC results in p/m$^3$ for best case, best estimate and worst case limits for the scenario

## Scheme Reults Summary - 'One Off' Implementation Method

• Enter the discount Rate at which costs and savings are to be discounted into the future

Annual Discount Rate: 4.5 %

Guidance

### Average Incremental Social Cost (p/m$^3$)

**Best Estimate**

| AISCs | | |
|---|---|---|
| Pop 1 for Scenario 1 | **30.5** | p/m$^3$ |
| Pop 2 (Not used) | | p/m$^3$ |
| Population 3 (Not used) | | p/m$^3$ |
| Population 4 (Not used) | | p/m$^3$ |
| Total Population | **30.48** | p/m$^3$ |

**Best Case**

| AISCs | | |
|---|---|---|
| Pop 1 for Scenario 1 | **8.6** | p/m$^3$ |
| Pop 2 (Not used) | | p/m$^3$ |
| Population 3 (Not used) | | p/m$^3$ |
| Population 4 (Not used) | | p/m$^3$ |
| Total Population | **8.56** | p/m$^3$ |

**Worst Case**

| AISCs | | |
|---|---|---|
| Pop 1 for Scenario 1 | **75.0** | p/m$^3$ |
| Pop 2 (Not used) | | p/m$^3$ |
| Population 3 (Not used) | | p/m$^3$ |
| Population 4 (Not used) | | p/m$^3$ |
| Total Population | **75.03** | p/m$^3$ |

### Net Present Values (Assessed over a 25 year period)

| | | |
|---|---|---|
| WAFU NPV | 543.90 | Ml |
| CAPEX NPV | 0.000 | £M |
| OPEX NPV | 0.166 | £M |
| Opex Savings NPV | 0.0000 | £M |
| Social & Env Costs NPV | 0.000 | £M |

| | | |
|---|---|---|
| WAFU NPV | 3363.30 | Ml |
| CAPEX NPV | 0.000 | £M |
| OPEX NPV | 0.288 | £M |
| Opex Savings NPV | 0.0000 | £M |
| Social & Env Costs NPV | 0.000 | £M |

| | | |
|---|---|---|
| WAFU NPV | 178.59 | Ml |
| CAPEX NPV | 0.000 | £M |
| OPEX NPV | 0.134 | £M |
| Opex Savings NPV | 0.0000 | £M |
| Social & Env Costs NPV | 0.000 | £M |

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