**‘How smart do smart meters need to be?’ paper data description**

File ‘ConsentForm\_community.docx’ is a consent form used for the participants in a community centre, university and a local café

File ‘Main study consent form.pdf’ is a consent form used for the participants of a field experiment in Exeter

File ‘energy\_beh\_change\_model.m’ is a code of the model developed in MATLAB

File ‘README\_MATLAB.txt’ explains the code in energy\_beh\_change\_model.m

File ‘EnergyLiteracy\_survey.docx’ presents the energy literacy survey used in the study

File ‘expectancy\_barriers\_survey.docx’ presents the expectancy and barriers survey

File ‘value\_messagesv4a.docx’ presents version a of value-framed messages survey

value\_messagesv4b.docx presents version b of of value-framed messages survey

File ‘Values\_survey\_description.docx’ describes the methodology behind values measurements

File ‘values\_survey.docx’ presents a survey for internal values measurements

File ‘Energy\_model\_valdiation.xlsx’ contains the data derived from the first main surveys within the ENLITEN project that were handed out during sensors installations in the 1st half of 2014 and during the iBert behaviour change system installations in December 2015. Average electricity consumption data for 3 weeks in December 2015 was extracted from the raw sensors data stored in a database of the ENLITEN project.

The raw electricity consumption data was expressed in financial costs (pounds £); in order to estimate the electricity consumption in kWh, the standard price of £ 0.145 for 1 kWh was assumed.

The data file consists of 4 sheets:

1. energy\_literacy
2. model\_validation
3. values
4. expectancy\_barriers

The main sheet is called ‘model\_validation’. It contains model input variables obtained from the surveys, energy consumption data, 1 demographic variable, three models output values (model1, model2, random model) and an absolute error of each of the three models compared to the normalised energy consumption data.

| **Variable name** | **Type** | **Type (+)** | **Coding** | **Comments** |
| --- | --- | --- | --- | --- |
| **Tab:**  **energy\_literacy** |  |  |  | **Contains the data for the validation sample: 20 households** |
| home\_id | Integer | Continuous |  | Home ID number |
| q1\_energy | Integer | Ordinal |  | Energy literacy self-assessment |
| q2\_info | Text | String |  | Main source of energy information |
| q3\_renewable | Decimal | Ratio |  | Knowledge on ‘renewable energy resources’ |
| q4\_uk | Decimal | Ratio |  | Knowledge on sources of renewable energy in UK |
| q5\_actions | Decimal | Ratio |  | Knowledge on the potential effect of energy saving actions in UK |
| q6\_light | Decimal | Ratio |  | Knowledge on energy saving lighting |
| score | Decimal | Continuous |  | Total energy literacy score |
| model\_score | Decimal | Continuous |  | Total energy literacy score on [0,1] scale |
|  |  |  |  |  |
| **Tab: model\_validation** |  |  |  | **Data for model inputs and model error estimation** |
| home\_id | Integer | Continuous |  | Home ID number |
| success\_expectancy | Decimal | Continuous |  | Success expectancy on [0,1] scale |
| altruistic | Decimal | Continuous |  | Altruistic values on [0,1] scale |
| biospheric | Decimal | Continuous |  | Biospheric values on [0,1] scale |
| egoistic | Decimal | Continuous |  | Egoistic values on [0,1] scale |
| hedonic | Decimal | Continuous |  | Hedonic values on [0,1] scale |
| barriers\_corrected | Decimal | Continuous |  | Energy saving barriers on [0,1] scale |
| energy\_literacy | Decimal | Continuous |  | Energy literacy on [0,1] scale |
| kWh\_consumption | Decimal | Continuous |  | Average electricity consumption during 3 weeks in December 2015 (1.12.2015-21.12.2016) |
| saving\_beh\_normalised | Decimal | Continuous | Reversed scored | Energy saving behaviour: energy consumption value in column kWh\_consumption was mapped onto [0,1] scale in a reverted order so that high consumption corresponds to low saving behaviour |
| demographics | Text | String | m=multiple person household  s=single person household | Multiple versus single person household categorisation |
| model1 | Decimal | Continuous |  | Energy saving behaviour which is computed by the model given the seven model input values from columns success\_expectancy, altruistic, biospheric, egoistic, hedonic,barriers\_corrected, energy\_literacy. This model assumes equal contributions of motivation and ability/recourses to behaviour |
| error\_model1 | Decimal | Continuous |  | An absolute difference between the observed saving behaviour (value in column saving\_beh\_normalised) and simulated behaviour of model 2 (value in column model1) |
| model2 | Decimal | Continuous |  | Energy saving behaviour which is computed by the model given the seven model input values from columns success\_expectancy, altruistic, biospheric, egoistic, hedonic,barriers\_corrected, energy\_literacy. This model assumes a higher contribution of motivation and lower contribution of ability/recourses to behaviour |
| error\_model2 | Decimal | Continuous |  | An absolute difference between the observed saving behaviour (value in column saving\_beh\_normalised) and simulated behaviour of model 2 (value in column model2) |
| random\_model | Decimal | Continuous |  | Energy saving behaviour which is computed by the model given the seven random inputs for success expectancy, altruistic, biospheric, egoistic, hedonic values, barriers and energy literacy. This model assumes an equal contribution of motivation and ability/recourses to behaviour |
| error\_random\_model | Decimal | Continuous |  | An absolute difference between the observed saving behaviour (value in column saving\_beh\_normalised) and simulated behaviour of a random model (value in column random\_model) |
| **Tab:**  **values** |  |  |  | Contains the data for the whole sample of ENLITEN homes: 55 households |
| home\_id | Integer | Continuous |  | Home ID number |
| v\_A1 | Integer | Ordinal | 1= not important at all  2= slightly important  3= reasonably important  4= very important  5 = extremely important | Altruistic value 1  ‘That everyone is given equal opportunities.’ |
| v\_B1 | Integer | Ordinal | Biospheric value 1  ‘To respect the earth and live in harmony with other species.’ |
| v\_E1 | Integer | Ordinal | Egoistic value 1  ‘To have social power e.g. control or dominance over others.’ |
| v\_H1 | Integer | Ordinal | Hedonic value 1  ‘To have pleasure, joy and to satisfy our desires.’ |
| v\_B2 | Integer | Ordinal | Biospheric value 2  ‘To live in unity and fit in with nature.’ |
| v\_A2 | Integer | Ordinal | Altruistic value 2  ‘That the world is at peace, free of war and conflict.’ |
| v\_E2 | Integer | Ordinal | Egoistic value 2  ‘To be wealthy. To have material possessions and money.’ |
| v\_E3 | Integer | Ordinal | Egoistic value 3  ‘To have the right to lead or command and have authority over others.’ |
| v\_A3 | Integer | Ordinal | Altruistic value 3  ‘That there is social justice and that we care for the weak.’ |
| v\_H2 | Integer | Ordinal | Hedonic value 2  ‘To enjoy life by enjoying food, sex, leisure activities etc.’ |
| v\_B3 | Integer | Ordinal | Biospheric value 3  ‘To protect the environment and preserve nature.’ |
| v\_E4 | Integer | Ordinal | Egoistic value 4  ‘To be influential and have an impact on people and events.’ |
| v\_A4 | Integer | Ordinal | Altruistic value 4  ‘To be helpful and work for the welfare of others.’ |
| v\_B4 | Integer | Ordinal | Biospheric value 4  ‘To prevent pollution and protect natural resources.’ |
| v\_H3 | Integer | Ordinal | Hedonic value 3  ‘To be self-indulgent and do pleasant things.’ |
| v\_E5 | Integer | Ordinal | Egoistic value 5  ‘To be ambitious, hardworking and aspiring.’ |
| Altruisitc | Decimal | Continuous |  | Average score altruistic value |
| Biospheric | Decimal | Continuous |  | Average score biospheric value |
| Egoistic | Decimal | Continuous |  | Average score egoistic values |
| Hedonic | Decimal | Continuous |  | Average score hedonic value |
| model\_A | Decimal | Continuous |  | Average score altruistic value on [0,1] scale |
| model\_B | Decimal | Continuous |  | Average score biospheric value on [0,1] scale |
| model\_E | Decimal | Continuous |  | Average score egoistic value on [0,1] scale |
| model\_H | Decimal | Continuous |  | Average score hedonic value on [0,1] scale |
|  |  |  |  |  |
| **Tab: expectancy\_barriers** |  |  |  | **Contains the data for the whole sample of ENLITEN homes: 55 households** |
| es\_PBC1 | Integer | Ordinal |  | Energy Saving  Success Expectancy 1 -control |
| es\_PBC2 | Integer | Ordinal | Energy Saving  Success Expectancy 2 - knowledge |
| es\_PBC3 | Integer | Ordinal | Energy Saving  Success Expectancy 3 - Self efficacy |
| es\_AtH | Integer | Ordinal | Energy Saving  Barriers- hassle |
| es\_AtC | Integer | Ordinal | Energy Saving  Barriers - comfort |
| es\_AtF | Integer | Ordinal | Energy Saving  Barriers - freedom |
| PBC\_average | Decimal | Continuous |  | Average survey score of Success Expectancy |
| At\_average | Decimal | Continuous |  | Average survey score of Barriers |
| expectancy\_model | Decimal | Continuous |  | Average Success Expectancy score on [0,1] scale |
| barriers\_model | Decimal | Continuous |  | Average Barriers score on [0,1] scale |
| barriers\_model\_reversed | Decimal | Continuous |  | Average Barriers score on [0,1] scale reversed |