RE: CONNECT analysis:

Summary Report

Report to the GLA - September 2014

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1 Introduction

RE:CONNECT was the Mayor's Low Carbon Zones programme that ran between September 2009 and September 2012. It aimed to deliver a 20% saving in carbon dioxide (CO_2) emissions (on a 1990 baseline) in ten neighbourhoods in London by the end of the programme, and to put them on a path to a 60% reduction by 2025, in line with the Mayor's CO_2 emissions reduction target.

The intention of the programme was to explore and demonstrate a range of new approaches to neighbourhood-scale carbon saving that involved communities and businesses. The broad hypothesis being tested was that integrating efforts across sectors in the same geography and engaging people in lowering the carbon footprint of their neighbourhood could provide cost-effective carbon savings and a wider set of outcomes in terms of local sustainability.

The programme was seed funded by the Greater London Authority (GLA) and each Zone was managed by a London borough, with external funding being brought in by the boroughs and their partners. The GLA funding was used in different ways by each borough and supported a range of activities covering project management, community engagement and other incentives. Each Zone comprised an area with an average of around 1,500 homes and a variety of commercial and public buildings. Carbon reduction projects and baselines were agreed with the Zones at the beginning of the programme, with revisions being made over time where more effective projects could be delivered and in response to changing circumstances within each Zone – particularly in relation to external funding regimes.

With the programme now complete, the GLA has commissioned the Centre for Sustainable Energy (CSE) to use the reported carbon saving data from each Zone to analyse the project in terms of its success against that objective. The primary aim of this analysis is to report the outcomes of the programme, and draw out findings and learnings to take forward in designing future carbon saving programmes that will keep London on track to meet its 2025 carbon reduction target.

This report concentrates on the carbon saving aspects of the programme and presents findings from analysis of the data collected during the programme and from interviews conducted with the RE:CONNECT stakeholders (see appendix A for a full list of stakeholders). It does not give detailed attention to the additional local sustainability objectives of the programme.

RE:CONNECT aimed to reduce emissions in three types of buildings: homes, community and public sector buildings, and businesses and commercial buildings. The analysis presents results from each of these sectors individually as well as their combined impact on emissions reductions.

The RE:CONNECT programme took place in ten areas across London. The characteristics of the Zones varied considerably in terms of housing type and tenure, levels of deprivation, and the amount of public and commercial buildings. They were selected in part for their representativeness of a range of London neighbourhoods. As such, caution should be taken in making direct comparisons between Zones.

2 Headline results

Headline figures and key findings:

- **Total annual emissions reductions from RE:CONNECT are an estimated 12,600 tonnes of CO_2 ($t.CO_2$), with two-thirds of this total being achieved from the residential sector[1].**
- **Two Zones managed to hit the 20% reduction target, with another Zone coming very close (19.5%).**
- **The Zones that achieved the highest relative CO_2 emissions reductions were those that managed to secure significant amounts of additional funding on top of the initial GLA seed funding.**
- **In total, £33.5m of additional funding was secured across the ten Zones, with an average ratio of £12 of additional funding for every £1 of RE:CONNECT funding[2].**
- **GLA seed funding was directly responsible for a total reduction of approximately 2,100 $t.CO_2$, with additional funding resulting in a further reduction of 10,500 $t.CO_2$ across the Zones.**
- **Measures installed in domestic properties resulted in estimated total bill savings of over £1.1m annually across the ten Zones.**
- **Over 4,000 homes were retrofitted in the Low Carbon Zones.**
- **Projects that focused on retrofitting social housing (and in particular retrofitting high density housing such as high-rise tower blocks or low-rise estates) resulted in considerable emissions savings.**
- **Zones which achieved large emissions reductions in the non-domestic sector were those focusing on larger buildings, such as hospitals, leisure centres and libraries.**

2.1 Reduction target

As Figure 2.1 shows, two Zones managed to surpass their 20% reduction target: Barking Town Centre and Queens Park reduced their baseline emissions by 21% and 25% respectively. Archway came very close to reaching the target with reductions of 19.5%. Four other Zones achieved savings of between 12% and 16%. The three remaining Zones achieved reductions of between 6% and 7% from their baseline emissions.

[1] All data should be considered 'estimates'. Please see box 1 on data quality for more information.
[2] As some activity was already planned and underway in some RE:CONNECT areas prior to the Low Carbon Zone being established, this figure does not represent direct 'leverage' of additional funding by the Low Carbon Zones. Rather it represents additional funding which was secured by the local authority and delivered within the Low Carbon Zone.

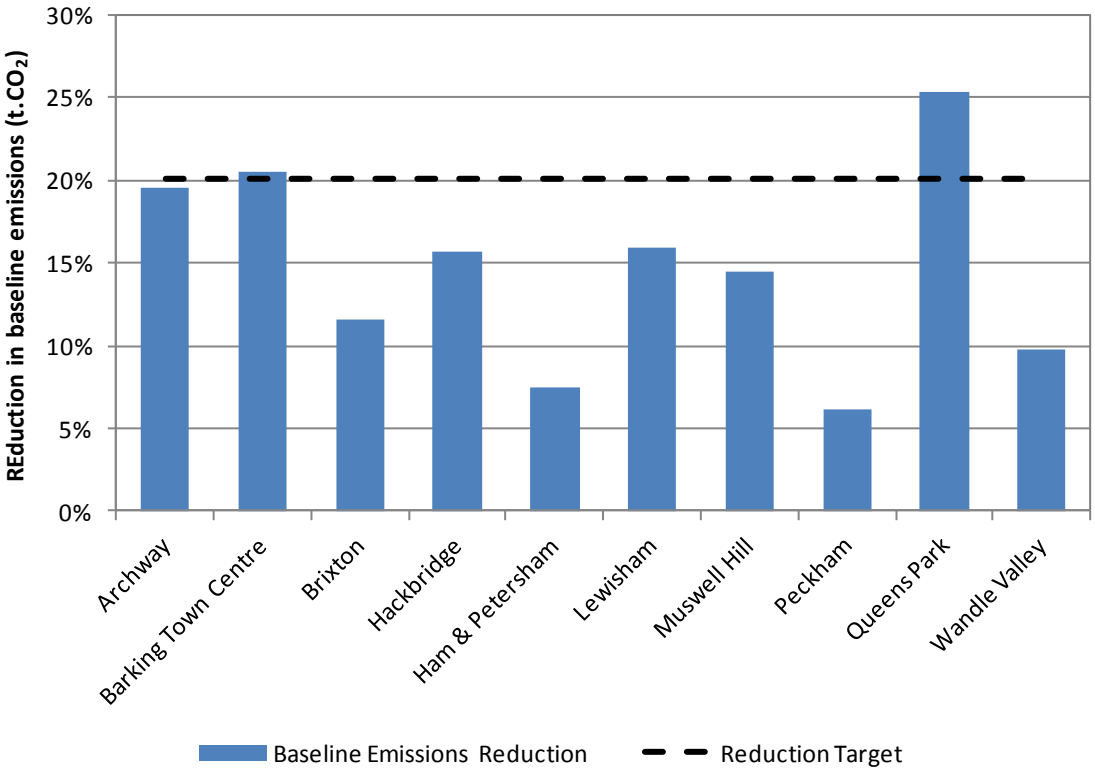

Figure 2.1: Percentage emissions reductions for each Low Carbon Zone against the target baseline

It should be noted that the emissions factors used in this report to calculate CO_2 emissions reductions from measures installed in the Zones varies from those factors provided by the GLA and used by Zones in reporting during the project. This is to reflect more up to date emission factors, and allow for comparison between GLA programmes (please see box 1 on data quality). In nearly all Zones, use of the revised factors has reduced the total amount of CO_2 emissions savings. However, the total amount of activity and measures installed remains the same. Although changing emission factors show the progress being made in the measurement and monitoring of the impact of energy efficiency measures, it also highlights the difficulty in setting and achieving CO_2 emissions reductions targets and targeting cost effective action over time.

The following analysis discusses some of the success factors in the Zones and highlights some opportunities for future schemes. However, from discussion with stakeholders, many of those involved in running projects under RE:CONNECT felt that wider benefits than purely carbon emissions reductions had been experienced through the implementation of measures and from engagement with the community and businesses. Examples of some of these additional longer-term benefits are discussed in Section 5.

Box 1: Note on data quality

Due to limitations in data capture and the time lag in reporting, the data used in this report should be considered estimates. Where specific data on housing types was reported (such as RdSAP and Carbon Emissions Reduction Target reported figures), this data is used. However, where this data was not available, national average emissions factors provided by the Energy Saving Trust have been used. Where measures have not been consistently classified CSE has made assumptions and applied the emissions factors for the nearest standard measure type. This may result in under or over estimations of emissions savings. However, the GLA believes these to be a sufficiently reliable indication of emissions savings attributable to the RE:CONNECT programme.

For reasons of comparison, the GLA has applied revised Energy Saving Trust emissions factors to the data in line with those used by other GLA-delivered domestic energy efficiency programmes such as RE:NEW. This has resulted in variations in CO_2 emissions reported by individual Low Carbon Zones in Zone-specific reports. For example, the following Zones reported total CO_2 emissions reductions under emissions factors agreed with the GLA within the lifetime of the project:

- Ham and Petersham: Reported savings of 807 tonnes CO_2
- Peckham: Reported a 12.1% reduction within the domestic sector, and a 3.1% reduction within the commercial sector
- Wandle Valley: Reported savings of 854 tonnes CO_2

As multiple GLA-funded programmes (RE:NEW, Decent Homes and Targeted Funding Stream) were delivered in some Zones, caution should be made in 'adding together' CO_2 emissions reductions across programmes.

2.2 Total emissions reductions

RE:CONNECT resulted in total annual CO_2 savings of an estimated 12,600 t.CO_2 across the ten Low Carbon Zones. Table 2.1 shows the emissions reduction for each Zone and sector. In the domestic sector, Archway, Queens Park, Brixton and Barking Town Centre Low Carbon Zones achieved the highest overall emissions reductions. This, however, largely reflects the relative size of the Zones, with these four Zones being the largest of the ten areas.

Overall, domestic measures accounted for more than two-thirds of the total emissions reductions, or 8,400 t.CO_2 of the 12,600 t.CO_2 saved overall (Figure 2.2), reflecting the main focus of projects undertaken. Community and public buildings achieved further carbon reductions of approximately 3,800 t.CO_2, and emissions from businesses and measures installed in commercial buildings resulted in emissions reductions of nearly 400 t.CO_2.

However, the contribution to the total savings from different sectors varies noticeably between different Zones, as Figure 2.3 shows. In Queens Park almost all emissions reductions came from implementing savings in domestic properties, whereas in Archway and Lewisham – where substantial retrofit projects were undertaken in hospitals – a significant proportion of the total savings were achieved by improving public buildings.

Figure 2.3 also shows the remaining carbon savings required for Zones to meet their 20% target reduction, and helps to illustrate the range in size between the different Zones.

Table 2.1: Total CO_2 emissions reductions in each Low Carbon Zone by sector

Low Carbon Zone	Domestic	Community and Public Sector	Commercial	Total Savings
Archway	1,901	1,759	61	3,722
Barking Town Centre	1,304	409	40	1,753
Brixton	1,348	723	113	2,184
Hackbridge	190	44	36	270
Ham and Petersham	545	59	21	625
Lewisham	222	558[3]	0[4]	780
Muswell Hill	464	98	85	647
Peckham	390	54	5	449
Queens Park	1,698	5	0	1,703
Wandle Valley	328	117	20	465
Total	**8,390**	**3,826**	**381**	**12,597**

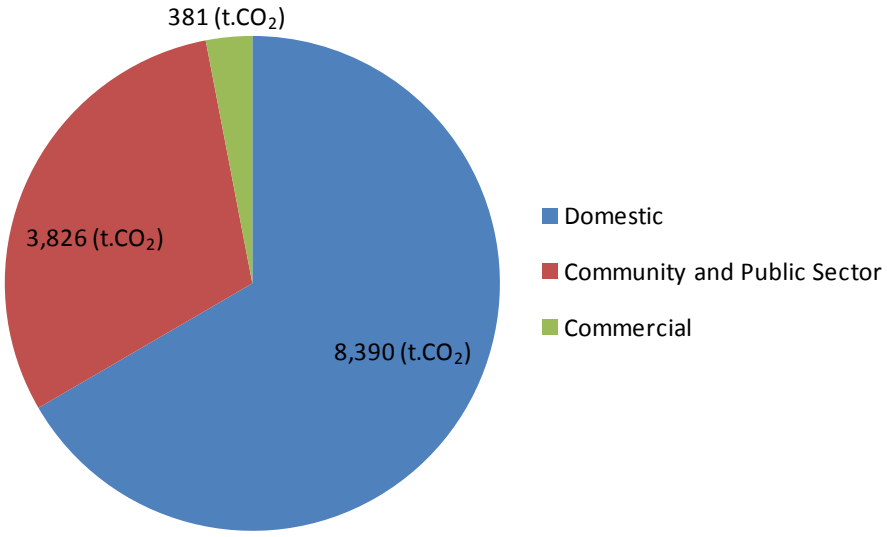

Figure 2.2: Total CO_2 emissions reduction for each sector across all Low Carbon Zones

[3] Please note that as the hospital in the Lewisham Low Carbon Zone accounted for such a significant amount of CO_2, it was not included in the baseline in the lifetime of the project as it distorted the comparative emissions reductions of the Zone. For the purposes of full reporting, it has been included here. However, data on the public sector is only partial because the hospital was removed from the Zone during the project and therefore no further recording was made.

[4] Although data was reported from the borough, the timelag in collating data meant it was not possible to verify source data. For data reliability reasons it is therefore reported as zero here.

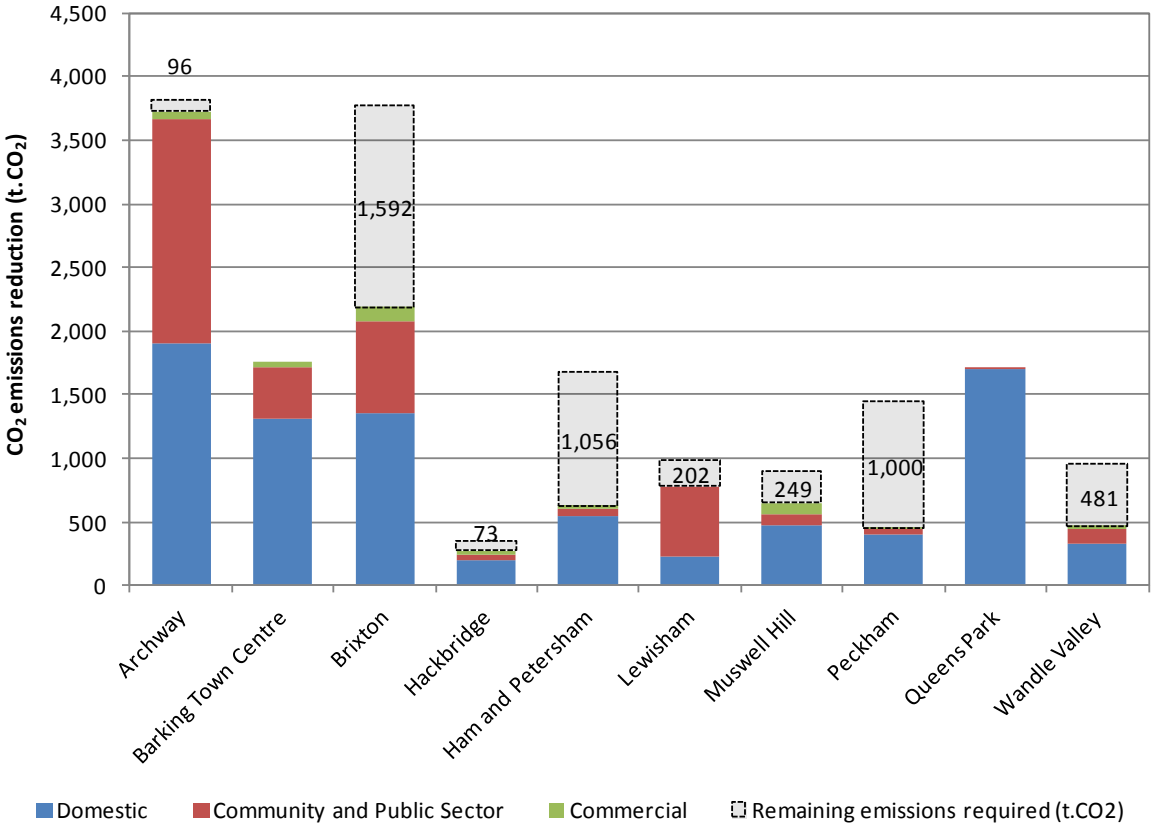

Figure 2.3: Total CO_2 emissions reduction in each Low Carbon Zone by sector, plus remaining emissions required to meet reduction target.

2.3 Funding streams and carbon savings

Table 2.2 shows the amount of initial GLA seed funding provided for each Zone plus the additional funding each Zone attracted. GLA seed funding ranged between approximately £192,900 (Barking) and £359,400 (Archway).

In total, £33.5m of additional funding was secured across the ten Zones, with an average ratio of £12 of additional funding acquired for every £1 of RE:CONNECT funding[5]. The amount of additional funding obtained by each of the Zones varied considerably. This depended in part on whether the boroughs already had planned activity in the Zone.

For two of the Zones (Hackbridge and Ham and Petersham) GLA funding accounted for over half the total funding for projects. The other eight Zones secured significantly higher amounts of funding from other sources. For example, the three Zones that either met or came very close to their 20%

[5] As some activity was already planned and underway in some RE:CONNECT areas prior to the Low Carbon Zone being established, this figure does not represent direct 'leverage' of additional funding by the Low Carbon Zones. Rather it represents additional funding which was secured by the local authority and delivered within the Low Carbon Zone.

reduction target secured between £3.4m and £10.8m in additional funding. The main sources of funding for these projects were from the Boroughs' own funding streams, and Community Energy Saving Programme (CESP) and CERT (Carbon Emission Reduction Target) funding streams to pay for larger retrofit measures. Brixton also managed to attract over £11.6m (via CESP and Lambeth Borough Council) to conduct a series of retrofit measures on high-rise and low-rise flats.

In general, the higher the level of funding leveraged, the greater the impact on energy consumption and carbon emissions. There are a number of lessons to be learnt regarding successful leverage of additional funds, for example the use of innovative partnership approaches was considered key by many of the Boroughs. One local authority also cited the partnering of community energy projects with private sector companies. Another noted that working with partners was considered an essential way to access and secure finance from the CESP funding stream.

Table 2.2: Summary of project spend per Zone

Zone	Total spend	GLA RE:CONNECT funding	Other funding	Non-GLA funding sources
Archway	£3,751,600	£359,400	£3,392,200	Whittington Hospital, Islington Council, Mayor's TFS Fund, Homes and Communities Agency, CERT, CESP
Barking	£10,990,800	£192,900	£10,797,800	EDRF, CESP, CERT, Future Job Fund, Barking and Dagenham Council, S106, GLA Decent Homes
Brixton	£11,873,500	£300,300	£11,573,200	EDRF, other European funding, Defra, Concerto (EU), URH Decent Homes, CESP,
Hackbridge	£483,000	£270,800	£212,300	CERT, S&ES Water, London council grant stream, Global Action Plan, Technology Strategy Board, EDRF
Ham and Petersham	£588,500	£347,100	£241,500	Richmond-Upon-Thames Council, CERT, London Sustainability Exchange, British Gas Green Streets
Lewisham	£656,700	£240,000	£416,700	Lewisham Council. Lewisham NHS Healthcare Trust, Lewisham Homes, Future Jobs Fund. Homes & Communities Agency through SHESP. CESP. CERT. Scottish Power. ERDF. Thames Water.
Muswell Hill	£1,002,400	£253,500	£748,900	Haringey Council, DECC, LEPT. Also contributions from partner organisations, which are not included in finance totals.
Peckham	£730,500	£219,200	£511,300	Southwark Council, CESP and GLA Targeted Funding Stream
Queens Park	£5,371,100	£239,100	£5,132,000	Westminster Council, ERDF, CERT, Council housing leaseholders, Westminster Community Homes /Homes and Communities Agency, SHESP, CESP, Decent Homes (GLA), Technology Strategy Board. Also private funding / FITs for PV in wider Queens Park area (not included in figures here)
Wandle Valley	£772,200	£295,800	£476,500	Merton Council, NEA, Future Jobs Fund, Circle Anglia, CESP, EU, London Councils, Technology Strategy Board, Moixa, Haslemere primary school, Sustainable Merton, Thames Water, CERT, Thames Water
Totals	**£36,220,400**[6]	**£2,718,000**[6]	**£33,502,400**	

[6] Figures may be more of less than totals due to rounding

In addition, the GLA-organised quarterly get-togethers between the various RE:CONNECT local authorities which were noted as a helpful opportunity to share advice between authorities on available funding streams, and on how specific funds were successfully leveraged.

The annual carbon savings associated with GLA funded activities and additional, non-GLA funded activities within each Zone is summarised in Table 2.3. In general, the carbon savings attributed to GLA and non-GLA activities mirror the levels of investment from each funding stream. GLA seed funding was directly responsible for a total of approximately 2,070 t.CO_2 emissions reduction, while additionally funding resulted in a further 10,500 t.CO_2 reduction across all ten Zones. Barking and Ham & Petersham had the highest level of GLA associated emissions reductions, although in Barking this was mainly attributable to emissions reductions associated with GLA Decent Homes funding. Archway – which leveraged an additional £3.4m – had the highest amount of savings attributable to non-GLA funding sources.

Table 2.3: Summary of CO_2 emissions by GLA and non-GLA funded activities

Zone	Total annual tonnes CO_2 reduction	Annual tonnes CO_2 reduction from GLA funded measures	Annual tonnes CO_2 reduction from non-GLA additional funding
Archway	3,722	208	3,513
Barking	1,753	486[7]	1,267
Brixton	2,184	188[8]	1,997
Hackbridge	270	249	21
Ham and Petersham	625	430	194
Lewisham	780	114	666
Muswell Hill	647	177	471
Peckham	449	100	349
Queens Park	1,703	428	1,611
Wandle Valley	465	768	389
Totals	**12,597**	**2,069**	**10,528**

2.4 Cost-effectiveness

In order to assess the cost-effectiveness of the GLA funding for RE:CONNECT, analysis has been undertaken on the cost per lifetime tonne of CO_2 reduction in each Low Carbon Zone. This allows for better like-for-like comparison than annual tonnes of CO_2. The analysis focuses on the GLA RE:CONNECT funding only, to reflect the cost-effectiveness of the GLA spend. Lifetime savings have been calculated for each measure installed under each project and combined with the associated funding information. The resulting costs per lifetime savings for the domestic and non-domestic sector in each Zone are also presented where data was available. This information is presented in Table 2.4.

[7] Please note that this includes CO_2 emissions associated with GLA funding from Decent Homes as well as RE:CONNECT

[8] Please note that RE:NEW was also delivered in a RE:CONNECT area so RE:NEW CO_2 figures are also included in this figure.

RE:CONNECT seed funding paid for direct CO_2 emissions reductions of 2,069 t.CO_2. The average cost efficiency for these direct emissions reductions was £59 per lifetime t.CO2. However, when looking at both the direct and indirect CO_2 emissions delivered by the other funding in the Zone, the GLA cost efficiency was £9 per lifetime t.CO_2

For domestic projects, the cost per lifetime savings associated with direct GLA funding varies between £18 per lifetime t.CO_2 in Barking to £532 per lifetime t.CO_2 in Wandle Valley, with an average of £64. Compared to CERT and Energy Company Obligation (ECO)-traded prices, the indirect CO_2 emissions reductions price is very low at an average of £9. However, the cost per tonne of CO_2 for direct GLA emissions is more in line with prices for hard to treat properties.

For non-domestic measures, some projects were missing information for funding and carbon emissions in different Zones, so it has not been possible to produce a figure for each non-domestic sector in each Zone. However, using the information available, the cost of carbon reduction programmes in non-domestic projects as a whole had average costs of £40 per lifetime tonne of CO_2 of direct GLA funding (around two thirds of the average for domestic projects), and £8 for indirect lifetime savings in the Zone, in line with the domestic sector.

Table 2.4: Costs per lifetime carbon reductions in each Zone from RE:CONNECT funding

Borough	Sector	Total RE:CONNECT lifetime CO_2 reduced (tonnes)	Lifetime CO_2 reduced from direct RE:CONNECT funding (tonnes)	RE:CONNECT funding	Cost per tonne from indirect lifetime CO_2	Cost per tonne lifetime CO_2 from direct GLA funding
Archway	Domestic	55,209	2,625	£272,000	£5	£104
	Non-Domestic	31,086	1,086	£87,400	£3	£81
	Total	86,295	3,710	£359,400	£4	£97
Barking	Domestic	25,265	10,051	£182,900	£7	£18
	Non-Domestic	4,535	400	£10,000	£2	£25
	Total	29,800	10,451	£192,900	£6	£18
Brixton	Domestic	66,066	2,641	£225,400	£3	£85
	Non-Domestic	11,522	5,720	*insufficient funding data*		
	Total	77,589	8,360	£300,300	£4	£36
Hackbridge	Domestic	4,281	4,065	£173,900	£41	£43
	Non-Domestic	745	650	£96,900	£130	£149
	Total	5,026	4,715	£270,800	£54	£57
Ham and Petersham	Domestic	8,387	7,633	£347,100	£41	£45
	Non-Domestic	1,355	*insufficient funding data*			
	Total	9,742	7,633	£347,100	£36	£45
Lewisham	Domestic	2,692	1,456	£99,500	£37	£68
	Non-Domestic	5,789	2,894	£140,500	£24	£49
	Total	8,481	4,350	£240,000	£28	£55
Muswell Hill	Domestic	6,600	1,870	£213,500	£32	£114
	Non-Domestic	2,573	704	£40,000	£16	£57
	Total	9,173	2,574	£253,500	£28	£98
Peckham	Domestic	11,901	917	£124,900	£10	£136
	Non-Domestic	943	811	£94,300	£100	£116
	Total	12,844	1,728	£219,200	£17	£127
Queens Park	Domestic	43,554	1,621	£218,800	£5	£135
	Non-Domestic	48	20	£20,300	£418	£1,038
	Total	43,603	1,640	£239,100	£5	£146
Wandle Valley	Domestic	10,577	537	£285,800	£27	£532
	Non-Domestic	2,989	272	£10,000	£3	£37
	Total	13,566	810	£295,800	£22	£365
Totals	**Domestic**	234,532	33,415	£2,143,800[9]	£9	£64
	Non-Domestic	61,585	12,557	£499,300[9]	£8	£40
	Total	296,117	45,972	£2,718,000[9]	£9	£59

[9] Figures may be more of less than totals due to rounding

2.5 Projects and measures

All of the Zones adopted an approach of installing energy efficiency and carbon reduction measures in multiple sectors. Table 2.5 summarises the types of projects run in the Zones in all sectors.

Table 2.5: Summary of project types per Zone

RE:CONNECT Zone	Archway	Barking	Brixton	Hackbridge	Ham and Petersham	Lewisham	Muswell Hill	Peckham	Queens Park	Wandle Valley
Domestic										
Home energy audits / Energy Dr	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Easy / DIY measures (inc draught proofing)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Retrofit (professional) - private (inc. grants)	Y	Y		Y	Y	Y	Y	Y	Y	Y
Retrofit (professional) - social housing	Y	Y	Y			Y	Y	Y	Y	Y
Street Champions / ECOteams / similar	Y	Y			Y		Y			Y
Carbon trading / Carbon diary							Y			Y
Solar PV / solar thermal - private sector					Y		Y			
Solar PV / solar thermal - social housing	Y	Y	Y					Y		
Assistance for retrofit (e.g. loft clearance)					Y	Y				
Thermal imaging					Y					
Fuel poverty training for frontline workers						Y				Y
Billing, fuel switching and replacement heating		Y		Y		Y			Y	
Community / Public sector										
Solar panels (PV and thermal) - installed directly		Y			Y	Y	Y		Y	Y
Company established to install PV							Y			
Energy efficiency retrofit	Y	Y		Y		Y	Y			Y
Audits				Y	Y	Y		Y	Y	Y
Energy monitoring software										Y
Easy measures						Y		Y		Y
Grants						Y			Y	
Commercial										
Business support incl audits	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Company established to install PV							Y			
Subsidised measures	Y						Y			
Cross-sector										
Communications / engagement / marketing	Y				Y	Y	Y		Y	
Baseline and monitoring			Y			Y				
Voluntary sector capacity-building					Y	Y				
Demonstration projects / videos					Y	Y	Y			
Consultancy support						Y				Y
Feasibility studies					Y	Y		Y	Y	
Other										
Transport		Y	Y			Y	Y	Y	Y	Y
Food		Y				Y				
Waste			Y			Y				
Water		Y				Y				Y
Employment training	Y	Y				Y				

3 Uptake of measures in the residential sector

Table 3.1 shows the types and numbers of measures installed as part of domestic projects. All of the Zones implemented domestic energy assessments and installed easy measures; often the energy assessments led to the uptake of easier DIY measures either at the same time as the assessment or in follow-up home visits.

In addition, all Zones also implemented projects that professionally installed further retrofit insulation and heating measures, particularly loft and wall insulation and new heating systems and controls, with varying degrees of success. Most Zones targeted both private and social housing, although as Table 3.1 shows, significantly higher numbers of measures were installed in social housing than private housing in most of the Zones.

Archway, Barking Town Centre and Brixton installed 2,209, 6,120 and 2,088 further retrofit measures in social homes, respectively. These areas had some of the highest levels of social housing across the ten Zones and the boroughs were able to capitalise on this. Improving social housing did not generally require the same level of community engagement as the housing was often council owned, meaning measures could be installed with minimal involvement from residents. The installation of measures was a result of top-down decisions rather than the active choice of private households. Areas such as Hackbridge had a high proportion of private sector housing, making individual house-to-house engagement more appropriate for installation of further measures such as insulation.

Table 3.1: Number of measures installed in domestic properties by project type

RE:CONNECT Zone	Archway	Barking	Brixton	Hackbridge	Ham and Petersham	Lewisham	Muswell Hill	Peckham	Queens Park	Wandle Valley
Home energy audits / Energy Dr	>300	294	210	300	796	741	488	3	374	358
Easy / DIY measures (inc draught proofing)	2,886	3,156	632	2,720	6,387	3,119	6,049	276	3,757	7,062
Further retrofit[10] - private (inc. grants)	117	93		211	254	24	121	9	6	11
Further retrofit[11] - social housing	2,209	6,120	2,088			16	55	570	127	477
Street Champions / ECOteams / similar		5			40		650			~358
Solar PV / solar thermal - private sector					11		1			
Solar PV/solar thermal - social housing	0[12]	2	1					60		
Billing and fuel switching		200		11					81	

[10] Includes cavity wall insulation, loft insulation and solid wall insulation
[11] Includes cavity wall insulation, loft insulation and solid wall insulation
[12] Measures were installed and CO_2 emissions reduction reported. However, local authority did not provide data on number of measures.

Compared to social housing retrofit, all RE:CONNECT areas had relatively low levels of uptake of measures in the private sector; the exceptions being Ham & Petersham and Hackbridge which both had relatively high levels of private sector housing stock. As well as reflecting the low levels of private stock in some areas, the overall lower levels of retrofit measures installed in private homes highlights a number of difficulties that can be experienced when engaging with private households, and how methods of communication, engagement and incentives are crucial to the success of such projects. Higher cost, professionally installed measures are likely to involve disruption to householders, and without the incentive or realising the full benefits it can be difficult to achieve high levels of uptake. This problem becomes more difficult still when trying to install hard-to-treat measures such as solid wall insulation, due to additional costs and disruption.

Table 3.2 presents the average uptake of energy surveys, easy measures and loft and cavity wall insulation in domestic properties across the ten Low Carbon Zones. Also included are the minimum and maximum uptake rates, illustrating the range across the Zones. These categories together represent the majority of measures that were installed during the programme.

Table 3.2: Uptake of energy surveys and main measures across all Low Carbon Zones

Measure type	Proportion of homes receiving measure (%)		
	Minimum	Average	Maximum
Energy surveys and audits	2.0%	23%	93%
Easy/DIY measures	4.6%	20%	73%
Loft insulation	1.6%	6%	35%
Cavity wall insulation	0.2%	6%	29%

In order to achieve the largest and most cost effective CO_2 emissions reductions, homes required 'further' retrofit measures such as loft insulation and wall insulation, replacement boilers and heating systems, and solar PV/solar thermal. Without these measures the Zones were unable to reach their CO_2 emissions reduction targets.

However, to achieve this in the private sector usually requires engagement with individual households to encourage uptake of the measures. All of the Zones implemented home energy assessments or very similar interventions (e.g. energy audits). It was consistently noted by stakeholder interviewees as being particularly successful in terms of engaging householders. However, the delivery mechanism for these varied and this is reflected in the range of uptakes experienced across the different Zones. On average, 23% of all homes in the ten Zones received an energy assessment, with Lewisham reaching 93% of homes in the Zone. In Lewisham there was a strong focus on ensuring comprehensive engagement with all households, ensuring that all residents were able to benefit from a straightforward offer, backed up by delivery with professional, knowledgeable delivery. They employed an independent contractor to run a door-knocking scheme with support from a local Future Jobs Fund employee. The scheme was also designed to minimise the number of visits and points of contact required for people to get further measures installed, helping to speed things up, reduce stress and minimise the drop-out rate.

The data presented in Figure 3.1 also suggests that energy assessments and home visits are a very successful way of ensuring other easier DIY measures are installed. This was something supported by stakeholders who highlighted the importance of energy assessments in engaging householders, and in turn leading to the installation of simple, low cost energy efficiency measures. Uptake rates of easier, DIY measures generally match the rates of energy assessments; Lewisham's high uptake rate of energy assessments was matched by a high percentage of homes installing easier measures (73%). Similar patterns can be seen for Archway, Barking, Hackbridge and Muswell Hill in particular. This is primarily due to home energy assessors distributing and installing easy measures at the time of the assessment.

In Brixton and Peckham, the proportion of homes receiving energy assessments was comparatively low and corresponding uptake rates of smaller, easier measures was also low. However, these Zones had a stronger focus on professionally installed retrofit measures, as discussed below.

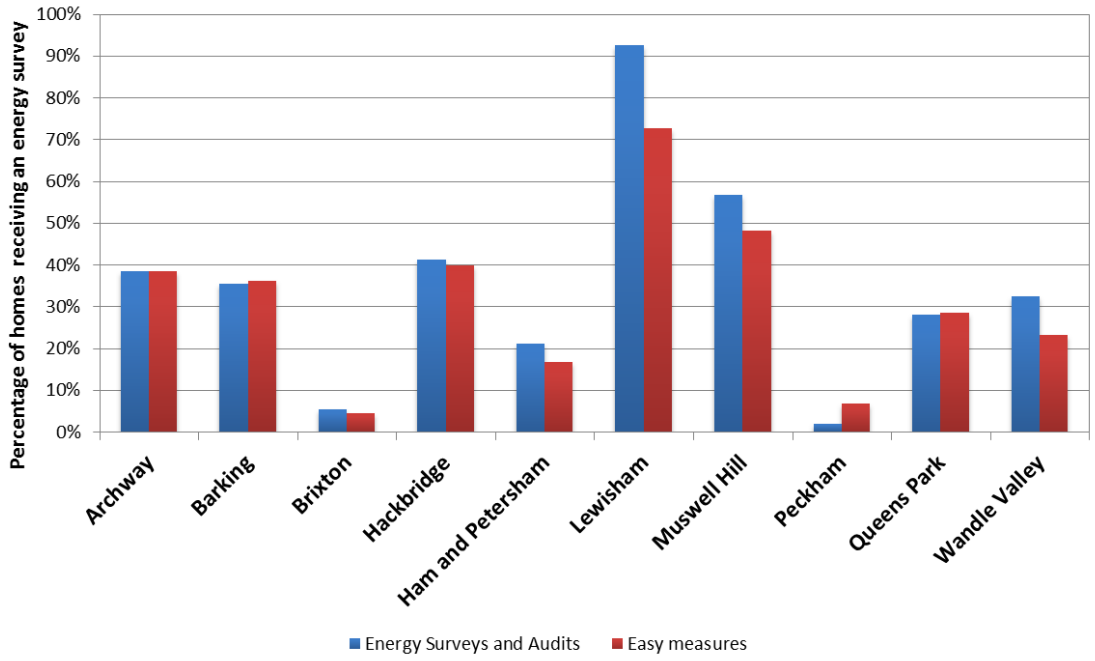

Figure 3.1: Proportion of homes in each RE:CONNECT Zone receiving a domestic energy survey and easy measures

Stakeholders noted the advantage of having an assessor visiting people in their homes, which could ensure people were provided with the most appropriate measures. It was generally agreed that simple design and implementation of theses schemes had helped with the high uptake experienced by some Zones. For example, schemes where households received a customised service, and were provided with relevant measures, usually for free were championed by a number of stakeholders.

However, the rate of converting home energy assessments and easy measures into the further measures varied between the Low Carbon Zones. Hackbridge had the highest 'assessment to further measure' ratio at 70%. This was achieved through subsidies on loft and cavity wall insulation and boilers in an area with high levels of private housing. Archway, Barking, Ham & Petersham and Peckham also had ratios of 32%-39%. The average across the RE:CONNECT programme was 22%.

Some areas had relatively high numbers of home energy assessments but low conversion rates to installed further measures in private homes. Although this indicates that high levels of assessments

do not always translate into further cost-effective measures being installed, it is useful to understand why these did not translate. A number of the Zones attempted to gain funding through CESP whereby energy companies were required to install energy efficiency measures, predominantly solid wall insulation, in low income areas. Many of the boundaries of the Zones were chosen by boroughs to align with areas eligible for CESP funding. Some areas were successful in gaining funding.

However, Zones that had inherently higher delivery costs were not always successful in attracting CESP funding. As solid wall insulation costs are significantly higher than cavity wall insulation (up to £10,000 compared to around £300) and more disruptive, without CESP funding, the costs of solid wall insulation for private household were too high and proved a significant barrier to uptake. For example, in Queens Park there were a large number of properties with solid walls which the authority planned to insulate. Due to higher delivery costs the Zone was not successful in attracting CESP funding, and therefore attempts to encourage residents to pay for solid wall insulation were, as expected, generally unsuccessful. Likewise in Lewisham, anticipated additional funding for harder measures such as solid wall insulation did not materialise. Home assessments had been provided to ensure all residents were able to benefit from the scheme and to provide behavioural advice to complement the anticipated installation of larger measures on the basis that greater CO_2 emissions reductions are delivered when measures and advice are provided together. In this case, and in other Zones where further measures were not feasible, the home energy visits allowed the Zones to maximise energy efficiency savings within the funding constraints, and importantly, allow all homes in the Zone to be offered some energy efficiency support, regardless of their housing type. This 'offer for every household' was important for a number of the Zones.

Table 3.3: Solid wall insulation installed in social and private dwellings

RE:CONNECT Zone	Social		Private		Total	
	Internal	External	Internal	External	Internal	External
Barking	0	200	0	0	0	200
Brixton	203	336	0	0	203	336
Lewisham	0	0	0	16	0	16
Muswell Hill	0	1	0	0	0	1
Peckham	9	0[13]	0	0	9	0
Wandle Valley	0	1	0	0	0	1
Total	**750**		**16**		**766**	

Despite funding constraints half of the Boroughs managed to install solid wall insulation on a total of 766 homes, as Table 3.3 shows. The majority of these were installed in social housing in Brixton and Barking, once more highlighting the difficulties in engaging private households in expensive and disruptive retrofit works, particularly internal insulation. This also reflects the funding which was available at the time, which made delivery of solid wall insulation projects difficult generally and particularly in the private sector.

[13] Although some external wall insulation was installed in the Peckham Low Carbon Zone, due to insufficient data due to the time lag in reporting, it is not represented here.

4 Uptake of measures in the non-domestic sector

Across the different Zones, projects that focused on community and public buildings were more diverse than domestic projects, reflecting the larger variety of buildings being targeted. The most commonly occurring projects focused on energy audits, energy efficiency retrofits and the installation of solar panels, which were installed on schools in six of the Zones.

Most of the Zones opted for business support and energy audits of businesses and commercial properties. However, Archway also negotiated a successful lighting systems upgrade programme by offering significant subsidies to businesses.

The number of non-domestic buildings receiving measures is shown in Table 4.1. In total, 64 community buildings received energy efficiency improvements. The largest number of community/public buildings improved in a single Zone was in Ham and Petersham where 20 buildings received measures. 112 businesses and commercial buildings were also improved as part of the programme, with 41 of these in Muswell Hill.

There was a significant variety of building types that received measures under RE:CONNECT, which illustrates the variance in potential emissions reductions that is likely to be achieved, but also the difficultly in making generalised recommendations from the results. However, large buildings and high energy consumers such as hospitals, leisure centres and schools are likely to be able to achieve significant reductions in emissions, whereas smaller buildings have less potential for reducing energy consumption in absolute terms.

Table 4.1: Number of non-domestic buildings retrofitted in each Low Carbon Zone

Zone	Number of community and public buildings receiving measures	Number of commercial buildings receiving measures
Archway	9	12
Barking	6	18
Brixton	3	9
Hackbridge	6	unknown
Ham and Petersham	20	6
Lewisham	2	7
Muswell Hill	9	41
Peckham	4	14
Queens Park	1	0
Wandle Valley	4	5
Totals	**64**	**112**

The type of community and public buildings receiving measures included the following:

- Hospitals
- Schools
- Leisure centres

- Community centres
- Libraries
- Police stations
- Fire stations
- Town halls
- GP surgery

The types of commercial properties and buildings being improved in several Zones included:

- Supermarket
- Beauty salon/Hairdresser
- Restaurant
- Pharmacy
- Offices

The following sections present the types and numbers of each measure installed in commercial properties (Section 4.1) and community and public buildings (Section 4.2).

4.1 Commercial Sector Analysis

Nearly all Zones undertook activities in the commercial sector predominantly with small to medium enterprises (SMEs), although a number of Zones reported difficulties in engaging with businesses, particularly SMEs. The most common explanation for this was funding constraints whereby free measures were not available and several Zones could only offer audits, carbon foot-printing or energy efficiency advice, which did not necessarily fit with the SMEs' needs. In additional, several interviewees noted that many of the SMEs had fewer than five employees and, as such, dedicating time to an energy efficiency advisor was not a priority. Finally, many of these small businesses rented premises meaning they were either unable or unmotivated to make changes in the building, especially if they had to pay or partly pay for measures themselves.

However, a number of Zones were successful in achieving significant savings in the commercial sector. Most of these were achieved through energy audits and monitoring, energy efficient light bulb replacements and installing energy efficient lighting systems. Overall, Brixton achieved the highest emissions reductions, largely through multiple 'further' retrofit measures such as new boilers in a small number of SMEs. Archway and Muswell Hill also had a greater level of success engaging with SMEs; in Archway this was partly attributed to a strong sense of community, with good communication between local businesses. As with other Zones, Archway offered free audits for businesses, but a key difference being that this was followed up with a grant of up to 80% of the cost of installing energy efficient lighting.

Muswell Hill also had a light bulb amnesty and offered free, comprehensive audits to reduce energy use by working with the University of Middlesex and the Global Action Plan. Audits were followed up with awards for businesses which spurred interest as businesses were attracted by the opportunity to communicate their successes with customers. This is an interesting finding, as it shows that prestige can be a great motivator to engage SMEs with, as opposed to solely focussing on financial savings.

Some Zones tried engaging with larger business chains but found that there was usually a corporate social responsibility strategy determined centrally, leaving little flexibility and control at the local level. A notable exception was the success of Muswell Hill, where community owned solar panels were installed on the local Marks & Spencer.

Zones reported that the ability to capitalise on relationships that already existed within a given local authority, working with other council departments, and finding external partners helped them achieve their objectives, particularly in a resource-constrained environment.

4.2 Community/Public Sector Analysis

The Zones with the highest CO_2 emissions reductions from the commercial and public sectors were those with large buildings located within the Zones. Overall, the majority of the savings were achieved through a range of easier measures (draughtproofing and energy efficient lightbulbs), although a number of Zones also upgraded heating systems and controls, upgraded lighting systems and installed a range of insulation measures.

As shown in Section 2, Archway was the most successful in terms of reducing emissions from community and public buildings. This success was due in part to Islington Council's Climate Change Partnership – an initiative designed to engage local businesses in energy saving opportunities. Whilst the majority of these reductions were from the hospital in the Zone, other projects focused on installing lighting, insulation, heating and solar arrays in other large energy consuming buildings, including several schools, a leisure centre and a community centre. While the total number of buildings improved is fewer than in some other Zones, the buildings that have been improved are generally larger and demonstrated significant potential for emissions reduction. Furthermore, the measures that have been installed are high impact measures that are likely to result in the most significant long term savings.

Brixton also achieved significant savings in a small number of community buildings, again by focusing on large properties. Emissions reductions here were mostly the result of a substantial lighting system retrofit, but behaviour changes and improved housekeeping also contributed to the savings total.

It was noted that in the case of community buildings, flexibility was important as each building had different requirements and managers with their own priorities. For example, Haringey Council supported the successful retrofitting of a local dance academy, and as part of this process helped the Academy complete a feasibility study for funding to get the building re-clad and re-glazed – a long-term objective of the Academy. Assisting them in achieving their own objectives ensured a trusted relationship that allowed a successful outcome for both parties.

Capitalising on existing relationships within engaged community groups was also important for working in community buildings and institutions. For example, the Muswell Hill Sustainability Group (MHSG) was instrumental in ensuring a good relationship with three local schools where PV was installed; they were particularly fortunate to have a local governor within MHSG who facilitated the process.

5 Other successes

In addition to the CO_2 emissions reductions and energy savings achieved in the Low Carbon Zones, there were a number of other wider impacts. In the case of Wandle Valley, the relationship that was established between the local council and Sustainable Merton has been repeated in subsequent projects, such as a Green Deal pilot project. For example, work with young people in the Zone led to 11 people going into employment or education. A detailed report on the Wandle Valley Zone is available at http://www.merton.gov.uk/wvlcz_final_report_2012.pdf.

Similarly in Muswell Hill, the MHSG continues to be involved in several projects and has held more events as well as initiating an active discussion regarding the potential for installing solar at a large local social housing scheme. This work is being pursued in partnership with the council and they hope to release another community share offer as a result. MHSG are also considering more business engagement in the future, including using the offering of free/heavily subsidised LEDs as a hook for businesses to complete a survey, which may then lead to them being able to access additional subsidised energy efficiency measures.

In Brixton, the social enterprise Community Draught Busters built their expertise by installing measures in properties previously identified by the Green Doctors (funding for the delivery of Groundwork's Green Doctors programme was only for six months). Both of these community groups have established strong legacies that have continued following the end of the project.

In addition, Brixton's community led initiative has been held up as exemplary not just within London but also across other parts of the country. The model proved so successful that the Zone manager went on to co-found Repowering London, which now provides advice and expertise to the council in order to extend the scheme to the rest of the borough.

Lewisham Council delivered participatory budgeting, building on work the Council had undertaken previously around this type of community engagement and using this in an environmental context. This led to engagement amongst residents and an online forum was established which enabled people to discuss environmental issues and share ideas. The community chose to increase recycling facilities around the social housing blocks within the Zone. These blocks previously had low levels of recycling and issues with fly-tipping but recycling increased significantly across all of the blocks.

Finally, RE:CONNECT was able to provide the foundation for key demonstration projects under the Low Carbon London programme. Led by London's electricity distribution network operator UK Power Networks, this major Smart Grid demonstrator used the Zones to deploy smart meters, to put communication and automation technology across the network and to run a set of trials to emulate a Smart Grid such as Time of Use tariffs and monitoring of PV panels and CHP usage and their grid impacts[14].

[14] The full results of those trials will be available at http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-(LCL)/

6 Conclusions

Cross comparison between the Zones and general recommendations are not applicable to all types of areas. Nevertheless, this section presents a series of conclusions from the data analysis and interviews with stakeholders to consider when designing future area-based carbon reduction programmes.

Make-up of areas and use of data

The characteristics of each Zone have a significant influence on the types of project that will be most effective. Some Zones had more businesses (both large and small), community groups or community buildings to work with than others; the housing make-up of areas differed; and the social capital and community- involvement varied hugely across Zones. Therefore, having a clear understanding of the make-up of a Zone in terms of demographics, housing type and tenure, scale and type of public buildings, and commercial buildings is important in designing the most effective programme for a given area.

The Low Carbon Zones used data to understand the composition of homes and buildings within their area and to target their programme of work to varying degrees. Publically, freely available small area statistics and data are obtainable from a range of sources[15] and other data is available at a small cost, for example, domestic EPC data providing information on efficiency of individual houses has subsequently become available since the Low Carbon Zone project finished (although this does not cover all properties in the country). Local authorities should also have access to internal datasets such as social housing stock, private sector housing condition surveys, Warm Front and Building Control data.

The form, comprehensiveness and accuracy of data that was used varied between authorities, as did the usefulness of particular datasets. Some authorities had comprehensive internal databases, and internal energy expertise to manipulate the data usefully. Internal data coverage for the Zones was generally more comprehensive where there was a higher proportion of public rather than private housing within the Zone (i.e. local authorities are less likely to hold comprehensive and accurate data about the latter). Some authorities used housing archetypes to predict the private housing make-up, whilst others procured additional datasets held privately; for example, one authority used the Energy Saving Trust's HEED data. One authority mentioned that the poor accuracy of data used meant that the number of measures that they predicted they could install was far higher than what they were actually able to install.

Using data should be encouraged by ensuring that expertise and resources are available for a specific project and that preliminary data analysis is awarded upfront priority. It assists in a number of ways, most significantly in understanding the make-up and composition of an area and in targeting specific projects at the most suitable housing. This results in more targeted efficiencies and projects with higher impacts. For example, a specific data use recommendation for non-domestic

[15] These include Office for National Statistics (ONS), Neighbourhood Statistics, Index of Multiple Deprivation (IMD), Department for Energy and Climate Change (DECC) and Department for Communities and Local Government (DCLG).

projects would be to identify larger public buildings that are the least efficient by using EPC ratings data[16] (which includes floor areas) and focus on engaging and targeting those as a priority.

Similarly, levels of priority should also be given to collection of data during a scheme in order to effectively and efficiently obtain feedback on the success or otherwise of different interventions and approaches.

Reducing emissions from social housing

Retrofitting social housing proved to be very successful for reducing CO_2 emissions in a number of Zones, particularly areas with social housing in the form of high-rise flats and low-rise estates. In these Zones, a high proportion of properties received retrofitting measures and large savings were achieved (e.g. Archway and Brixton). Works conducted on social housing can be more straightforward in terms of securing funding and the ability to professionally install higher cost, larger impact measures such as insulation and heating improvements. Furthermore, social tenants are more likely to be receptive to works conducted when: a) no capital investment is required by them; and b) they are likely to experience warmer homes and/or lower utility bills as a result of the measures. Local authorities and Housing Associations can also have requirements to achieve energy efficiency and carbon reduction targets in social housing stocks and this type of intervention is likely to be given a higher priority than engaging with privately owned or rented property owners. Local authorities and social housing providers can receive support to retrofit their social housing stock through the London RE:NEW programme. More information is available at www.london.gov.uk/renew.

Reducing emissions from private households

All Zones conducted domestic energy assessments as a method of auditing and implementing household behavioural change. It was consistently noted by interviewees as being particularly successful in terms of engaging householders, and leading to the installation of simple, low cost energy efficiency measures. The most successful domestic projects also seemed to benefit from a simple yet flexible approach. A good example of this being where households received a customised service following an energy assessment, and were provided with a series of relevant measures that had been identified as being beneficial to their homes. Future schemes could seek to follow these successes and note the benefit and positive impact of door-to-door, face-to-face engagement with households.

However, to ensure that CO_2 emissions are maximised, engagement and installation of easy measures should translate into 'further measures' being installed. The rate of converting home energy assessments and easy measures into the further measures varied between the Low Carbon Zones. The most successful Zones at conversion were those that had relatively high amounts of homes with 'easy' loft and cavity walls that needed insulating. They targeted assessments on private housing requiring loft and cavity wall insulation and boilers, and offered subsidies on these measures. Local authorities should be aware that high levels of assessments do not always translate into further cost-effective measures being installed. This is particularly the case in areas with high levels of private solid walled properties where the significantly higher costs and disruption involved

[16] Data available here: http://www.cse.org.uk/resources/open-data/display-energy-certificate-data

in installing wall insulation are prohibitive for most households. Conversion rates in these areas will likely only be higher where incentives are offered to households. Purchasing and analysing EPC data will enable local authorities to have a better understanding of the housing stock as a whole in their boroughs and can use this to draw in and target existing sources of funding as and when they arise.

Reducing emissions from public and community buildings

The largest impacts in the non-domestic sector were achieved by targeting larger buildings such as hospitals, leisure centres and schools. Identifying and targeting these should be a priority of any non-domestic projects in the first instance and should be conducted by using both local knowledge through relationships and publically available data. The measures required to reduce CO_2 emissions from these buildings varied significantly and a tailored approach is required due to the individual characteristics of buildings in a given area. However, there are still potential learnings within sectors from buildings located outside of the Zone, for example between hospitals. The Greater London Authority supports the public sector to retrofit their buildings through the RE:FIT programme. For more information, visit http://refit.org.uk/.

Reducing emissions from commercial buildings

The greatest savings in the commercial sector were achieved through the installation of multiple 'further' retrofit measures such as new boilers, in a small number of SMEs. Free audits for businesses, and subsidised measures such as lighting also proved successful. In addition, understanding the priorities of individual businesses and organisations and demonstrating how these can align with reducing energy consumption and emissions was important for the success of several projects. Effectively implementing this is likely to come through successful engagement and by developing relationships with organisations and businesses.

Cost-effective carbon emissions reductions

There was a significant difference between the cost-effectiveness of the carbon emissions reductions that were delivered across the Zones. Those projects that can minimise the cost per tonne of carbon for any given measure are more likely to attract funding and finance and maximise CO_2 emission reductions. This demonstrates the need to integrate energy efficiency specifications into other projects – linking into planned maintenance or regeneration projects so as to reduce the additional costs and benefit from economies of scale. Use of procurement frameworks such as the RE:NEW framework and the Lewisham Energy Efficiency Installations Framework can also reduce costs.

Size matters

The Size of Zone can have a significant impact on what measures are cost effective, and the ability to adapt delivery programmes to changing funding circumstances. Larger Zones have the positive benefit that there are more opportunities to make reductions and to adapt projects as funding becomes available or is reduced. Smaller Zones have less opportunity to do this. However, engagement with households, businesses and public buildings can be more resource intensive in larger Zones and needs to be funded appropriately. Engagement within a smaller Zone may involve fewer properties, but may require more comprehensive engagement in order to achieve emissions reductions. When designing Zones, size and the relative funding levels should be considered.

Community-based engagement and partnerships

During RE:CONNECT several different engagement process were noted as being successful. For domestic improvements, the face-to-face engagements have previously been mentioned. In addition to this, a number of Zones used community groups to run household visits. In areas with a strong community group presence this seemed to be effective and in several Zones partnering with community groups was also considered invaluable due to the trust networks already established between the community group and local people.

When engaging with businesses, several Zones highlighted the cost savings achievable through various measures and behavioural change. However, Muswell Hill also ran a successful award scheme which incentivised businesses' involvement through the prestige of certification. It was also believed that a clear, solid offer that provided a definite benefit to businesses was important to the project's success.

Several councils commented that existing partnerships were invaluable to achieving their objectives but this was a resource that not all councils had at their disposal. In some cases, these relationships were used to help gain understanding about a Zone's buildings and businesses and gather information when designing particular projects. One representative from a community group also stressed the importance of locally-held knowledge for the success of their engagement activities. Fostering positive relationships both internally and externally should be noted as a valuable resource for future projects of all kinds, and where possible, authorities should be supported in nurturing these.

Appendix A

The following stakeholders were interviewed as part of this programme analysis:

- Tim Starley-Grainger: Low Carbon Zone Project Manager, Westminster (Queens Park)
- Jess Sherlock: Team Manager for Environmental Resources (interview completed with Natalie Butler), Haringey (Muswell Hill)
- Damian Hemmings: Climate change officer within the Future Merton team , Merton (Wandle Valley) (joined after RE:CONNECT ended)
- Alan Morton from Muswell Hill Sustainability Group (MHSG)/ EN10ERGY (Muswell Hill)
- Sarah Fletcher: Low Carbon Zone Project Manager, Lewisham
- Victoria Howse: Low Carbon Partnerships Manager, Islington (Archway)
- Afsheen Kabir Rashid: Project Manager, Lambeth (Brixton)