Department of Energy & Climate Change

DECC Non - domestic building energy use project phase I Annex 2: Main Stage Tables

June 2013

Main Stage Tables

Table 1: Number of Interviews Completed in the Main Stage and Profile based on Respondent Description of Activity

Independent/chain	Activity sector/Thompson code	Number of interviews completed
Independent	Butchers	208
	Bakers' shops	143
	Supermarkets	160
	Freezer centres	3
	Newsagents	27
	Other food/mixed retail[1]	184
Chains (2-99 sites)	Butchers	33
	Bakers' shops	55
	Supermarkets	16
	Freezer centres	2
	Newsagents	2

[1] Defined as any business within the following Thomson codes: Confectionery Retailers, Corner Shops, Delicatessens, Farm Shops, Fishmongers, General Stores, Greengrocers & Fruit Sellers, Grocers, Health Foods & Products, Herbalists, Herbs & Spices, Organic Foods, Shell Fish, Sports Nutrition and Supplements.

Independent/chain	Activity sector/Thompson code	Number of interviews completed
	Other food/mixed retail	29

Table 2: Weighing for Independent/Small Chain Food/Mixed Retailers, based on Experian pH Categorisation of Business Activity

Independent/chain	Activity sector based on Thomson codes	Population based on Experian	Number of premises interviewed from this Experian pH category	Weight N/n
Independent	Butchers	2,023	223	9.1
	Bakers' shops	1,012	185	5.5
	Supermarkets	992	165	6.0
	Freezer centres	8	4	2.1
	Newsagents	3,755	21	178.8
	Other food/mixed retail[2]	7,254	167	43.4
Chains (2-9 sites)	Butchers	907	39	23.3
	Bakers' shops	1,085	19	57.1
	Supermarkets	570	16	35.6
	Freezer centres	21	2	10.5
	Newsagents	1,434	18	79.7

[2] Defined as any business within the following Thomson codes: Confectionery Retailers, Corner Shops, Delicatessens, Farm Shops, Fishmongers, General Stores, Greengrocers & Fruit Sellers, Grocers, Health Foods & Products, Herbalists, Herbs & Spices, Organic Foods, Shell Fish, Sports Nutrition And Supplements.

Independent/chain	Activity sector based on Thomson codes	Population based on Experian	Number of premises interviewed from this Experian pH category	Weight N/n
	Other food/mixed retail	3,463	110	31.5
Chains (10-99 sites	Butchers	87	39	2.2
	Bakers' shops	765	74	10.3
	Supermarkets	386	77	5.0
	Freezer centres	0	0	n/a
	Newsagents	255	39	6.5
	Other food/mixed retail	790	17	46.5

Table 3: Analysis of VSA Data from the Mid-Nineties – Retail Sector

Business activity	Net Internal Area (m2)	Number of hereditaments	Mean Net internal Area (m2)
Food retail	6,317,617	59,475	106
Mixed retail	4,026,605	26,631	151
Total	10,344,222	86,106	120

Table 4: Comparison of Population Data Available from ONS, Experian and VOA.

Source	Subset of database	Population in England and Wales nearest thousand
Valuation Office Agency (VOA) database	Retailers	548,000
Office of National Statistics (ONS) - UK Business: Activity, Size and Location - 2011	Local units in: SIC2007 47 Retail trade, except of motor vehicles and motorcycles SIC2007 45 Retail trade and repair of motor vehicles and motorcycles	320,000
Experian B2B prospector (June 2012)	Individual locations in: SIC2007 47 Retail trade, except of motor vehicles and motorcycles SIC2007 45 Retail trade and repair of motor vehicles and motorcycles	299,007

Table 5: SIC 2007 Categories Relevant to Food/Mixed Retail

SIC retail categories
Retail sale in non-specialised stores with food, beverages or tobacco predominating
Retail sale of bread, cakes, flour confectionery and sugar confect. specialised store
Retail sale of fish, crustaceans and molluscs in specialised stores
Retail sale of fruit and vegetables in specialised stores
Retail sale of meat and meat products in specialised stores
Other retail sale of food in specialised stores
Other retail sale of food in non-specialised stores

Table 6: Thomson categories relevant to food/mixed retail

Activity sector	Definition- Thomson Categories
Butchers	Butchers
Bakers	Bakers
Supermarkets	Supermarkets
Freezer centres	Freezer centres
Newsagents	Newsagents
Other mixed retail	Confectionary retailers, corner shops, delicatessens, farm shops, fishmongers, general stores, greengrocers, grocers, health food products, herbs and spices, organic food, shell fish

Table 7: Total Premises Owned/Leased by Food/Mixed Retailers

Activity sector	Definition -Thomson Categories	Number of individual sites/premises		
		PLCs / Internationals large chain retailers with 100+ sites	Chains with 2-99 sites	Independent retailers
Butchers	Butchers	0	994	2,023
Bakers	Bakers	1,474	1,850	1,012
Supermarkets	Supermarkets	8,535	957	992
Freezer centres	Freezer centres	148	21	8
Newsagents	Newsagents	886	1,689	3,755
Other mixed food retail	Confectionary retailers, corner shops, delicatessens, farm shops, fishmongers, general stores, greengrocers, grocers, health food products, herbs and spices, organic food, shell fish	7,222	4,253	7,254
Total		18,265	9,764	15,044

Table 8: Analysis of Experian pH data and adjustments based on fieldwork / analysis

Activity sector	Definition - Thompson Categories	Number of individual sites/premises					
		PLCs / Internationals large chain retailers with 100+ sites		Chains with 2-99 sites		Independent retailers	
		Experian pH	Adjust. based on analysis[3]	Experian pH	Adjust. based on fieldwork	Experian pH	Adjust. based on fieldwork
Butchers	Butchers	-		1,274	994	2,175	2,023
Bakers	Bakers	1,474	1,474	2,075	1,850	1,075	1,012
Supermarkets	Supermarkets	6,275	8,535	1,096	957	1,045	992
Freezer centres	Freezer centres	148	148	21	21	9	8
Newsagents	Newsagents	886	886	2,390	1,689	4,304	3,755
Other mixed retail	Confectionary retailers, corner shops, delicatessens, farm shops, fishmongers, general stores, greengrocers, grocers, health food products, herbs and spices, organic food, shell fish	9,482	7,222	5,641	4,253	8,240	7,254

[3] The stores of one of the major supermarket chains were categorised as corner shops, and so adjustments were required to the population data to reflect this.

Activity sector	Definition -	Number of individual sites/premises					
Total		18,265	18,265	12,497	9,764	16,848	15,044

Table 9: Estimated Number of Items of Equipment in use by Independents and Small Chains (fewer than 100 outlets)

End use	Equipment	Number of items
Refrigeration	Chilled cabinets	40,673
	Chilled cabinets (without doors/display)	29,954
	Upright freezers	10,322
	Chest freezers	31,261
	Cold stores	9,720
	Chiller plants (for refrigeration)	771
Heating	Boilers	1,002
	Electric radiators	1,124
	Portable fan heaters	4,552
	Gas heaters	301
	Air conditioning systems (split unit - heating)	2,731
Cooling	Air conditioning systems (split unit - cooling)	1,680
	Room air conditioning systems	5,468

• End use	• Equipment	• Number of items
	Chiller plants (for space cooling only)	308
Hot Water	Boiler	3,922
	Immersion	6,575
	Taps Heaters	9,414
	Oil Boilers	269
	Multi-point	133
Ovens	Standard electric oven	6,688
	Deck electric oven	305
	Rotisserie electric oven	27
	Standard gas oven	87
	Standard oven unknown supply	4,792
	Deck oven unknown supply	347
	Rotisserie oven unknown supply	15
Cafe	Coffee machine	1,393

Table 10: Bottom-Up Estimate / Analysis of Energy Consumption for Independents and Small Chains (fewer than 100 outlets)

Process	Specific Equipment	Annual GWh for equipment	Annual GWh for process	% of total kWh	kWh/m2/yr - gross floor area	kWh/m2/yr - net floor area
Lighting	Compact fluorescent	7.2	149.5	7%	34	35
	Halogen lighting	34.5				
	Sodium lighting	0.3				
	Fluorescent Strip Lighting	98.6				
	Standard Incandescent lighting	8.8				
Refrigeration	Chilled cabinets (with doors)	162.8	755.6	37%	173	175
	Chilled cabinets (no doors/display)	243.8				
	Upright freezers	63.4				
	Chest freezers	204.0				
	Cold stores (chiller rooms)	64.8				
	Chiller plants	17.0				
Heating	Boilers	26.6	39.7	2%	9	9
	Electric radiators	1.2				
	Portable fan heaters	4.8				
	Gas heaters	2.1				
	Air conditioning (split unit - heating)	4.9				
Cooling	Air conditioning (split unit - cooling)	6.8	51.3	3%	12	12
	Room air conditioning	37.7				

Process	Specific Equipment	Annual GWh for equipment	Annual GWh for process	% of total kWh	kWh/m2/yr - gross floor area	kWh/m2/yr - net floor area
	Chiller plants (for cooling only)	6.8				
Hot Water	Gas boiler	38.7	130.4	6%	30	30
	Electric immersion heater	70.2				
	Taps Heaters	0.6				
	Oil Boilers	20.8				
	Multi-point	0.02				
Ovens	Standard electric oven	47.9	90.7	4%	21	21
	Deck electric oven	0.8				
	Rotisserie electric oven	0.1				
	Standard gas oven	0.6				
	Standard oven unknown supply	39.5				
	Deck oven unknown supply	1.7				
	Rotisserie oven unknown supply	0.1				
Café	Coffee machine	1.8	1.8	0%	0.4	0.64
Other end uses including specialist equipment (e.g. dough makers, mincers), small power (estimate based on difference between bill data and bottom-up figures)		831.2	831.2	40%	161	247
Total		2,050.3	2,050.3	100%	441	677

Table 11: Organisational Behaviour / Energy Intensity Comparison for Independents and Small Chains (fewer than 100 outlets)

•	• Energy intensity per net floor area (kWh per annum per m²)	
	Yes	No
Have objectives to reduce energy consumption / carbon emissions	1,391	873
Have an environmental policy	1,458	900
Have a system for monitoring energy use over time	1,220	939

Table 12: Key Findings Relating to Actions Taken/Considered and Observations from Analysis for Independents and Small Chains (fewer than 100 outlets)

• End use	• % of premises where end use is applicable Have taken action in last three years	Have considered action in last three years	• Observations from analysis regarding behaviour by activity sector and nature of action taken	• Reasons cited •
Refrigeration	40%	4%	Supermarkets were the most likely to have considered or taken action (57%) with bakers (36%) and freezer centres (28%) being the least likely. Actions taken/considered: Entire replacement of existing units (72% of actions overall - energy efficiency considered in 24% of cases) Replacement of unit parts (22% of actions overall – energy efficiency mentioned in 26% of cases) A small proportion had purchased new equipment/units (i.e. not replacement) (5% of actions overall).	Breakdowns were the most commonly cited reason for considering or taking action in regard to refrigeration (44%), followed by changes to store layout or shop fitting (19%), planned replacement cycles (14%), high running costs (13%) and inadequate service (12%).

• End use	• % of premises where end use is applicable		• Observations from analysis regarding behaviour by activity sector and nature of action taken	• Reasons cited •
	Have taken action in last three years	Have considered action in last three years		
Lighting	36%	4%	Bakers (63%) and supermarkets (55%) were the most likely to have done so, with newsagents (25%) and freezer centres being the least likely (21%). In 98% of cases the action taken or considered involved the replacement of existing lighting – in 51% of cases action was taken/considered specifically to improve energy efficiency	High running costs were the reason most commonly cited by those taking or considering action to replace their lighting or improve its efficiency (33%), followed by breakdown (18%) and changes to store layout or shop fittings (10%).
Heating	35%	1%	Supermarkets (43%) and newsagents (41%) were the most likely to have done so, with bakers being the least likely (7%). Actions: Entire replacement of existing units (65% of actions overall - energy efficiency considered in 37% of cases)	Inadequate service from their heating was the reason most commonly cited by those taking or considering action (33%), followed by breakdowns (25%) and high running costs (24%).

• End use	• % of premises where end use is applicable Have taken action in last three years	Have considered action in last three years	• Observations from analysis regarding behaviour by activity sector and nature of action taken	• Reasons cited •
			Purchase of new heaters/equipment units (i.e. not replacement) (32% of actions overall – energy efficiency considered in 13% of cases). A small proportion (2%) had taken action to replace unit parts.	
Hot water	27%	2%	Supermarkets (26%) and freezer centres (15%) were significantly less likely to have done so than newsagents (36%). Actions: Entire replacement of existing equipment (89% of actions overall - energy efficiency considered in 11% of cases) Repair of existing equipment (5% of actions overall) Entirely new equipment (i.e. not replacement (4% of actions overall) Replacement of parts	Breakdown was the most commonly cited reason for taking or considering action in relation to hot water (63%), though some mentioned planned replacement cycles (10%), changes to store layout (9%), high running costs (8%) and inadequate service (8%).

• End use	• % of premises where end use is applicable Have taken action in last three years	Have considered action in last three years	• Observations from analysis regarding behaviour by activity sector and nature of action taken	• Reasons cited •
			(3% of actions overall)	
Cooling	21%	1%	Newsagents (24%) and organisations in the other mixed food retail category (26%) were the most likely to have done so, with butchers (16%) and bakers (17%) being the least likely. Actions: Entire replacement of existing units (68% of actions overall - energy efficiency considered in 42% of cases) Purchase of new equipment/units (i.e. not replacement) (28% of actions overall – energy efficiency considered in 9% of cases). A small proportion (3%) had taken action to replace unit parts.	Changes to store layout/fitting were the single most commonly cited reason for considering or taking action to replace or improve the efficiency of space cooling systems (20%), followed closely by inadequate service from their cooling system (19%), high running costs (15%) and breakdown (15%).
Ovens	13%	1%	Butchers (21%), Bakers (18%) and other mixed food retailers (21%) were more likely to have done	The most commonly cited reason for considering or taking action to replace ovens or improve their

• End use	• % of premises where end use is applicable		• Observations from analysis regarding behaviour by activity sector and nature of action taken	• Reasons cited •
	Have taken action in last three years	Have considered action in last three years		
			so than supermarkets (10%). Actions: Entire replacement of existing units (82% of actions overall - energy efficiency considered in 37% of cases) Purchase of new equipment/units (i.e. not replacement) (9% of actions overall – energy efficiency not mentioned) Replacement of parts (9% of actions – energy efficiency cited in 37% of cases)	efficiency was breakdown (43%), followed by inadequate service (15%), planned replacement cycles (9%), changes to store layout/shop fitting (8%), and high running costs (7%).

Table 13: Operation Hours for Each Type of Equipment by Independents and Small Chains (fewer than 100 outlets)

• End use/equipment	• Estimated hours of operation per annum	• Source
Lighting	3,744	Median annual operating hours based on survey responses
Refrigeration	8,736	Responses indicate majority of refrigeration is running 24/7
Heating	546	Median daily hours of operation multiplied by median number of days open per year – calculated in this way as many respondents indicated that heating was turned on each day as needed
Space cooling	1,092	Median daily hours of operation multiplied by median number of days open per year – calculated in this way as many respondents indicated that cooling was turned on as needed
Hot water – gas boilers	4,368	Median annual operating hours based on survey responses
Hot water – immersion heaters	3,120	Median annual operating hours based on survey responses
Hot water – tap heaters and multi-points	85	Anecdotal information from survey responses – 2 minutes per employee per day multiplied by median days of operation per annum
Ovens	1,404	Median operation hours from survey responses
Coffee machines	3,250	Median annual opening hours for those with coffee machines

Table 14: Impact and Value for Money of Replacing Halogen Bulbs with LEDs in Independents and Small Chains (fewer than 100 outlets)

•	•
Total lumens served by halogen bulbs per annum (estimated from bottom up analysis of energy consumption)	586,000m
Total lumens served by halogen bulbs per hour, assuming operational for 10 hours a day, 6 days a week (3,120 hours a year)	188m
Lumens per Watt for halogen bulbs (US Department of Energy)	17
Estimated total number of bulbs assuming 50W per bulb (approx)	220,000
Approx cost per halogen bulb (50W) (£) www.energybulbs.co.uk	£2.50
Approx cost per LED bulb (50W equivalent) (£) www.energybulbs.co.uk	£8.00
Additional cost per bulb (£)	£5.50
Total cost of buying LEDs instead of halogen bulbs (£)	£1.2m
Energy saved per annum	22.7 GWh
Total CO_2e per annum (tonnes)	11,900
Total CO_2e over 10 years (tonnes)	119,000
Value for money – cost per tonne of CO_2e saved per annum (£ per tonne)	£10

Table 15: Impact of Replacing Refrigeration Units Greater than 10 years old in Independents and Small Chains (fewer than 100 outlets)

• Equipment	• Number of Appliances • (nearest hundred)	• Energy Saving per annum (GWh)	• Energy savings as a % of total energy utilised by refrigeration (756 GWh)
Chilled cabinets (with doors)	6,800	17.45	2%
Chilled cabinets (without doors)	6,100	5.35	1%
Upright freezers	1,400	4.22	1%
Chest freezers	4,900	11.27	1%
Total	19,200	38.30	5%
Total CO_2e saved per annum ~20,100 tonnes			

Table 16: Impact of Refurbishing Cold Stores/Rooms Greater than 10 years old in Independents and Small Chains (fewer than 100 outlets)

• Equipment	• Number of Appliances • (nearest hundred)	• Resultant Energy Saving (GWh) per annum	• Energy savings as a % refrigeration use
Cold stores	4,500	3.56	0.5%
Total CO_2e saved per annum ~1,900 tonnes			

Table 17: Impact and Value for Money of Fitting Transparent Doors in Independents and Small Chains (fewer than 100 outlets)

•	•
Number of units (approx)	30,000
Number of premises with display cabinets without doors (approx)	11,300
Cost per unit to fit transparent doors to chilled cabinets (£ per unit)[4]	£400
Labour cost per premises (£ per premises)	£60
Total cost (£)	£12.6m
Total energy saving per annum (GWh)	73GWh
Total energy saving across 10 years (GWh)	730GWh
Total CO_2e across 10 years (tonnes)	384,000
Value for money – cost per tonne of CO_2e saved over 10 years (£ per tonne)	£33

[4] Indicative estimates of costs obtained from: http://www.nwcouncil.org/energy/rtf/meetings/2011/0830/WP_PECIREF_CA%20DRAFT.pdf

Table 18: Impact on Energy Consumption by Heating Equipment of Sites Implementing a Closed Door Policy in Independents and Small Chains (fewer than 100 outlets)

• Equipment	• Number of stores with an open door policy and which have a heating system (nearest hundred)	• Resultant Energy Saving (GWh) per annum	Energy savings as a % of energy consumption by heating equipment
Boilers	200	2.81	8%
Electric radiators	500	0.23	1%
Portable fan heaters	1,500	0.76	2%
Gas heaters	100	0.46	1%
Total	2,200	4.26	12%
Total CO_2e saved per annum ~2,200 tonnes			

Table 19: Comparison of Intensity for Large Supermarkets with Independent / Small Chain Retailers

• Activity sector	• n	• N	• kWh per m^2 – net floorspace
Independent and small chain retailers			
Butchers	241	3,016	369
Bakers	198	2,862	705
Supermarkets	176	1,948	795
Freezer centres	5	29	193
Newsagents	29	5,444	323
Other mixed food retail	213	11,507	418
Total	862	24,807	475
Large chain retailers			
Supermarkets	3 retailers	9,349	810

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