

ARCoES project 'The value of constant electricity supply to domestic customers in Northwest England': Metadata and README

Description of the project

This project is part of the multi-institution, multidisciplinary ARCoES project (Adaptation and Resilience of Coastal Energy Supply) <https://www.liverpool.ac.uk/geography-and-planning/research/adaptation-and-resilience-of-coastal-energy-supply/> that identified challenges to UK nuclear energy sector and coastal energy supply as a result of a changing climate.

ARCoES was funded by EPSRC as an ARCC Energy sector project (ARCC = Adaptation and Resilience in the Context of Change). Grant reference EPSRC EP/I035390/1.

The social science project to value constant electricity supply was led by Dr Karyn Morrissey (KM), assisted by Dr Mary Dean, and carried out primarily at University of Liverpool, with some work in 2016 / 2017 by KM at University of Exeter. The aim was to investigate the value that household customers place on the availability of 24 hour electricity, given their daily needs and lifestyles. This value was decoupled from the actual cost of supplying electricity and identified the actual value customers place on a continuous electricity supply in their daily lives as a whole. A further refinement investigated heterogeneity of households to identify variation in WTP estimates for different household and socio-economic groupings.

This type of research is known as Willingness-to-Pay (WTP) and has a framework of econometric modelling. This project aligned to the ARCoES Case Study area and focused specifically on the North West region of England.

The data created by this project is available from the University of Liverpool Data Archive and, for continuity purposes, the data owner is the Principal Investigator of the ARCoES project, Prof. Andy Plater, gg07@liverpool.ac.uk

Keywords

Continuous electricity supply, constant electricity, willingness-to-pay, WTP, domestic customers, householders, North west England, Focus Group, Choice Experiment, CE attributes, Ngene, customer survey, SurveyMonkey, mixed logit model, ML modelling

Overview of the project steps

Two focus groups with household customers (sometimes referred to as domestic customers) were held: one in Liverpool and one in Southport, both held during March 2014. The focus groups were used to collect qualitative data to inform survey questions and inform the values for a constant electricity supply, a supply that is a continuous electricity supply with no power cuts.

The values obtained were used to inform and set the price element for a Choice Experiment (CE) to investigate how much householders were willing to pay to avoid stated power cuts. The CE was constructed using efficient design in Ngene software and this produced a blocked design of 2 blocks each with 8 choice scenarios (8 choice cards). The CE was incorporated as part 2 of an online survey developed using SurveyMonkey software. Part 1 asked a series of questions to encourage participants to consider how well they would manage during power cuts, part 2 was the CE and part 3 collected socio-economic data. Survey participants were presented with either Block 1 or Block 2 CE.

The online survey was run by PureProfile, a marketing company, during autumn 2015. Two pilot runs were carried out by PureProfile to obtain priors for incorporation in reruns of the Ngene software. This resulted in an improved CE. PureProfile have their own consumer panel and the survey was presented to panel members who were electricity bill-payers residing in north west England.

The CE data collected was used in a Mixed Logit Model (ML), an extension of the Multinomial Logit Model (MNL), that allowed, amongst others, for preference heterogeneity amongst respondents. The ML was used to estimate the value of constant electricity to customers in the NW region. The resultant values are useful to policymakers, electricity generation and distribution companies, regulators, community groups and charities for financial planning of long-term infrastructure investments in the electricity sector. The publications and other outputs arising from this research are shown below.

Publications and presentations

Morrissey, K., Dean, M., Plater, A. submitted 2017. The Value of Constant Electricity Supply: A non-market approach. *Energy Policy*.

Dean, M. Morrissey, K., Plater, A.J. submitted 2017. A Systematic Review of the Choice Experiment approach to estimating Willingness to Pay for Continuous Electricity Supply: A consideration of Domestic Households. *Energy Research and Social Science*.

Morrissey, K., Dean, M., Plater, A., 2016. The value of constant electricity supply: a non-market approach. Presentation at Regional Science Association International (RSAI) (British and Irish Section) conference. August 2016, Newquay.

Datasets produced and archive storage format

Seven files have been stored in the ARCoES area of University of Liverpool data Archive:

[\\bhrd01\projstore\ARCoES](#) in the Valuing electricity folder, under ARCoES Overview README / Liverpool ARCoES / Social Sci folders hierarchy.

All data is anonymised and is freely available. There are no access restrictions.

Two Domestic Focus Group partial transcripts (anonymised) in Adobe .pdf format. These contain partial transcripts of the meetings with participants anonymised. Facilitators Karyn (Morrissey) and Mary (Dean) not anonymised. Files are:

- Electricity supply Focus group 1 Liverpool transcript
- Electricity supply Focus group 2 Southport transcript

Choice Experiment Attributes and Levels, and Ngene syntax stored in Adobe .pdf format. Choice Experiment Attributes and Levels are presented in tabular form and are similar to other research on WTP for continuous electricity. Ngene syntax to construct Choice Experiments requires Ngene software to run it, available (a charge) from ChoiceMetrics <http://www.choice-metrics.com/features.html> The Ngene manual should be used to understand the coding options used in the syntax. The match between letters A - E in the Ngene equation and attributes: A = Duration (4 levels), B = Time of day (peak or off-peak), C = Time of week (weekday or weekend / Bank Holiday), D = season (winter or not winter), E = price (4 levels). File is:

- WTP Choice Experiment Attributes and Ngene syntax

Two Domestic surveys, one each for blocks 1 and 2 in Adobe .pdf format. These are copied from the SurveyMonkey surveys and each corresponds to one of the Choice Experiment (CE) blocks constructed by the Ngene syntax (for syntax see separate WTP Choice Experiment Attributes and Ngene syntax file). Options presented for multi-choice questions are shown below. Part 2 of the survey is the CE scenarios, showing the attributes and levels presented to respondents. Files are:

- WTP electricity Main Survey Block 1 SurveyMonkey
- WTP electricity Main Survey Block 2 SurveyMonkey

Two Survey and Choice Experiment output data files (anonymised) in Excel .xls format. These are the raw output data for each respondent from the two surveys. Column reference and options for multi-choice questions are shown below.

- WTP electricity Survey CE Block 1 output data
- WTP electricity Survey CE Block 2 output data

Additional information for Main Survey questions options and WTP Survey output data files

The following columns in the WTP Survey and Choice Experiment output data files (and corresponding survey question number) are survey participants' selections from the following options:

Col	Qu'n	Option 1	Option 2	Option 3	Option 4	Option 5
H	1	Yes	No			
I	2	% or free format				
V-AE	8	1 col per option				
AF	9	Extremely well	Fairly well	Undecided	Fairly poorly	Extremely poorly
AG-AQ	10	1 col per option				
AR	11	Extremely well	Fairly well	Undecided	Fairly poorly	Extremely poorly
AS-AZ	12-19	Choice experiment				
AS-AZ	12-19	Option 1	Option 2			
BA	20	Yes, for each ..	Yes, for most ...	About half the time	No, not got most ..	No, not for any ...
BB	21	Not applicable	One of the attributes			
BC	22	Full time	Part time	Long term sick	Retired	Home duties
BC	22	Unemployed	Student			
BE	24	16-29	30-34	35-39	40-44	45-49
BE	24	50-54 etc in 5 year bands to	85 and over			
BF	25	Male	Female	Prefer not to say		
BG	26	< £10,000	£10,000 - £19,999	£20,000 - £29,999	£30,000 - £39,999	£40,000 - £59,999

BG	26	£60,000 - £79,999	£80,000 and over	Prefer not to say		
BJ	29	None	1 person	2 people	3 people	4 or more
BK	30	Yes	No			
BL	31	Village	Small town	Large town	Suburbs	City
BL	31	Hamlet / isolated				
BM	32	Yes	No			
BN	33	Flat / apartment (ground floor)	Flat / apartment (1 st + floor)	Bungalow (any type)	House (any type)	
BO	33	Free format for Other dwelling type				