IMPROVING THE ENERGY EFFICIENCY OF DWELLINGS IN GWYNEDD

APPROXIMATING THE OUTCOME OF REFURBISHMENT OPTIONS FOR AREAS

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IN COLLABORATION WITH CYNGOR GWYNEDD COUNCIL

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Executive Summary

Reducing emissions from existing dwellings is crucial to the success of local, national and global targets to cut greenhouse gas emissions. Local Authorities are faced with the enormous and complex task of forming plans that will help realise these targets. The model presented within this report aims to provide Gwynedd Council with the foundation needed to develop robust strategies to tackle the inefficiency of dwellings. By ensuring that the model was flexible in its use and its level of detail, it is hoped that refurbishment options can be explored and well informed decisions be made.

To fulfil this objective, a model was created so that the current state of the housing stock could be clearly represented and understood by decision makers. A database of all available EPCs for the area was analysed to approximate the state of all dwellings within the Local Authority, broken down to smaller geographical areas. This alone provided a valuable knowledge base for future housing energy efficiency plans whatever the upcoming national and international strategies might be.

Pathways for improvements were created in line with current energy efficiency targets. These were applied to suitable dwellings and areas so that the effect of potential improvements and associated costs could be explored. Areas or dwelling types could be compared and detailed approximations calculated for the selected properties.

Analysing the models' results exposed different aspects of the relationship between the current state of properties and possible pathways to improvement:

Effectiveness of types of measures - Results clearly identified that the consumption reduction / cost ratio of measures is greatly reduced if refurbishment measures have already been carried out to reduce consumption. E.g. improving the fabric of properties after installing efficient heating systems would result in less consumption reduction for the same cost as if the fabric were improved as the primary step.

Combination of measures - Applying systems, fabric or renewables alone would only improve efficiency up to a certain point. Going beyond this requires a mixture of improvement types applied in combination or succession over a period of time.

Cost of measures - Analysing the relationship between the energy consumed and its cost could provide a case for investing larger amounts of money in order to drastically reduce consumption and therefore minimise the effect of possible rise in future energy prices.

Targeting subsets of areas - It is evident that if subsets of properties are targeted rather than whole areas, concentrating on the least efficient properties would most definitely have the greatest impact on overall consumption reduction.

Incorporating results with other data sources - Combining this model's result with work such as the Fuel Poverty in Gwynedd Report (Service 2013) would mean that decisions can be made combining both economic and social arguments.

Contents

Introduction

Background/Aim

In 2011, Gwynedd's domestic stock was directly responsible for 33% of the county's total emissions (GwyneddCouncil 2013) It is predicted that 2/3 of the existing UK stock will still be standing in 2050 (Foresight 2008) therefore reducing emissions from existing dwellings is crucial to the success of local, national and global targets to cut greenhouse gas emissions.

In recent years, increasing emphasis has been placed on the role of regional and local government in contributing to energy efficiency improvements in the residential sector, and hence reductions in CO_2 emissions (DECC 2013). In Wales, Local Authorities have a commitment to reduce emissions of greenhouse gases by 3% each year (WAG 2010) as well as a target to achieve a reduction of at least 40% of all greenhouse gas emissions by 2020 against a 1990 baseline (WAG 2010).

Concurrently, Welsh Government has a commitment to eradicate fuel poverty in Wales by 2018 as far as is reasonably practicable. 38.6% of Gwynedd's households are at risk of fuel poverty (GwyneddCouncil 2013) and the Council is determined to develop appropriate measures to help people in need by reducing the number of fuel poor households, and to contribute to reducing the impact of poverty and deprivation in locations across the County (GwyneddCouncil 2013).

In order to reach such vital targets, it is essential that improving the performance of the existing domestic stock is addressed, both by using existing buildings more efficiently, and through refurbishment (LCICG 2012). Gathering data on actual building performance in-use and developing ways to implement measures effectively is critical to the achievement of these ambitions (LCICG 2012).

Energy Performance Certificates (EPCs) are a significantly large and detailed survey of the residential building stock. 26% of Gwynedd's stock currently have EPCs and therefore information exists about their typology, age, location, size, availability of services etc. This report aims to use this growing data source (gov.uk) in order to provide Gwynedd Council with data on the stock's current performance. It will consider current Welsh and UK energy efficiency schemes and provide options of improving the energy efficiency of dwellings by considering dwelling types and the characteristics of areas. It is hoped that the end result will enable Gwynedd Council to successfully reduce carbon emissions from dwellings whilst helping to eradicate fuel poverty from Gwynedd's households.

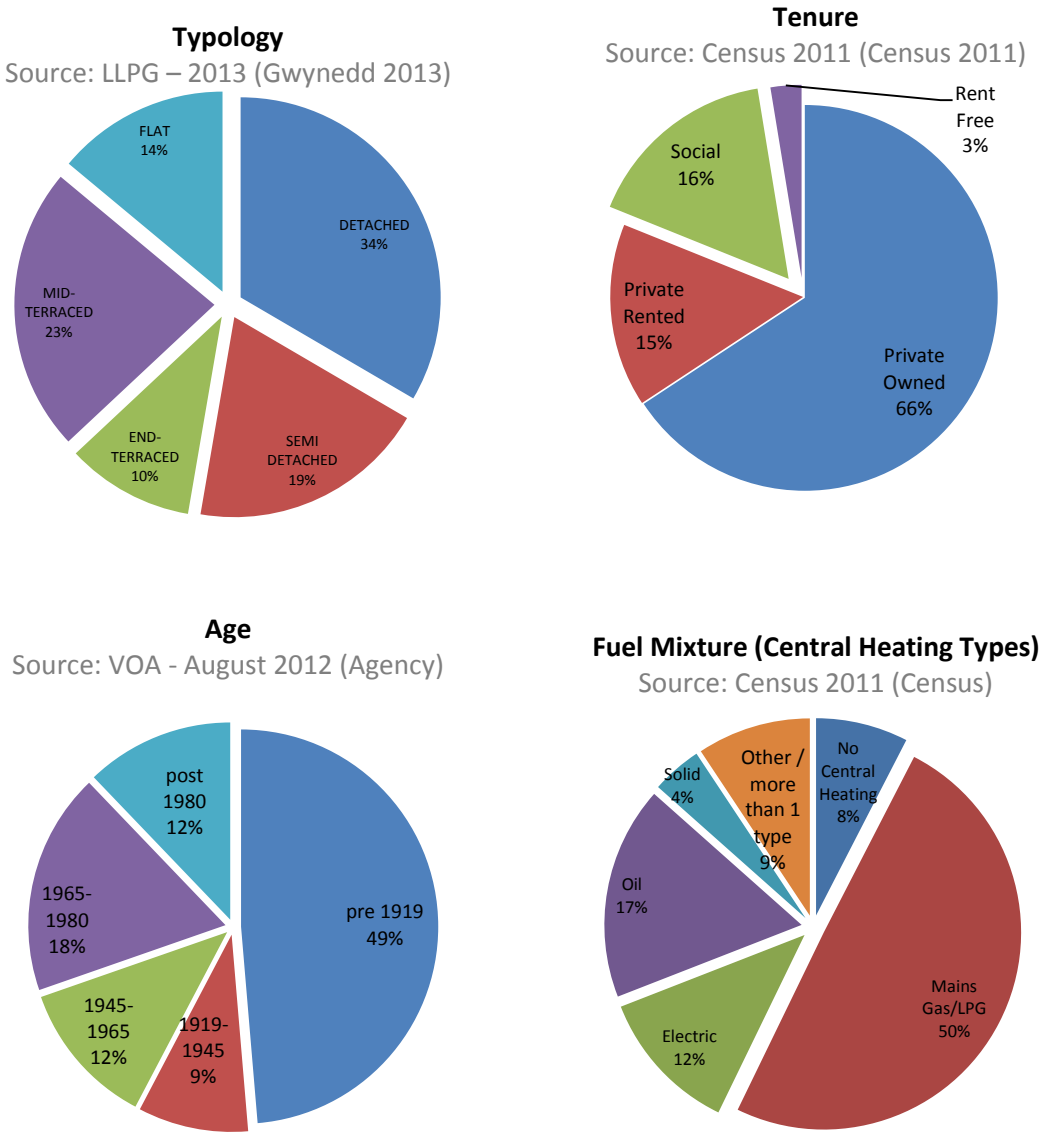
In summary, the objective of this report is to provide Gwynedd Council with the foundation needed to develop robust strategies to improve the energy efficiency of dwellings within the Local Authority.

Overview of Gwynedd Stock

There are 60,692 dwellings in Gwynedd (Gwynedd 2013), mainly characterised by detached and terraced housing. The proportions of these types of houses are higher in Gwynedd than the national averages (Cymru 2008). The private/social tenure split within Gwynedd is similar to national figures with slightly higher than average levels of private renting and slightly lower than average levels of outright home ownership (Cymru 2008).

Compared to other Welsh Local Authorities, Gwynedd has the 3rd highest proportion of housing built before 1919 with nearly half of all properties built before this date, far higher than the National figure of 32%. All pre 1919 dwellings have solid walls and are categorised as 'hard to treat'. In 2001, 53.8% of houses were also classified as 'hard to treat' as they were off the mains gas supply. The high proportion of 'hard to treat' homes within its housing stock is a major long term problem facing Gwynedd, as it contributes to fuel poverty and energy waste. See figure 1 for breakdown of dwellings' tenure, typology, age and fuel mixture.

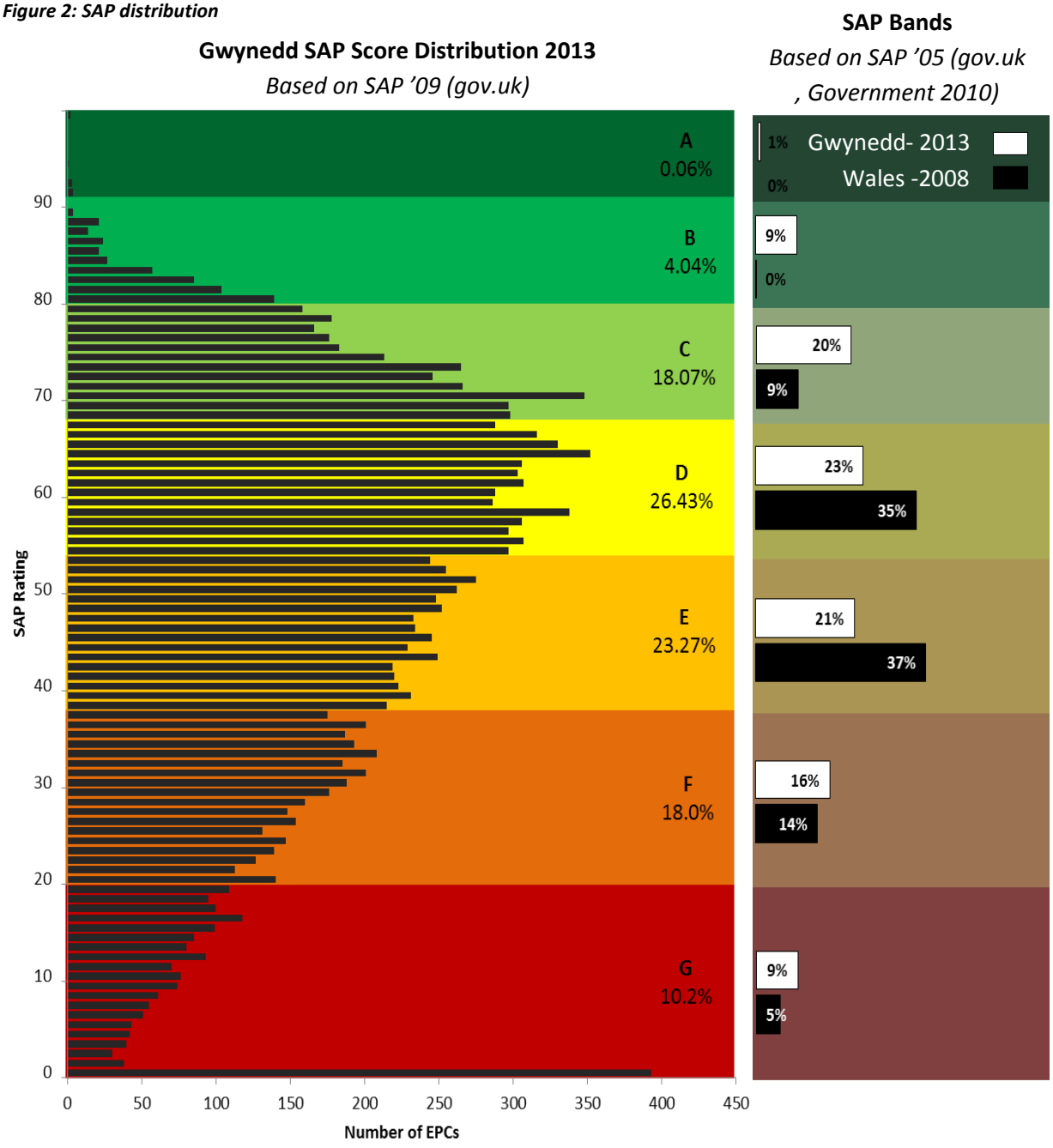
Figure 1: Breakdown of Gwynedd's dwellings in terms of tenure, typology, age and fuel mixture



Energy Efficiency of Gwynedd's Dwellings

The energy efficiency of Gwynedd's housing stock is more evenly distributed than in Wales as a whole (based on a sample of Welsh homes surveyed in 2008 (Government 2010)), see figure 2. There is a greater proportion of very poorly performing dwellings (F and G bands) in Gwynedd, which can be expected due to the high percentage of 'hard to treat' properties (i.e. solid walled and off gas properties). The national housing stock is rapidly improving, therefore higher energy efficiency in Gwynedd might be a consequence of the recent widespread efforts to improve the efficiency of houses rather than a geographical difference. This is likely to be reflected in Gwynedd's EPCs to a far greater extent than in the Welsh 2008 sample due to the inclusion of very recent EPC surveys, including all new builds.

Figure 2: SAP distribution



Gwynedd's data is based on all available EPCs with SAP 2009 values which have been converted to SAP 2005 values for comparison with data for Wales

Approach

The objective of this report is to provide Gwynedd Council with the foundation needed to develop robust strategies to improve the energy efficiency of dwellings within the Local Authority. A database of all available EPCs for the area is analysed to provide a picture of the current state of the housing stock. These analysed dwellings are then used to approximate the state of all dwellings, taking into account the location of properties and typological differences. Consequently, the model formed provides information on the condition of all properties within the Local Authority broken down to smaller geographical areas. This alone is a valuable knowledge base for future housing energy efficiency plans whatever the upcoming national and international strategies might be.

Pathways for improvements are provided in line with current Welsh and UK energy efficiency schemes and targets. Information about each Lower Super Output Area (LSOA) (around 800 dwellings) is used to identify the suitability of schemes. The costs of the improvements, energy consumption reduction and SAP rating distribution improvements are calculated for each suitable scheme and target for each LSOA.

(See appendix 1 for description of geographical areas and map of LSOAs within Gwynedd)

Schemes and Targets

2 Welsh schemes (NEST and ARBED phase 2), 1 UK scheme (ECO'S CSCO) and 1 UK target (2050 target) is considered:

NEST is the Welsh Government's fuel poverty scheme. "It aims to help reduce the number of households in fuel poverty and make Welsh homes warmer and more fuel-efficient places to live" (Government). The scheme works on a house by house basis and is available for all those who are eligible. To be eligible you must:

- own or privately rent your home and;
- live in a home that is not energy efficient (F or G rated)
- and receive a means tested benefit or live with someone who does

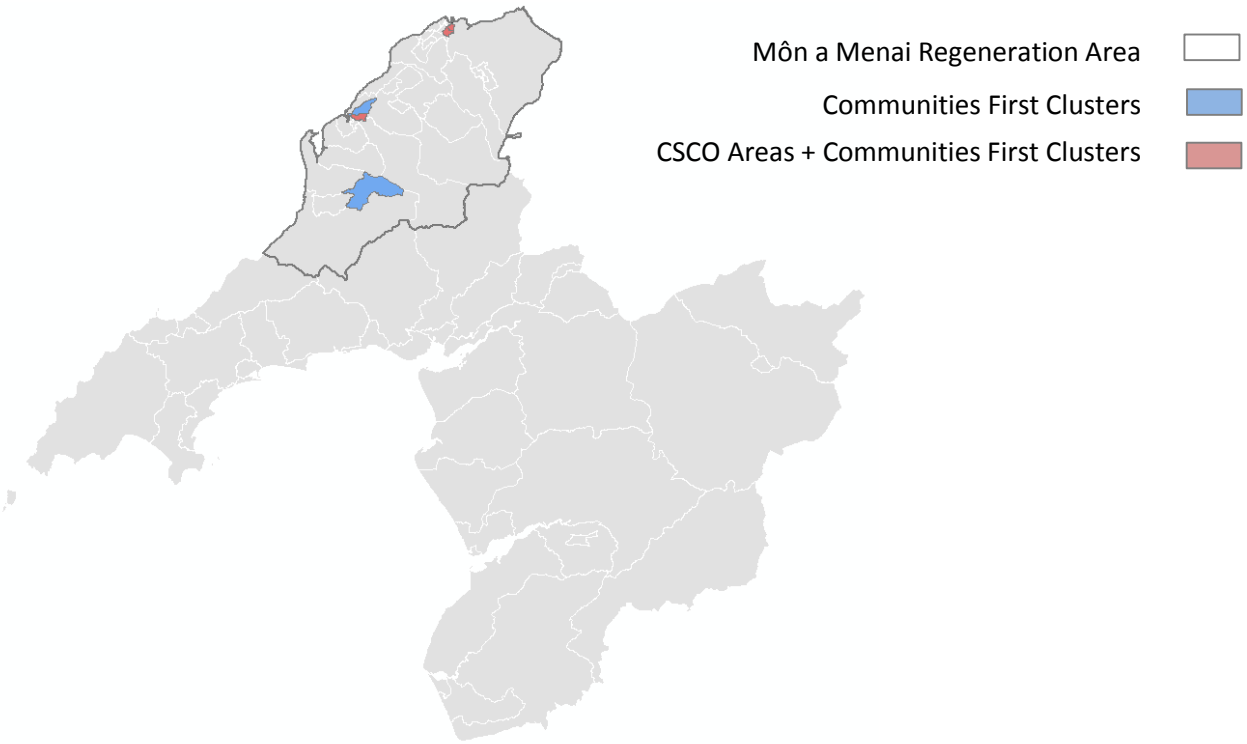
ARBED is an area-based programme also from the Welsh Government. It is committed to reducing "climate change, help eradicate fuel poverty and boost economic development and regeneration in Wales" (Government). The first phase of ARBED worked with social housing providers to make communities in deprived areas of Wales more energy efficient. ARBED is currently in phase 2, which concentrates on the private sector. Local Authorities can submit applications for 2 scheme areas per year and applications will be assessed and areas chosen to ensure that it reaches the scheme's target:

- hard-to-treat and hard-to-heat homes;
- low-income households;
- private-sector households;
- schemes align with strategic areas.(see figure 3)

CSCO (Carbon Saving Community Obligation) is part of the UK's Energy Company Obligation (ECO). CSCO "will require energy suppliers to deliver energy efficiency measures worth around £190m per

year through to March 2015. The CSCO will target households across Great Britain in specified areas to improve energy efficiency standards" (DECC 2012) As for NEST, CSCO aims to remove families from fuel poverty by ensuring that properties receive energy efficiency measures. LSOA Areas in England, Scotland and Wales ranked in the lowest 15% in terms of Indices of Multiple Deprivation (IMD) are included in the scheme. There are 3 qualifying areas in Gwynedd; 2 in Bangor and 1 in Caernarfon (see figure 3). Up to 20% of activity under CSCO may be undertaken in adjoining LSOAs and energy suppliers are required to deliver a minimum of 15% of their obligation to low income households living in rural areas.

Figure 3: Strategic Areas



2050 Target

The 2050 target reflects the commitment of Britain under the 2008 UK Government's Climate Change Act to reduce CO_2 emissions by 80% by 2050 (Wales 2008, Federation 2013). The UK government's December 2011 Carbon Plan highlighted that 25% of the UK emissions come from domestic properties and that reducing demand for energy is the cheapest way of cutting emissions (Federation 2013). Achieving the highest possible SAP rating band A (over 92) would be roughly equivalent to 80% reduction in domestic greenhouse gas emissions. This target will be used to approximate the effect of achieving the highest possible ratings for all Gwynedd's properties and the cost of doing so.

Methodology

A clustering technique is used to group EPCs with similar characteristics. This forms 'typical' dwellings that can be modelled to represent the whole housing stock. The model provides data on the stock's current performance and gives the foundation for calculating the carbon savings and costs of applying energy efficiency measures to certain groups within the stock.

Clustering

The Local Land and Property Gazetteer (LLPG) data (Gwynedd 2013) identifies all properties in Gwynedd by location and classifies all by type. Data for residential addresses in the LLPG were updated using Mastermap polygons (OrdenanceSurvey 2013) to differentiate between mid-terrace and end-terrace properties. The updated LLPG data was then used to determine the distribution of dwelling typologies within each LSOA (Geoportal 2011). 4 typologies were used to differentiate dwellings in the model, retaining only information concerning the exposure of outer surfaces: Detached, Semi Detached/End Terraced, Mid Terraced and Flats.

Each typology was split into a number of clusters, made up of EPCs with similar energy performance related characteristics. Typical characteristics were derived for each cluster before energy demand profiles were calculated using the SAP sensitivity tool (E. Crobu 2013). Each original EPC was therefore attributed with the description and profile of its cluster's representative dwelling.

EPCs were grouped into clusters in terms of 5 features: typology, wall type, SAP rating, fuel type and property size. A property is considered small if its total floor area is less than the average floor area of all properties of that typology, and large if the floor area is larger than the average (see table 2 for small and large definitions for typologies). The different options for each variable can be seen in table 1. This created a total of 240 possible clusters of which 179 existed in Gwynedd.

Table 1: Variables used in Clustering

Typology (4)	Wall Type (2)	SAP rating (3)	Fuel Type (5)	Property Size (2)
Detached	Solid	ABC	Gas/LPG	Large
Semi/End T	Cavity	DE	Oil	Small
Mid T		FG	Solid	
Flat			Electricity	
			Biomass	

Table 2: Definition of Property sizes

	Small	Large
Detached	< 120 m^2	≥120 m^2
Semi / end terrace	< 90 m^2	≥ 90 m^2
Mid terrace	< 80 m^2	≥ 80 m^2
Flat	< 60 m^2	≥ 60 m^2

Per LSOA, these clusters were proportionally applied to dwellings of that typology (i.e. not attributed directly to individual dwellings). This meant that, due to the rounding errors, there could be up to 2% less or more dwellings considered in the results per LSOA than in the LLPG data. The distribution of EPCs per cluster can be seen in figure 4 as can the approximation of all dwellings in Gwynedd per cluster (figure 5).

Figure 4: Distribution of EPCs per Cluster

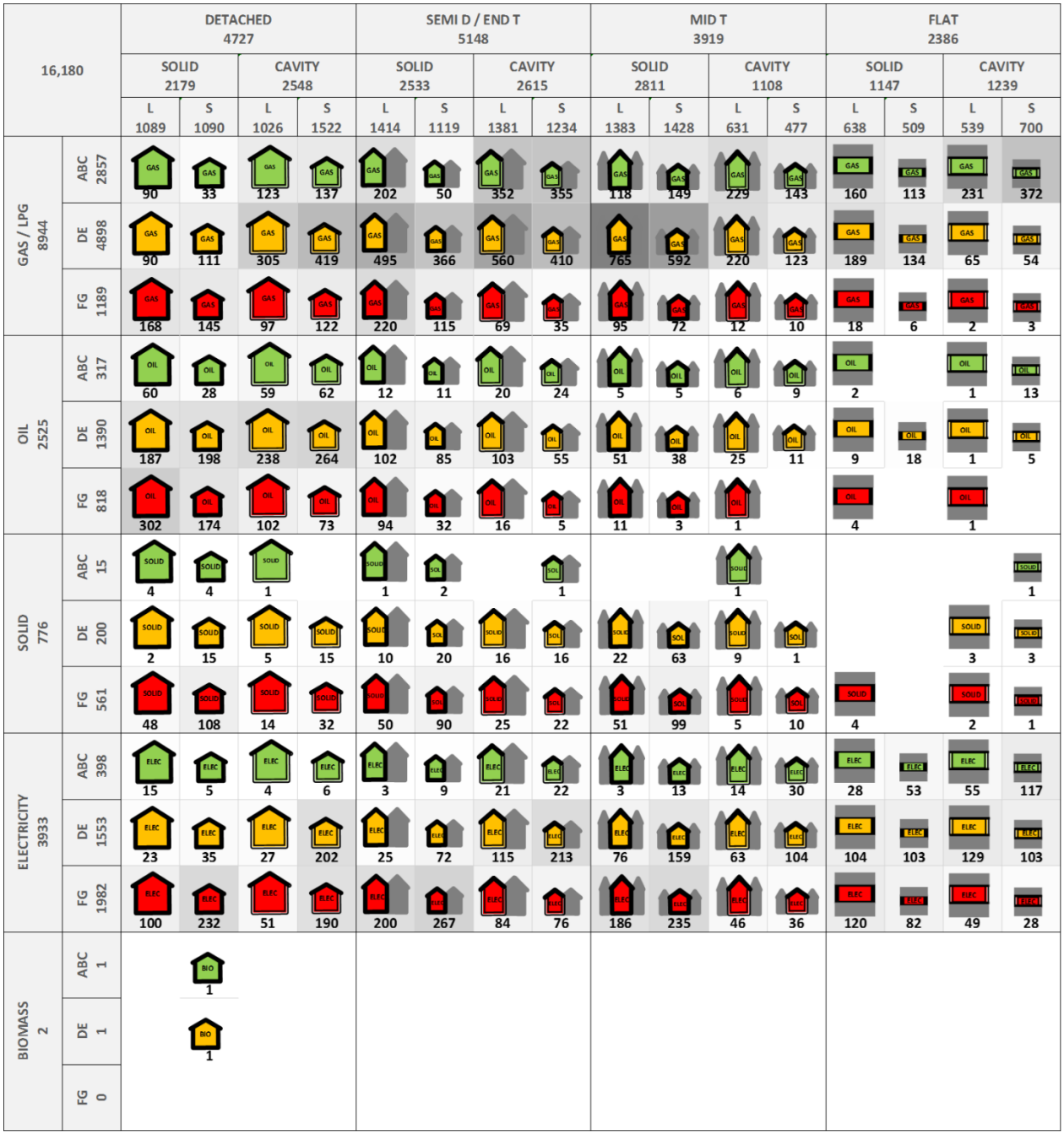
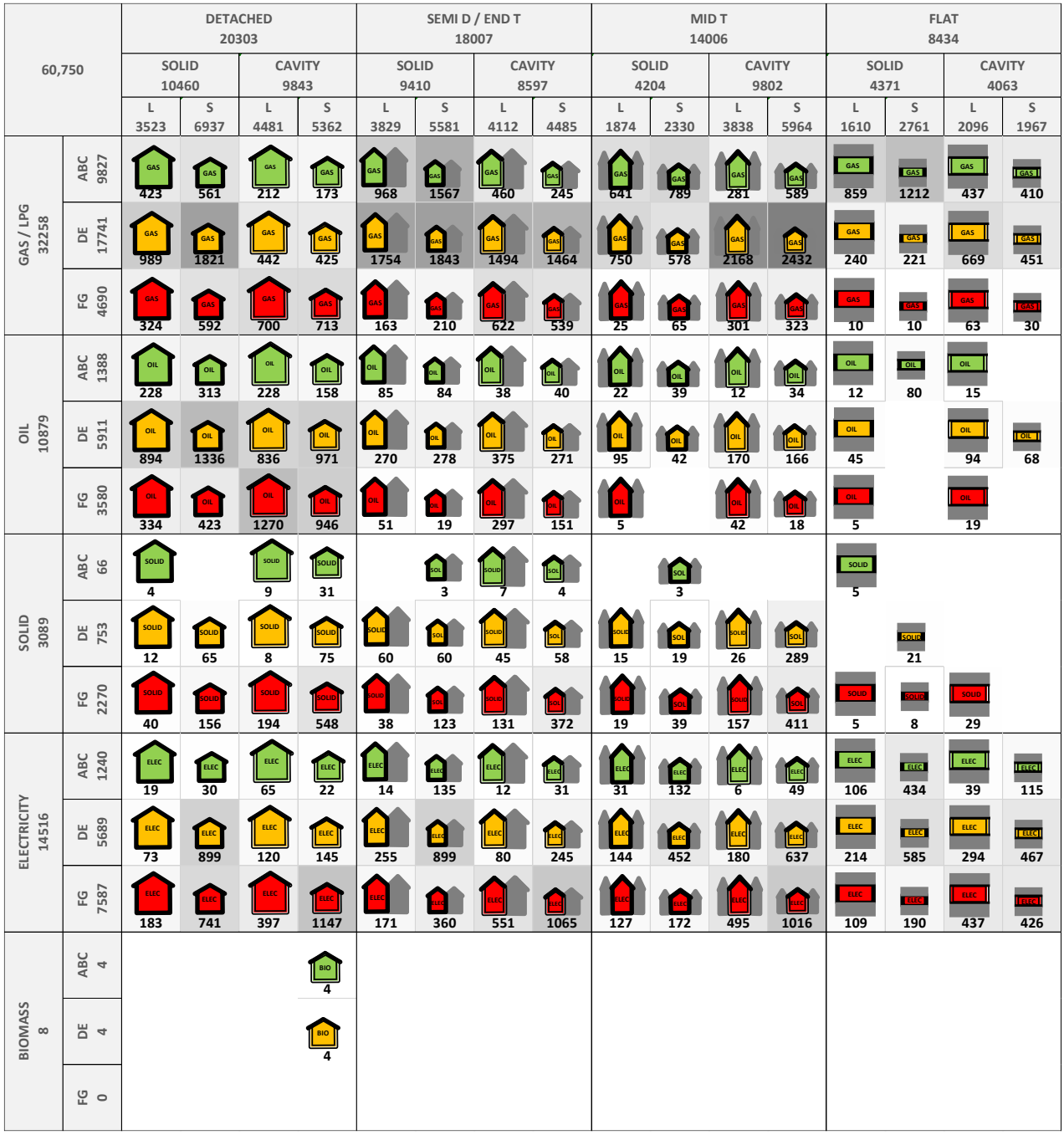


Figure 5: Approximation of the Distribution of dwellings per Cluster



Characteristics of Clusters

The EPCs were analysed in clusters so that typical dwellings could be formed to represent all properties within a cluster. In order to do this, data provided in the EPCs were categorised and simplified so that typical properties could be derived.

The EPC data fields were grouped depending on the feature they describe and by the type of measurement they handled. The grouping of fields can be seen in figure 6. For each EPC cluster, the central tendency was calculated for all energy performance related fields.

Handling EPC data

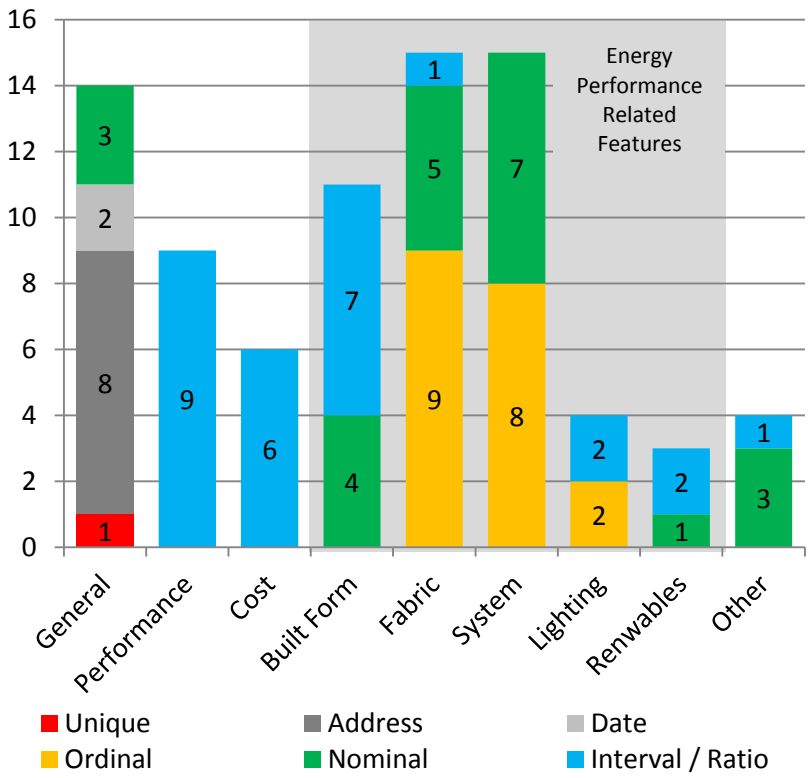
Each EPC had a unique code and contained information about the property's address and the date of inspection and lodgement.

All other measurements types were grouped as:

- interval/ratio - degree of difference between items
- nominal – descriptive / qualitative in nature
- ordinal - rank orders but no relative degree of difference between items

For detailed information on the EPC data variables, see appendix 2.

Figure 6: Grouping of EPC fields



Interval/Ratio Fields

The mean could easily be calculated for interval and ratio fields to represent the central tendency of each EPC cluster. The "performance" and "cost" data could all be described as interval data and included energy efficiency and environmental efficiency ratings, approximated CO_2 emissions, energy

use and energy costs. The built form, fabric, system, lighting and renewables groups included a mixture of measurement types but included a few interval and ratio fields such as total floor area for which the mean could also be calculated.

Nominal Fields

Nominal fields for energy related features described the feature in question. E.g. “Walls descriptions” included descriptions of wall types and included 150 different descriptions. Each had a description of the wall material and the presence or absence of insulation in a single field. Two new fields were created, one for wall material and one for the insulation description. Each of the 150 descriptions were given one of 4 wall descriptions and one of 4 insulation descriptions seen in table 3. This meant that all 16,180 EPCs fell into one of 16 wall descriptions. A similar reduction method was applied to all nominal fields. It was then possible to calculate the central tendency of nominal fields for each EPC cluster by identifying the mode (most frequently occurring description).

Table 3: Wall Description Simplification

Material	Insulation
Solid	Internal
Cavity	External
Timber Frame	Cavity Filled
System Built	No insulation

Ordinal fields

All energy performance related features have an energy efficiency and environmental efficiency rating. These ordinal fields are displayed in EPCs by star ratings and can be described as in figure 7.

Figure 7: EPC Star ratings

★☆☆☆☆	Very Poor	1
★★☆☆☆	Poor	2
★★★☆☆	Average	3
★★★★☆	Good	4
★★★★★	Very Good	5

Although these measurements rank energy related features in terms of performance, the differences between consecutive values might not be equal. (E.g. the difference between a rating of 1 star and 2 stars might not be of the same magnitude as the difference between 4 stars and 5 stars). The central tendency of these fields for EPC clusters were therefore calculated as median values (the middle value).

Current Performance of Clusters

SAP Sensitivity Tool (WSA 2014)

SAP is the UK energy compliance model that quantifies a dwelling's performance in terms of energy use per unit floor area based on the BRE's Domestic Energy Model (B R Anderson 1997). It takes into account the building's construction, location, heating systems and controls. The SAP sensitivity tool is based on a monthly version of BREDEM and estimates the energy consumption of space heating, water heating, lighting, electrical appliances and cooking. All BREDEM based models assume an internal temperature set point of 21°C. Previous work on the comparison of a BREDEM based model with DECCs actual gas and electricity meter readings on an aggregated LSOA level suggested that a set point of around 18-19°C would be a better representation of reality (Heledd Iorwerth 2013). The value used in the SAP sensitivity tool will be adjusted to 18.5°C to reflect this understanding of actual consumption. (SAP rating values will still use the default 21°C for comparison reasons).

The tool used is a web calculator designed to provide approximate SAP ratings by concentrating on the most crucial and commonly altered parameters, mostly relating to fabric and systems. Both inputs and outputs are visible on a single screen with a maximum of 12 values to choose from for each of the 22 variables. The variables can be split into 3 groups (table 4): Building overview, fabric and systems. These give the basic but essential options needed to distinguish physical properties that influence energy demand.

Table 4: Variables in SAP Sensitivity Tool (WSA 2014)

Building Overview	Fabric	Systems
Location	Thermal mass	Primary heating fuel and system age
Typology	Walls U-value	Secondary heating fuel type
Floor Area	Floor U-value	Infiltration rate
Orientation	Roof U-value	Ventilation
Surface ratio	Windows U-value	Solar thermal
Obstacles	Glazing ratio	PV panels
Lighting	Window shading and overhang	
	Thermal bridging	

Cluster Characteristics in SAP tool

Reference tables from SAP 2009 document (BRE 2011) were used to convert the representative descriptions and ratings for each feature of each cluster to one of the value options in the SAP sensitivity tool. For example, according to table S9 (BRE 2011), a slated or tiled roof with >=300mm of insulation would have an U-value of 0.13W/m^{2}K. If for an EPC cluster, the central tendency of the "roof description" field was >= 300mm of insulation, a U value of 0.13W/m^{2}K would be inputted into the SAP sensitivity tool. In some cases, the value inputted into the SAP tool would be derived from 2 or 3

fields. E.g. if the wall type was “Solid brick”, the insulation description was “Insulated” and the wall rating was 4 then a U value of 0.35W/m^{2}K would be inputted into the SAP sensitivity tool.

Creating a SAP for each cluster in the tool meant that all the energy performance related data and energy consumption profiles is saved as bitly links (All links can be found in appendix 3). These profiles are the basis of all calculations and represent the current approximated energy profile of Gwynedd’s stock.

Validation

By aggregating all individual properties’ consumption in the model and comparing with DECC’s aggregated meter readings per LSOA, the ability of the model to predict current consumption patterns could be evaluated. The heating consumption of all mains gas properties in the model were aggregated and compared to DECC’s gas consumption per LSOA and the electricity consumption of all dwellings in the model were compared to DECC’s electricity consumption per LSOA. Figures 8 and 9 show that the model accurately and precisely calculates the consumption of Gwynedd’s dwellings and is therefore a reliable foundation to calculate the potential impact of energy efficiency measures.

Figure 8: Gas Consumption Validation

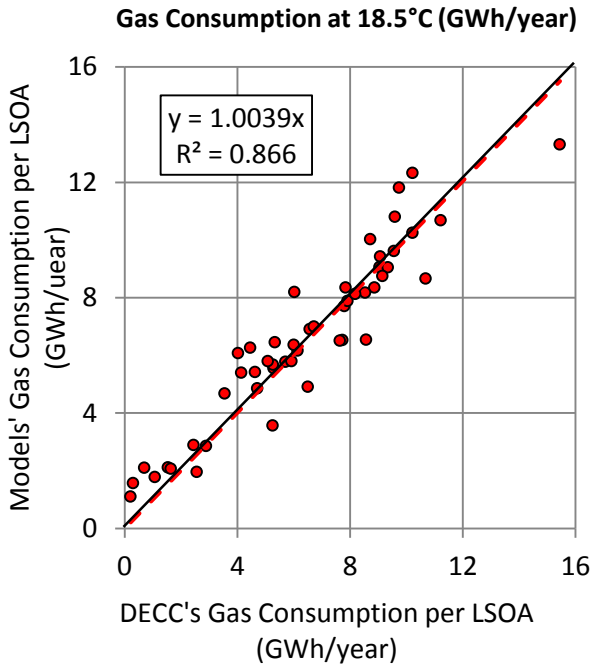
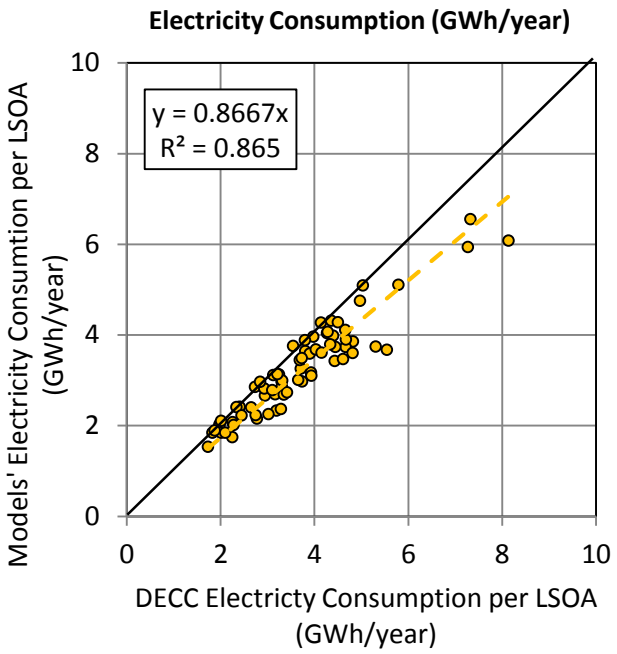


Figure 9: Electricity Consumption Validation



Clusters: Schemes, Measures, Costs and Improvements

Schemes and Targets

Schemes and targets are applied to dwellings depending on the cluster, the LSOA it is located within and any restrictions that might exist.

NEST

NEST is a house by house scheme for inefficient private dwellings with a householder receiving means tested benefits. As no detailed information exists in the model regarding tenure and householders, NEST measures are applied to all dwellings in F and G rated clusters (figure 10). The model will assume that all F and G rated properties are eligible for the scheme when in reality only a portion of these households would meet the other two criteria. NEST results for all areas within Gwynedd will be calculated (figure 11).

Figure 10: NEST Applicable Clusters

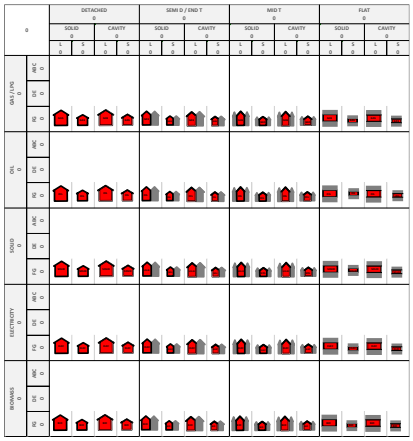
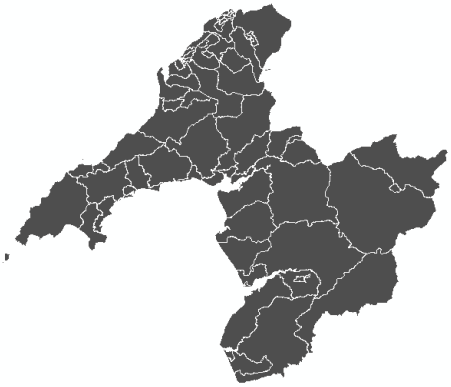


Figure 11: NEST Applicable LSOAs



ARBED

ARBED is an area based scheme targeting hard to treat, low income private homes in strategic areas (see figure 13). ARBED measures are applied to all non-gas clusters and all solid walled clusters (figure 12). Dwellings outside strategic areas will be calculated but not considered as possible areas for ARBED funding. As for NEST, details on the percentage of private dwellings and low income households are not included within the model but can be used in conjunction with calculated results to identify the most suitable areas.

Figure 12: ARBED Applicable Clusters

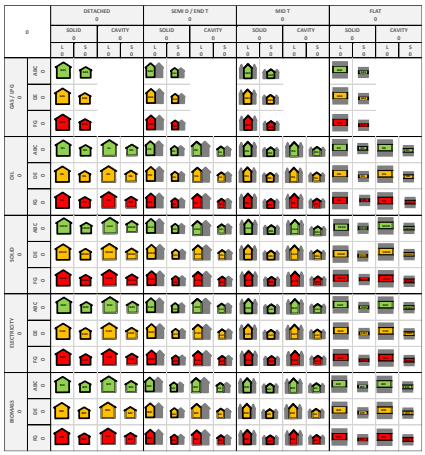
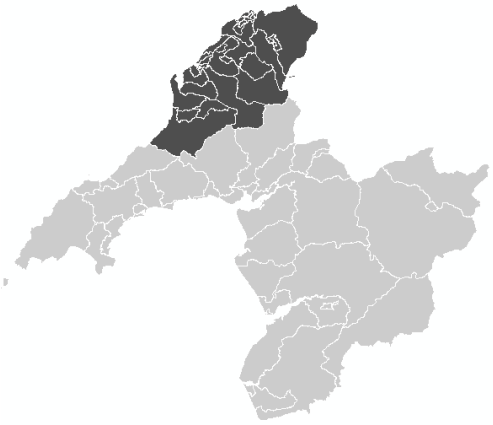


Figure 13: ARBED Applicable LSOAs



CSCO

CSCO targets households in specified areas to improve energy efficiency standards. There are no limitations in terms of dwelling types/clusters (figure 14). There are 3 qualifying areas in Gwynedd; 2 in Bangor and 1 in Caernarfon (red in figure 15). Up to 20% of activity under CSCO may be undertaken in adjoining LSOAs (Orange in figure 15) and energy suppliers are required to deliver a minimum of 15% of their obligation to low income households living in rural areas. All LSOAs in Gwynedd other than the two qualifying LSOAs in Bangor are rural, therefore all dwellings in all LSOAs could be eligible for CSCO funding.

Figure 14: CSCO Applicable Clusters

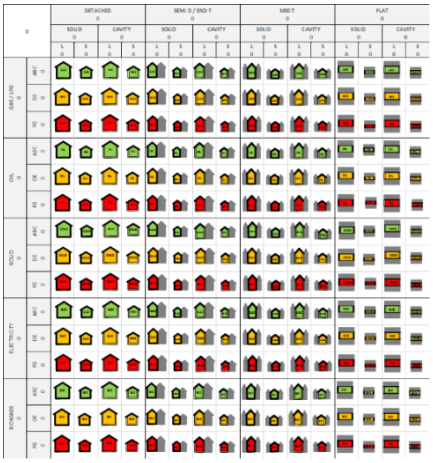
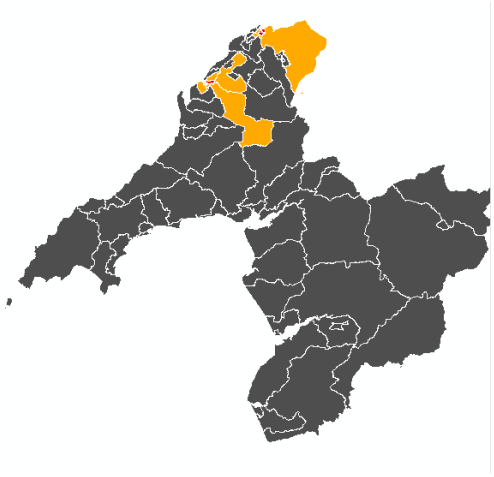


Figure 15: CSCO Applicable LSOAs



2050 Target

The 2050 target is considered a target for all properties (figure 16) in all areas (figure 17) therefore 2050 results will be calculated for all dwellings in Gwynedd.

Figure 16: 2050 Applicable Clusters

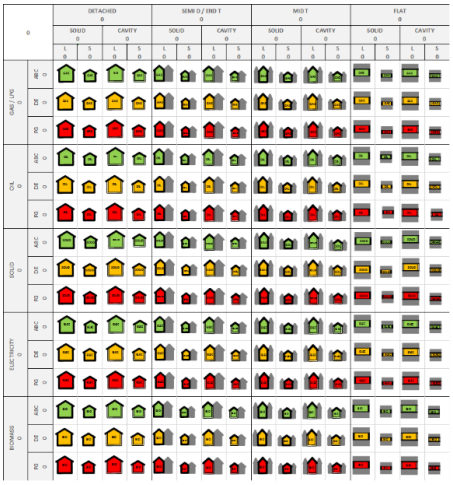
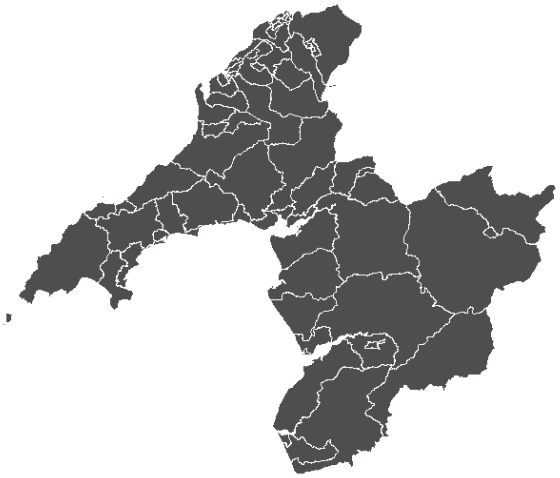


Figure 17: 2050 Applicable LSOAs



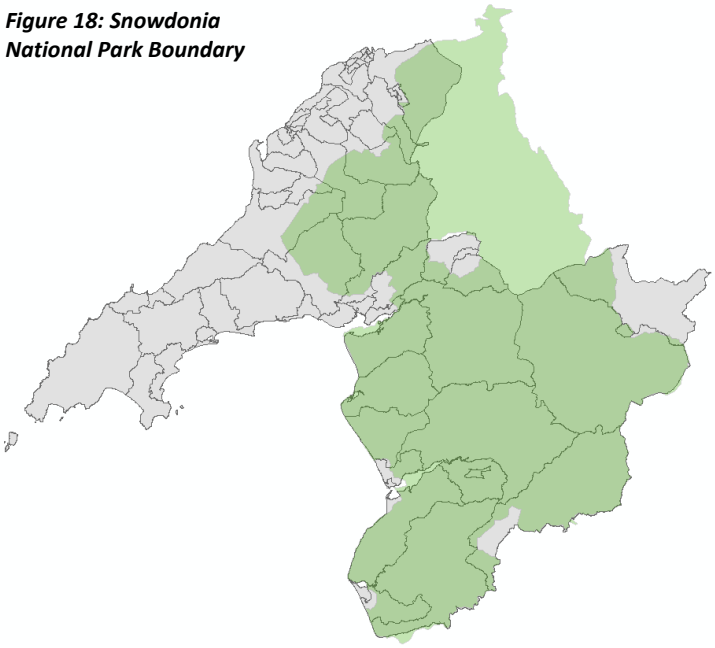
Restrictions on Measures

Measures are applied to dwellings depending the suitability of schemes/targets to the area and house type. Two restrictions will also be taken into account when deciding whether schemes are suitable and which measures are to be applied to dwellings:

National Park

Measures that alter the appearance of dwellings are not allowed within the Park therefore they would not be applied to dwellings considered to be within the Park. Where possible, alternatives will be considered e.g. internal wall insulation instead of external. It can be seen from figure 18 that the Park boundary does not align perfectly with LSOA boundaries. Clusters of a certain typology in LSOAs where the majority of dwellings of that typology is located within the Park are considered to be within the Park and vice versa.

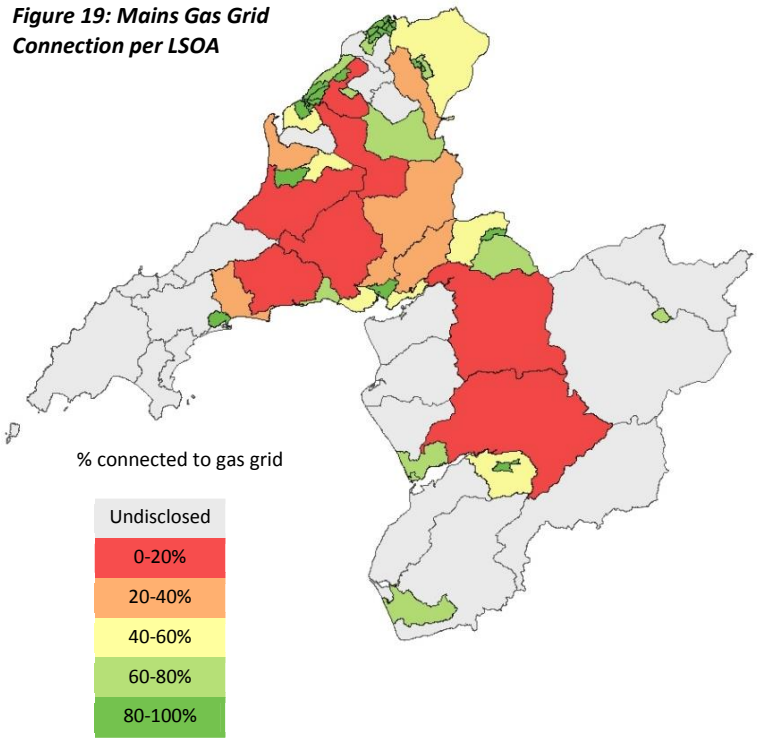
Figure 18: Snowdonia National Park Boundary



Off mains gas

Comparing the number gas meters in DECC's consumption estimates (Gov 2013) with the number of properties in Gwynedd's LLPG (Gwynedd 2013), it can be approximated that 47% of properties are connected the mains gas grid. It can be seen in figure 19 which areas have the greatest % of off gas grid properties. Figures for the areas in light grey are not released by DECC due to disclosure issues therefore are assumed to have a very low % of properties connected to the gas grid. These values agree well with the model's fuel use within LSOAs. When considering systems related energy efficient measures, the model's data will therefore be used to determine what is applicable (i.e. if a dwelling currently uses oil for heating it will be assumed that the property is off gas and therefore a new efficient gas boiler would not be an option).

Figure 19: Mains Gas Grid Connection per LSOA



Measures and Costs

For each scheme and target, a set of measures is applied to suitable clusters. Measures are included in table 5 if they are options considered within the schemes. The orders of measures for all schemes follow the order in table 5: systems first, fabric second and renewables last. Costs were derived from Arbed phase 1 post installation review (Government 2011), NEST presentation to EHAC (Government 2012) and EST website (Trust). Solid wall insulation costs were calculated for all clusters depending on the approximated external wall area. Figures of £42 per m2 (Living) for internal insulation and £55 per m2 (resurgance) for external were used. Costs of measures can be refined and altered in the underlying data through the attached excel spreadsheets and the interactive web page.

Table 5: Measures for Schemes and Targets

	MEASURES	COSTS	RESTRICTIONS AND DIFFERENCES	NEST	ARBED	CSCO	2050
SYSTEMS	Apply if current system is inefficient						
	System Upgrade (New gas boiler)	£2,300	On gas	✓	✓		✓
	System upgrade (New oil boiler)	£2,800	Off gas and currently oil	✓			✓
	Air source heat pump	£6,000	Off gas other	✓	✓		✓
FABRIC	Apply if current fabric is of poor performance						
	Loft Insulation	£250		✓	✓	✓	✓
	Draught Proofing	£100		✓	✓	✓	✓
	Cavity wall insulation	£475		✓		✓	✓
	Solid wall insulation (Internal or external)	£2,000-£10,000	Cost depending on size, typology and within/outside N.P. (see cost column of adjusting costs section of appendix 5)	✓	✓	✓	✓
	Under floor insulation	£530				✓	✓
	Upgrade Glazing	£2,400				✓	✓
RENEWABLES	Apply if there is no renewables currently						
	Solar thermal	£2,600		✓	✓		✓
	PV	£7,000	No PVs within park		✓		✓

Improvements

Appendix T of the official SAP2009 document (BRE 2011) gives the circumstances under which recommendations for improvements are made in EPCs and to which extent features should be improved. This gave a short list of frequently recommended improvements in the order that they would appear in EPCs. Some of the conditions were simplified in order to be comparable with values

in the SAP sensitivity tool. Table 6 highlights the recommendations considered, values used in the official SAP2009 document and in the SAP sensitivity tool.

Table 6: Circumstances for improvements, values in Appendix T of SAP 2009 document

Measure		Condition for improvement	Recommended Improvement
Loft/roof Insulation		**<=150 mm insulation or U-value entered by assessor >=0.35 W/(m²K)** (U-value >=0.35 W/(m²K))	**250mm insulation** (U value of 0.2 W/(m²K))
Wall	**Cavity wall insulation**	**Wall U-value>0.6 W/(m²K)** (U-value >0.6)	**Cavity filed wall (U-value dependant on age of wall)** (U value 0.3)
	Solid Wall Insulation	**Wall U-value>0.6 W/(m²K)** (U-value >0.6 W/(m²K))	**Internal or external wall insulation with U-value of 0.3 W/(m²K)** (U-value of 0.3 W/(m²K))
Floor Insulation		**Floor is as built (if built < 2006) Or U-value >0.5 W/(m²K)** (U value >0.45 W/(m²K))	**150mm of floor insulation** (U value 0.25 W/(m²K))
Draught proofing		**Less than 100% draught proofing of windows and doors** (poor or normal infiltration rate: approx. 10 m³/m² air changes per hour or more)	**100% draught proofing** (good practice infiltration rate: maximum of 5 m³/m² air changes per hour)
Low energy lighting		**Low energy lighting <100% of fixed outlets** (Low energy lighting <100% of fixed outlets)	**Low energy lighting in all fixed outlets** (Low energy lighting in all fixed outlets)
Upgrade heating system		**Any component of system is below A rating** (Age of system unknown)	**System that is A rated** (Age of system 2006 to present)
Solar water heating		**No solar thermal panel** (No solar panel)	**3m2 Solar thermal panel** (3m² Solar panel)
Double glazing		**Less than 80% of windows with multiple glazing** (U value < 3 W/(m²K))	**All single glazed windows replaced by double glazing with U-value 1.5 W/(m²K) and G=0.63** (U value 1.4 W/(m²K))
Photovoltaics		**No photovoltaics or less than 1kWp** (No PV panels)	**Photovoltaics, 2.5kWp** (2.5kWp PV panels)

Areas: Costs and Improvement

Data on the distribution of clusters within LSOAs was combined with detailed results of clusters calculated using the SAP sensitivity tool (A table of the counts of clusters per LSOA can be seen in appendix 4). This allowed a comparison of schemes and measures to be made for all areas in terms of the number of suitable properties, number and type of measures applicable, cost of measures/schemes, consumption reduction of measures/schemes and the average possible SAP rating improvement.

Results

The model contains information on refurbishment possibilities for all clusters and can be used as a data source on refurbishment options for individual dwelling types. By approximating the number of each dwelling cluster in a geographical area, the model can also be used to assess the effect of certain packages of improvements on areas. Detailed results for different options can be assessed and altered depending on the area's characteristics.

Results presented in this report concentrate on the possible improvement associated with the 4 mentioned schemes at LSOA level. LSOAs are ranked for each scheme in terms of the average consumption reduction per suitable property (the area with the greatest reduction per suitable property being ranked highest -1st). Detailed results for the 3 top ranking areas for each scheme are outlined within this report – appendix 6.

These results and all other results can be explored further (including the effect of individual measures) through the attached excel spreadsheet. These results can be used in conjunction with other data sources to give evidence on the suitability and scope of refurbishment options for certain areas within Gwynedd. The underlying data could also be used further to analyse the impact of targeting particular house types within areas and identify dwelling types with the greatest potential. See appendix 5 for guidance on using the model and its data.

Comparison of Schemes for LSOAs

(See Page 20)

Figure 20 gives a comparison of schemes in terms of the potential improvements and associated costs per LSOA. It can be seen that the CSCO scheme, which concentrates on improving the fabric of properties, is the cheapest option for most LSOAs with moderate impact on energy consumption and efficiency. ARBED and 2050 both have deep savings but at a much larger cost.

Summary of Scheme Results and Rankings (See Pages 21 to 24)

Tables 7-10 on pages 21 – 24 show a breakdown of results for the 4 schemes per LSOA. The average consumption reduction per suitable property is used as the main variable for ranking LSOAs (the ranked order can be seen in the second column of each table). LSOAs could also be ranked in terms of total consumption reduction, cost associated variables or the average SAP rating improvement.

Results for Areas with the Greatest Potential (See Page 25 and Appendix 5)

On page 25 the 9 top ranking areas and the 3 specified areas (CSCO) are described. Detailed results for the 12 areas can be seen in appendix 5. For each area, a summary of the characteristics of dwellings and key information about the area is given. This is followed by a detailed breakdown of possible improvements and the associated costs.

Comparison of Schemes for LSOAs

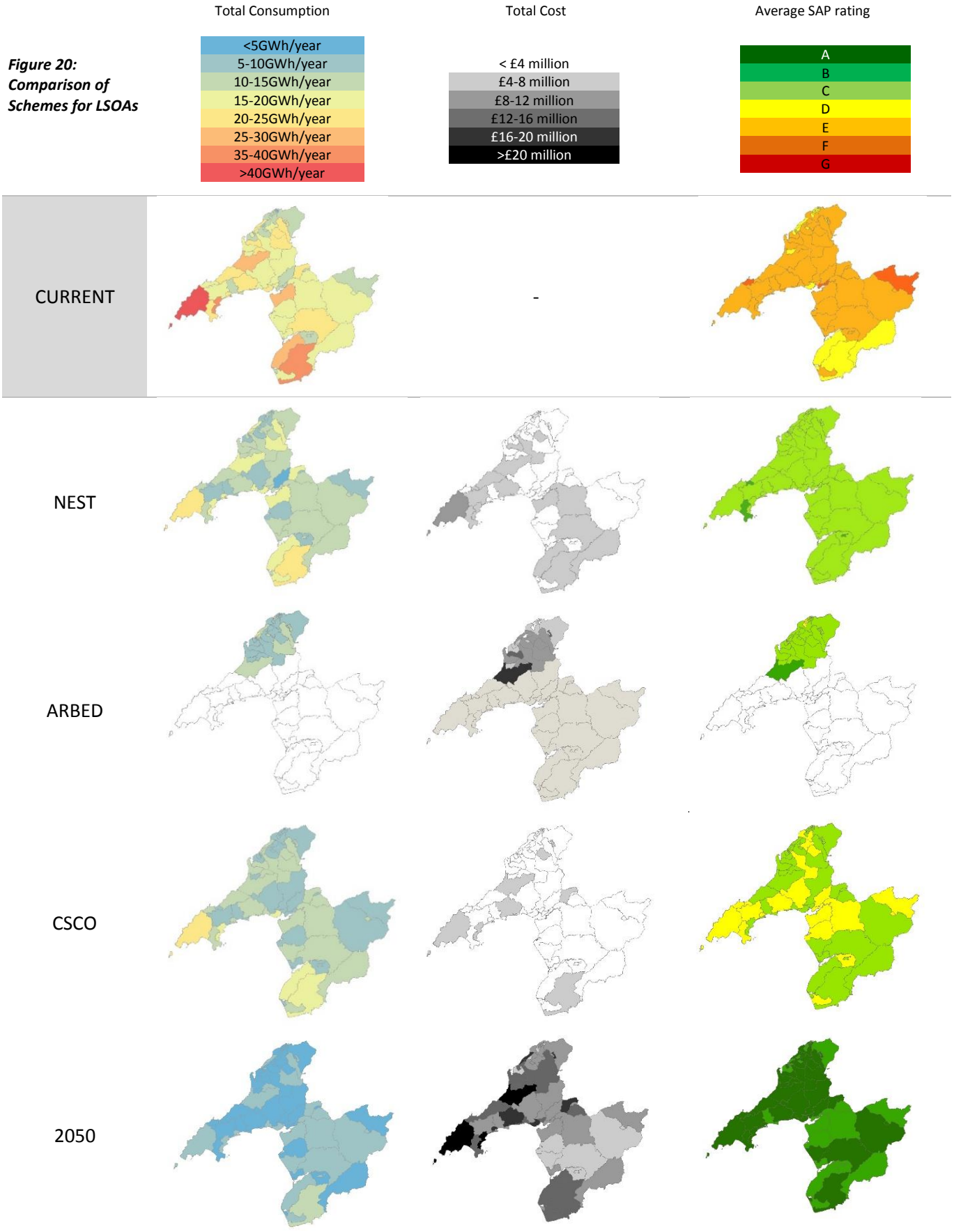


Figure 20: Comparison of Schemes for LSOAs

Summary of Scheme Results and Rankings

Table 7: NEST Results

NEST	Ranking	Area Suitable	Total Number of Properties	Number of suitable properties	Current Consumption (GWh)	Potential Consumption (GWh)	Consumption Reduction (GWh)	Average consumption reduction per suitable property (kWh)	Total Cost (£)	Average Cost per suitable porperty (£)	Cost/ kWh reduction (£/kWh)	Current average SAP	Potential average SAP	Average SAP improvement
001A	67	YES	679	50	9.5	8.7	0.8	15,961	£483,115	£9,662	£0.61	62	66	4
001B	45	YES	402	58	8.7	7.6	1.1	18,722	£658,200	£11,348	£0.61	54	61	8
001C	54	YES	556	55	10.0	9.0	1.0	17,676	£559,035	£10,164	£0.58	57	63	5
001D	70	YES	527	23	7.8	7.5	0.3	14,159	£224,805	£9,774	£0.69	65	67	3
001E	65	YES	627	100	11.2	9.5	1.6	16,429	£1,182,860	£11,829	£0.72	55	64	9
002A	41	YES	733	50	14.0	13.1	1.0	19,380	£492,010	£9,840	£0.51	61	64	3
002B	19	YES	673	57	14.0	12.8	1.2	21,779	£491,640	£8,625	£0.40	58	62	4
002C	52	YES	610	60	11.5	10.4	1.1	17,816	£634,535	£10,576	£0.59	56	62	5
002D	72	YES	537	7	8.0	8.0	0.1	10,873	£64,225	£9,175	£0.84	66	67	1
002E	14	YES	514	60	10.2	8.9	1.3	22,211	£547,675	£9,128	£0.41	59	64	5
003A	24	YES	600	164	14.1	10.6	3.5	21,356	£1,785,355	£10,886	£0.51	50	63	13
003B	57	YES	1101	230	21.8	17.9	4.0	17,230	£2,647,050	£11,509	£0.67	50	62	12
003C	35	YES	540	56	10.4	9.2	1.1	19,957	£617,000	£11,018	£0.55	58	63	5
003D	66	YES	591	83	10.0	8.7	1.4	16,315	£895,185	£10,785	£0.66	58	66	8
003E	23	YES	978	372	23.6	15.6	8.0	21,497	£3,895,200	£10,471	£0.49	45	65	20
004A	39	YES	476	65	9.8	8.5	1.3	19,606	£603,965	£9,292	£0.47	54	62	8
004B	10	YES	538	238	13.9	8.5	5.4	22,646	£2,813,580	£11,822	£0.52	41	65	24
004C	29	YES	766	99	14.8	12.7	2.1	20,763	£1,015,145	£10,254	£0.49	56	63	7
004D	68	YES	1194	203	21.6	18.6	3.0	14,990	£2,236,030	£11,015	£0.73	55	64	9
005A	6	YES	897	416	22.6	13.0	9.6	23,118	£4,528,840	£10,887	£0.47	41	66	25
005B	20	YES	1013	194	20.4	16.2	4.2	21,749	£2,128,135	£10,970	£0.50	54	64	10
005C	25	YES	745	299	16.8	10.5	6.3	21,187	£3,054,255	£10,215	£0.48	44	67	22
005D	18	YES	607	239	14.1	8.9	5.2	21,836	£2,600,325	£10,880	£0.50	46	67	21
006A	60	YES	1000	74	15.6	14.3	1.3	17,114	£805,275	£10,882	£0.64	59	63	4
006B	15	YES	1152	153	22.8	19.4	3.4	22,167	£1,733,890	£11,333	£0.51	57	64	7
006C	50	YES	988	69	17.5	16.3	1.2	18,082	£629,275	£9,120	£0.50	61	65	4
006D	73	YES	610	4	9.6	9.6	0.0	10,361	£36,700	£9,175	£0.89	65	65	0
007A	1	YES	508	138	11.3	7.9	3.4	24,678	£1,428,490	£10,351	£0.42	51	66	14
007B	16	YES	870	384	21.2	12.7	8.5	22,080	£4,261,260	£11,097	£0.50	43	66	23
007C	46	YES	846	126	15.7	13.4	2.3	18,637	£1,371,810	£10,887	£0.58	55	63	8
007D	31	YES	824	380	19.5	11.8	7.8	20,405	£4,141,350	£10,898	£0.53	43	67	24
008A	8	YES	819	256	18.3	12.5	5.8	22,753	£2,949,525	£11,522	£0.51	48	65	17
008B	17	YES	1169	499	27.3	16.4	10.9	21,874	£6,212,435	£12,450	£0.57	43	66	22
008C	48	YES	868	168	15.7	12.6	3.1	18,304	£1,956,335	£11,645	£0.64	56	67	11
008D	34	YES	946	330	20.0	13.4	6.7	20,184	£3,678,550	£11,147	£0.55	48	67	19
009A	32	YES	1056	317	21.7	15.3	6.4	20,334	£3,866,800	£12,198	£0.60	48	65	18
009B	64	YES	669	179	12.5	9.6	3.0	16,494	£1,956,245	£10,929	£0.66	50	65	15
009C	55	YES	985	292	19.9	14.8	5.1	17,468	£3,172,278	£10,864	£0.62	48	65	17
009D	27	YES	830	387	19.4	11.3	8.1	21,000	£4,174,128	£10,786	£0.51	41	67	26
010A	4	YES	603	278	15.4	8.8	6.6	23,791	£3,621,880	£13,028	£0.55	40	66	25
010B	13	YES	522	173	11.3	7.5	3.9	22,273	£2,263,755	£13,085	£0.59	40	66	25
010C	58	YES	860	113	15.2	13.3	1.9	17,228	£1,282,700	£11,351	£0.66	47	67	20
010D	61	YES	1244	297	24.4	19.4	5.0	16,684	£2,993,955	£10,081	£0.60	57	65	8
010E	30	YES	811	306	16.4	10.1	6.3	20,600	£3,296,998	£10,775	£0.52	50	64	14
011A	5	YES	627	201	14.0	9.2	4.8	23,790	£2,538,105	£12,627	£0.53	48	68	20
011B	49	YES	996	229	19.7	15.5	4.1	18,091	£2,518,985	£11,000	£0.61	46	63	17
011C	12	YES	868	427	20.9	11.4	9.5	22,319	£4,961,665	£11,620	£0.52	53	66	13
011D	7	YES	946	491	24.2	12.8	11.3	23,054	£6,416,685	£13,069	£0.57	39	66	27
012A	11	YES	621	349	16.6	8.8	7.9	22,579	£4,191,260	£12,009	£0.53	40	67	28
012B	36	YES	841	362	18.7	11.5	7.1	19,738	£3,921,320	£10,832	£0.55	37	67	30
012C	37	YES	757	379	17.3	9.8	7.5	19,736	£4,328,085	£11,420	£0.58	45	69	24
012D	59	YES	1166	239	20.7	16.6	4.1	17,189	£2,758,370	£11,541	£0.67	40	68	28
012E	71	YES	964	185	18.0	15.6	2.3	12,642	£1,833,110	£9,909	£0.78	54	66	12
013A	42	YES	855	353	18.0	11.2	6.8	19,210	£3,236,477	£9,168	£0.48	54	66	12
013B	47	YES	1259	478	25.1	16.4	8.8	18,326	£4,699,011	£9,831	£0.54	45	68	23
013C	43	YES	651	350	15.2	8.6	6.6	18,898	£3,684,104	£10,526	£0.56	45	66	21
013D	9	YES	718	140	13.6	10.4	3.2	22,678	£1,714,105	£12,244	£0.54	37	68	31
014C	44	YES	1489	732	33.1	19.4	13.7	18,730	£6,949,695	£9,494	£0.51	53	65	12
014D	40	YES	835	449	20.7	11.9	8.8	19,577	£4,722,050	£10,517	£0.54	42	69	27
014E	21	YES	1537	830	38.9	20.9	18.0	21,656	£10,553,885	£12,716	£0.59	40	67	27
015A	38	YES	1008	198	18.2	14.3	3.9	19,633	£1,944,339	£9,820	£0.50	40	68	29
015B	26	YES	787	424	19.5	10.5	9.0	21,179	£4,629,082	£10,918	£0.52	55	66	12
015C	33	YES	523	235	12.9	8.1	4.8	20,225	£2,673,840	£11,378	£0.56	38	67	29
015D	3	YES	697	326	17.9	10.2	7.8	23,905	£3,464,642	£10,628	£0.44	43	65	21
016A	22	YES	718	182	15.4	11.5	3.9	21,648	£1,849,105	£10,160	£0.47	42	66	24
016B	53	YES	715	184	13.5	10.3	3.3	17,793	£2,012,785	£10,939	£0.61	52	65	13
016C	2	YES	799	378	20.6	11.4	9.3	24,482	£4,154,772	£10,991	£0.45	51	66	14
016D	56	YES	724	288	14.4	9.5	5.0	17,295	£3,109,843	£10,798	£0.62	41	67	25
016E	51	YES	762	153	13.2	10.4	2.7	17,906	£1,670,092	£10,916	£0.61	47	69	22
017C	28	YES	1297	606	29.5	16.9	12.6	20,822	£6,066,031	£10,010	£0.48	56	68	12
017D	69	YES	1037	130	17.1	15.2	1.9	14,542	£1,196,770	£9,206	£0.63	40	66	27
017E	62	YES	817	159	14.0	11.3	2.6	16,618	£1,529,490	£9,619	£0.58	57	65	8
017F	63	YES	1652	569	31.6	22.2	9.4	16,555	£5,864,786	£10,307	£0.62	55	66	11

Table 8: ARBED Results

ARBED	Ranking	Area Suitable	Total Number of Properties	Number of suitable properties	Current Consumption (GWh)	Potential Consumption (GWh)	Consumption Reduction (GWh)	Average consumption reduction per suitable property (kWh)	Total Cost (£)	Average Cost per suitable porperty (£)	Cost/ kWh reduction (£/kWh)	Current average SAP	Potential average SAP	Average SAP improvement
001A	34	YES	679	448	9.5	6.1	3.4	7,616	£4,814,460	£10,747	£1.41	62	78	16
001B	18	YES	402	283	8.7	5.4	3.3	11,611	£3,988,095	£14,092	£1.21	54	75	21
001C	30	YES	556	399	10.0	6.2	3.8	9,447	£4,880,210	£12,231	£1.29	57	77	20
001D	35	YES	527	121	7.8	7.0	0.9	7,224	£1,533,360	£12,672	£1.75	65	72	8
001E	31	YES	627	528	11.2	6.2	5.0	9,389	£6,388,425	£12,099	£1.29	55	80	25
002A	19	YES	733	186	14.0	11.9	2.1	11,352	£2,388,095	£12,839	£1.13	61	68	8
002B	8	YES	673	150	14.0	11.7	2.3	15,576	£2,281,660	£15,211	£0.98	58	66	8
002C	25	YES	610	389	11.5	7.5	4.0	10,219	£5,411,525	£13,911	£1.36	56	75	19
002D	29	YES	537	42	8.0	7.6	0.4	9,786	£627,955	£14,951	£1.53	66	69	3
002E	9	YES	514	123	10.2	8.3	1.9	15,497	£1,986,190	£16,148	£1.04	59	67	9
003A	13	YES	600	435	14.1	7.9	6.2	14,172	£6,473,905	£14,883	£1.05	50	75	25
003B	16	YES	1101	844	21.8	11.8	10.0	11,872	£12,605,335	£14,935	£1.26	50	79	28
003C	21	YES	540	280	10.4	7.3	3.1	10,961	£3,790,295	£13,537	£1.23	58	73	15
003D	33	YES	591	395	10.0	6.4	3.6	9,094	£4,345,955	£11,002	£1.21	58	77	19
003E	4	YES	978	735	23.6	11.6	12.0	16,340	£11,737,700	£15,970	£0.98	45	77	31
004A	17	YES	476	275	9.8	6.6	3.2	11,753	£3,946,535	£14,351	£1.22	54	73	19
004B	1	YES	538	465	13.9	5.6	8.3	17,815	£8,044,000	£17,299	£0.97	41	80	39
004C	20	YES	766	420	14.8	10.1	4.7	11,138	£5,827,355	£13,875	£1.25	56	73	18
004D	22	YES	1194	711	21.6	13.9	7.7	10,897	£10,592,190	£14,898	£1.37	55	77	22
005A	3	YES	897	760	22.6	9.5	13.1	17,260	£11,914,220	£15,677	£0.91	41	78	37
005B	15	YES	1013	637	20.4	12.2	8.2	12,845	£8,981,180	£14,099	£1.10	54	75	22
005C	12	YES	745	607	16.8	8.1	8.7	14,396	£9,050,345	£14,910	£1.04	44	76	32
005D	2	YES	607	419	14.1	6.9	7.3	17,377	£6,833,910	£16,310	£0.94	46	77	31
006A	32	YES	1000	531	15.6	10.7	4.8	9,120	£7,180,320	£13,522	£1.48	59	76	17
006B	28	YES	1152	774	22.8	15.0	7.7	10,011	£9,310,560	£12,029	£1.20	57	74	18
006C	26	YES	988	371	17.5	13.8	3.8	10,187	£4,922,675	£13,269	£1.30	61	71	11
006D	27	YES	610	43	9.6	9.2	0.4	10,062	£592,815	£13,786	£1.37	65	67	2
007A	10	YES	508	320	11.3	6.4	4.9	15,238	£4,614,240	£14,420	£0.95	51	73	22
007B	6	YES	870	784	21.2	8.7	12.5	15,901	£12,197,495	£15,558	£0.98	43	80	37
007C	24	YES	846	584	15.7	9.7	6.0	10,342	£7,486,510	£12,819	£1.24	55	75	21
007D	11	YES	824	734	19.5	8.4	11.2	15,197	£11,090,185	£15,109	£0.99	43	79	36
008A	5	YES	819	564	18.3	9.3	9.0	15,926	£8,641,540	£15,322	£0.96	48	76	29
008B	7	YES	1169	1098	27.3	10.0	17.3	15,750	£18,001,560	£16,395	£1.04	43	83	40
008C	23	YES	868	588	15.7	9.4	6.3	10,634	£7,726,540	£13,140	£1.24	56	77	22
008D	14	YES	946	827	20.0	9.2	10.9	13,165	£11,624,965	£14,057	£1.07	48	80	33
009A	-	NO	1056	873	21.7	9.4	12.3	14,094	£13,877,210	£15,896	£1.13	48	82	34
009B	-	NO	669	562	12.5	6.2	6.3	11,219	£7,816,395	£13,908	£1.24	50	81	31
009C	-	NO	985	793	19.9	10.4	9.6	12,070	£10,497,767	£13,238	£1.10	48	78	30
009D	-	NO	830	793	19.4	8.0	11.4	14,352	£6,853,523	£8,643	£0.60	41	75	34
010A	-	NO	603	549	15.4	5.1	10.3	18,734	£9,903,770	£18,040	£0.96	40	84	43
010B	-	NO	522	413	11.3	5.4	6.0	14,451	£6,423,525	£15,553	£1.08	40	84	43
010C	-	NO	860	495	15.2	10.1	5.2	10,406	£6,783,560	£13,704	£1.32	47	79	32
010D	-	NO	1244	926	24.4	14.6	9.8	10,581	£12,374,310	£13,363	£1.26	57	75	18
010E	-	NO	811	562	16.4	7.8	8.6	15,342	£7,674,862	£13,656	£0.89	50	76	26
011A	-	NO	627	514	14.0	5.1	8.9	17,254	£8,983,265	£17,477	£1.01	48	77	29
011B	-	NO	996	612	19.7	11.9	7.8	12,727	£8,793,355	£14,368	£1.13	46	82	36
011C	-	NO	868	805	20.9	7.3	13.6	16,923	£13,159,100	£16,347	£0.97	53	76	23
011D	-	NO	946	823	24.2	8.9	15.2	18,494	£14,252,305	£17,318	£0.94	39	82	42
012A	-	NO	621	577	16.6	5.5	11.1	19,297	£10,094,875	£17,495	£0.91	40	80	40
012B	-	NO	841	782	18.7	7.6	11.1	14,181	£11,898,905	£15,216	£1.07	37	82	45
012C	-	NO	757	701	17.3	6.9	10.4	14,827	£10,344,950	£14,757	£1.00	45	83	37
012D	-	NO	1166	840	20.7	12.0	8.7	10,384	£11,186,795	£13,318	£1.28	40	81	41
012E	-	NO	964	418	18.0	13.8	4.2	10,037	£5,531,175	£13,232	£1.32	54	78	25
013A	-	NO	855	733	18.0	9.6	8.4	11,399	£5,042,155	£6,879	£0.60	54	71	17
013B	-	NO	1259	1174	25.1	12.5	12.6	10,775	£9,286,036	£7,910	£0.73	45	71	26
013C	-	NO	651	623	15.2	6.2	9.0	14,438	£5,682,856	£9,122	£0.63	45	74	29
013D	-	NO	718	452	13.6	7.3	6.2	13,822	£7,168,740	£15,860	£1.15	37	75	37
014C	-	NO	1489	1303	33.1	14.6	18.5	14,214	£19,069,105	£14,635	£1.03	53	78	25
014D	-	NO	835	764	20.7	8.6	12.1	15,824	£12,127,955	£15,874	£1.00	42	79	37
014E	-	NO	1537	1480	38.9	13.8	25.1	16,987	£24,665,005	£16,666	£0.98	40	80	40
015A	-	NO	1008	607	18.2	12.3	5.9	9,781	£3,890,380	£6,409	£0.66	40	83	43
015B	-	NO	787	750	19.5	7.1	12.4	16,527	£9,899,071	£13,199	£0.80	55	71	16
015C	-	NO	523	513	12.9	5.1	7.8	15,129	£7,969,980	£15,536	£1.03	38	79	41
015D	-	NO	697	656	17.9	7.6	10.4	15,851	£5,515,343	£8,408	£0.53	43	82	38
016A	-	NO	718	423	15.4	8.8	6.6	15,658	£6,402,555	£15,136	£0.97	42	74	31
016B	-	NO	715	687	13.5	6.2	7.3	10,652	£8,271,515	£12,040	£1.13	52	74	22
016C	-	NO	799	732	20.6	8.7	12.0	16,328	£6,404,641	£8,750	£0.54	51	83	31
016D	-	NO	724	579	14.4	7.9	6.6	11,339	£4,515,718	£7,799	£0.69	41	73	32
016E	-	NO	762	463	13.2	8.6	4.5	9,757	£3,181,811	£6,872	£0.70	47	73	27
017C	-	NO	1297	1190	29.5	13.1	16.4	13,755	£10,152,737	£8,532	£0.62	56	73	17
017D	-	NO	1037	406	17.1	13.4	3.7	9,065	£4,900,215	£12,069	£1.33	40	73	33
017E	-	NO	817	405	14.0	9.4	4.6	11,255	£5,331,795	£13,165	£1.17	57	71	14
017F	-	NO	1652	1287	31.6	17.2	14.4	11,219	£10,426,629	£8,101	£0.72	55	73	18

Table 9: CSCO Results

CSCO	Ranking	Area Suitable	Total Number of Properties	Number of suitable properties	Current Consumption (GWh)	Potential Consumption (GWh)	Consumption Reduction (GWh)	Average consumption reduction per suitable property (kWh)	Total Cost (£)	Average Cost per suitable porperty (£)	Cost/ kWh reduction (£/kWh)	Current average SAP	Potential average SAP	Average SAP improvement
001A	70	YES	679	679	9.5	6.1	3.3	4,915	£1,437,075	£2,116	£0.43	62	75	12
001B	23	YES	402	402	8.7	4.8	3.9	9,622	£1,576,675	£3,922	£0.41	54	73	20
001C	57	YES	556	556	10.0	5.9	4.1	7,303	£1,675,985	£3,014	£0.41	57	74	16
001D	72	YES	527	527	7.8	5.3	2.5	4,716	£438,820	£833	£0.18	65	75	11
001E	55	YES	627	627	11.2	6.5	4.6	7,392	£2,203,870	£3,515	£0.48	55	73	18
002A	61	YES	733	733	14.0	8.8	5.2	7,084	£1,171,050	£1,598	£0.23	61	75	14
002B	43	YES	673	673	14.0	8.6	5.4	8,028	£1,123,190	£1,669	£0.21	58	73	15
002C	50	YES	610	610	11.5	6.8	4.7	7,748	£1,927,230	£3,159	£0.41	56	73	17
002D	71	YES	537	537	8.0	5.5	2.5	4,735	£399,765	£744	£0.16	66	76	10
002E	54	YES	514	514	10.2	6.4	3.8	7,431	£952,250	£1,853	£0.25	59	73	14
003A	17	YES	600	600	14.1	7.8	6.3	10,445	£2,516,615	£4,194	£0.40	50	72	22
003B	36	YES	1101	1101	21.8	12.4	9.5	8,601	£4,281,020	£3,888	£0.45	50	71	21
003C	45	YES	540	540	10.4	6.1	4.3	7,893	£1,542,225	£2,856	£0.36	58	74	17
003D	64	YES	591	591	10.0	6.0	4.0	6,786	£1,649,445	£2,791	£0.41	58	74	16
003E	15	YES	978	978	23.6	13.2	10.4	10,600	£3,689,655	£3,773	£0.36	45	69	24
004A	41	YES	476	476	9.8	5.9	3.9	8,152	£1,362,510	£2,862	£0.35	54	71	18
004B	2	YES	538	538	13.9	7.2	6.7	12,391	£2,953,185	£5,489	£0.44	41	69	28
004C	56	YES	766	766	14.8	9.2	5.6	7,350	£1,727,590	£2,255	£0.31	56	72	17
004D	60	YES	1194	1194	21.6	13.1	8.5	7,092	£3,170,395	£2,655	£0.37	55	72	18
005A	9	YES	897	897	22.6	12.4	10.2	11,358	£4,000,580	£4,460	£0.39	41	67	26
005B	38	YES	1013	1013	20.4	12.1	8.3	8,201	£3,134,750	£3,095	£0.38	54	72	18
005C	30	YES	745	745	16.8	10.0	6.8	9,172	£2,294,970	£3,080	£0.34	44	67	23
005D	21	YES	607	607	14.1	8.1	6.1	9,975	£2,145,820	£3,535	£0.35	46	68	22
006A	68	YES	1000	1000	15.6	10.1	5.4	5,438	£1,746,165	£1,746	£0.32	59	73	14
006B	47	YES	1152	1152	22.8	13.7	9.1	7,875	£3,525,565	£3,060	£0.39	57	73	16
006C	66	YES	988	988	17.5	11.1	6.4	6,520	£1,915,325	£1,939	£0.30	61	74	13
006D	73	YES	610	610	9.6	6.8	2.9	4,687	£506,800	£831	£0.18	65	75	10
007A	26	YES	508	508	11.3	6.5	4.8	9,443	£1,834,475	£3,611	£0.38	51	71	20
007B	14	YES	870	870	21.2	11.7	9.4	10,834	£3,432,735	£3,946	£0.36	43	69	26
007C	48	YES	846	846	15.7	9.1	6.6	7,849	£3,000,975	£3,547	£0.45	55	73	18
007D	16	YES	824	824	19.5	10.8	8.7	10,520	£3,378,670	£4,100	£0.39	43	68	25
008A	24	YES	819	819	18.3	10.4	7.9	9,611	£2,950,310	£3,602	£0.37	48	70	22
008B	12	YES	1169	1169	27.3	14.5	12.8	10,945	£5,643,670	£4,828	£0.44	43	70	27
008C	53	YES	868	868	15.7	9.2	6.5	7,472	£3,004,820	£3,462	£0.46	56	73	18
008D	27	YES	946	946	20.0	11.3	8.8	9,288	£3,696,255	£3,907	£0.42	48	70	23
009A	31	YES	1056	1056	21.7	12.1	9.6	9,083	£4,397,175	£4,164	£0.46	48	70	22
009B	39	YES	669	669	12.5	7.1	5.5	8,189	£2,657,285	£3,972	£0.49	50	71	21
009C	34	YES	985	985	19.9	11.4	8.6	8,687	£3,673,562	£3,730	£0.43	48	70	22
009D	19	YES	830	830	19.4	10.8	8.6	10,421	£2,903,405	£3,498	£0.34	41	67	26
010A	4	YES	603	603	15.4	8.3	7.2	11,873	£3,147,510	£5,220	£0.44	40	68	28
010B	33	YES	522	522	11.3	6.7	4.6	8,868	£1,843,555	£3,532	£0.40	40	68	28
010C	62	YES	860	860	15.2	9.3	5.9	6,916	£2,457,325	£2,857	£0.41	47	69	22
010D	52	YES	1244	1244	24.4	15.0	9.4	7,520	£3,189,515	£2,564	£0.34	57	73	16
010E	35	YES	811	811	16.4	9.4	7.0	8,611	£2,668,047	£3,290	£0.38	50	69	19
011A	25	YES	627	627	14.0	8.0	6.0	9,498	£2,310,085	£3,684	£0.39	48	69	22
011B	44	YES	996	996	19.7	11.8	7.9	7,912	£3,106,335	£3,119	£0.39	46	69	23
011C	11	YES	868	868	20.9	11.4	9.5	10,990	£3,874,585	£4,464	£0.41	53	72	19
011D	6	YES	946	946	24.2	13.0	11.2	11,810	£4,739,140	£5,010	£0.42	39	67	28
012A	1	YES	621	621	16.6	8.9	7.7	12,477	£3,060,725	£4,929	£0.40	40	67	28
012B	28	YES	841	841	18.7	10.9	7.7	9,203	£2,855,100	£3,395	£0.37	37	66	29
012C	20	YES	757	757	17.3	9.6	7.7	10,121	£2,926,860	£3,866	£0.38	45	68	23
012D	58	YES	1166	1166	20.7	12.4	8.3	7,158	£3,745,175	£3,212	£0.45	40	67	27
012E	59	YES	964	964	18.0	11.1	6.9	7,118	£2,160,890	£2,242	£0.31	54	72	18
013A	40	YES	855	855	18.0	11.0	7.0	8,177	£1,833,559	£2,145	£0.26	54	72	18
013B	42	YES	1259	1259	25.1	15.0	10.2	8,071	£3,015,415	£2,395	£0.30	45	66	21
013C	18	YES	651	651	15.2	8.4	6.8	10,430	£2,262,781	£3,476	£0.33	45	68	23
013D	51	YES	718	718	13.6	8.1	5.5	7,628	£2,127,850	£2,964	£0.39	37	66	28
014C	29	YES	1489	1489	33.1	19.4	13.7	9,185	£4,204,550	£2,824	£0.31	53	72	18
014D	13	YES	835	835	20.7	11.6	9.1	10,899	£3,087,195	£3,697	£0.34	42	66	24
014E	5	YES	1537	1537	38.9	20.7	18.2	11,837	£7,916,700	£5,151	£0.44	40	66	27
015A	63	YES	1008	1008	18.2	11.3	6.9	6,797	£2,002,215	£1,986	£0.29	40	68	29
015B	3	YES	787	787	19.5	10.0	9.4	11,963	£3,695,671	£4,696	£0.39	55	71	17
015C	10	YES	523	523	12.9	7.0	5.9	11,318	£2,368,400	£4,528	£0.40	38	68	30
015D	7	YES	697	697	17.9	9.8	8.2	11,695	£2,640,592	£3,789	£0.32	43	70	27
016A	32	YES	718	718	15.4	9.0	6.4	8,972	£2,291,900	£3,192	£0.36	42	69	26
016B	46	YES	715	715	13.5	7.9	5.6	7,892	£2,674,640	£3,741	£0.47	52	71	19
016C	8	YES	799	799	20.6	11.3	9.3	11,629	£2,867,327	£3,589	£0.31	51	72	20
016D	37	YES	724	724	14.4	8.4	6.1	8,414	£2,249,638	£3,107	£0.37	41	67	26
016E	65	YES	762	762	13.2	8.1	5.1	6,660	£1,698,566	£2,229	£0.33	47	69	23
017C	22	YES	1297	1297	29.5	17.0	12.5	9,676	£3,652,549	£2,816	£0.29	56	73	17
017D	69	YES	1037	1037	17.1	11.7	5.4	5,166	£1,201,930	£1,159	£0.22	40	65	26
017E	67	YES	817	817	14.0	8.9	5.1	6,250	£1,750,805	£2,143	£0.34	57	71	13
017F	49	YES	1652	1652	31.6	18.7	13.0	7,842	£4,429,838	£2,682	£0.34	55	71	15

Table 10: 2050 Results

2050	Ranking	Area Suitable	Total Number of Properties	Number of suitable properties	Current Consumption (GWh)	Potential Consumption (GWh)	Consumption Reduction (GWh)	Average consumption reduction per suitable property (kWh)	Total Cost (£)	Average Cost per suitable porperty (£)	Cost/ kWh reduction (£/kWh)	Current average SAP	Potential average SAP	Average SAP improvement
001A	70	YES	679	679	9.5	2.9	6.6	9,680	£9,623,615	£14,173	£1.46	62	94	31
001B	32	YES	402	402	8.7	2.5	6.2	15,417	£6,334,065	£15,756	£1.02	54	91	38
001C	56	YES	556	556	10.0	2.9	7.1	12,692	£8,159,575	£14,675	£1.16	57	92	35
001D	72	YES	527	527	7.8	2.9	5.0	9,418	£6,575,830	£12,478	£1.32	65	92	28
001E	60	YES	627	627	11.2	3.3	7.8	12,467	£9,776,180	£15,592	£1.25	55	92	37
002A	61	YES	733	733	14.0	4.9	9.1	12,381	£9,257,350	£12,629	£1.02	61	91	30
002B	41	YES	673	673	14.0	4.6	9.4	13,975	£8,782,530	£13,050	£0.93	58	90	32
002C	50	YES	610	610	11.5	3.4	8.1	13,203	£8,919,690	£14,622	£1.11	56	92	35
002D	73	YES	537	537	8.0	3.1	4.9	9,186	£6,242,465	£11,625	£1.27	66	92	26
002E	53	YES	514	514	10.2	3.5	6.7	13,077	£6,712,070	£13,059	£1.00	59	90	31
003A	25	YES	600	600	14.0	4.1	9.9	16,560	£9,294,245	£15,490	£0.94	50	91	41
003B	36	YES	1101	1101	21.8	6.0	15.8	14,390	£17,219,280	£15,640	£1.09	50	92	42
003C	51	YES	540	540	10.4	3.2	7.1	13,192	£7,648,625	£14,164	£1.07	58	91	34
003D	64	YES	591	591	10.0	3.0	7.0	11,848	£8,316,455	£14,072	£1.19	58	93	35
003E	15	YES	978	978	23.5	5.9	17.7	18,068	£15,631,605	£15,983	£0.88	45	92	46
004A	40	YES	476	476	9.8	3.1	6.7	14,067	£6,793,700	£14,272	£1.01	54	91	37
004B	4	YES	538	538	13.9	3.2	10.8	19,997	£9,610,695	£17,864	£0.89	41	92	51
004C	49	YES	766	766	14.8	4.6	10.2	13,314	£10,701,030	£13,970	£1.05	56	91	36
004D	57	YES	1194	1194	21.6	6.5	15.1	12,656	£17,728,515	£14,848	£1.17	55	93	38
005A	5	YES	897	897	22.6	4.8	17.7	19,756	£15,196,330	£16,941	£0.86	41	93	52
005B	38	YES	1013	1013	20.3	5.8	14.5	14,313	£14,956,050	£14,764	£1.03	54	92	38
005C	20	YES	745	745	16.8	3.9	12.9	17,321	£11,849,530	£15,905	£0.92	44	93	49
005D	19	YES	607	607	14.1	3.5	10.6	17,475	£9,496,960	£15,646	£0.90	46	92	46
006A	68	YES	1000	1000	15.5	4.7	10.8	10,827	£14,235,075	£14,235	£1.31	59	93	34
006B	47	YES	1152	1152	22.7	7.1	15.6	13,580	£16,835,205	£14,614	£1.08	57	91	34
006C	65	YES	988	988	17.5	6.0	11.6	11,733	£13,209,725	£13,370	£1.14	61	91	31
006D	71	YES	610	610	9.5	3.7	5.8	9,457	£7,093,420	£11,629	£1.23	65	91	26
007A	28	YES	508	508	11.3	3.1	8.2	16,211	£7,209,485	£14,192	£0.88	51	90	39
007B	12	YES	870	870	21.2	4.9	16.2	18,652	£14,356,785	£16,502	£0.88	43	93	49
007C	48	YES	846	846	15.7	4.5	11.3	13,318	£12,469,635	£14,740	£1.11	55	92	37
007D	16	YES	824	824	19.5	4.7	14.8	17,937	£13,309,190	£16,152	£0.90	43	92	49
008A	26	YES	819	819	18.3	4.8	13.5	16,521	£12,671,850	£15,472	£0.94	48	92	44
008B	14	YES	1169	1169	27.3	5.9	21.4	18,268	£20,713,120	£17,719	£0.97	44	93	50
008C	59	YES	868	868	15.6	4.7	10.9	12,592	£12,211,090	£14,068	£1.12	56	92	36
008D	30	YES	946	946	20.0	5.0	15.0	15,843	£14,672,065	£15,510	£0.98	48	92	45
009A	31	YES	1056	1056	21.7	5.1	16.7	15,768	£17,645,735	£16,710	£1.06	48	93	46
009B	42	YES	669	669	12.5	3.2	9.3	13,933	£10,374,215	£15,507	£1.11	50	93	43
009C	35	YES	985	985	19.9	5.7	14.2	14,405	£13,630,542	£13,838	£0.96	48	90	41
009D	22	YES	830	830	19.4	5.3	14.1	16,961	£8,402,753	£10,124	£0.60	41	84	43
010A	3	YES	603	603	15.4	3.3	12.1	20,033	£11,108,680	£18,422	£0.92	41	92	52
010B	29	YES	522	522	11.3	2.9	8.4	16,116	£8,316,115	£15,931	£0.99	41	92	52
010C	62	YES	860	860	15.2	4.7	10.5	12,191	£12,305,725	£14,309	£1.17	47	92	45
010D	39	YES	1244	1244	24.3	6.6	17.7	14,216	£19,086,615	£15,343	£1.08	57	92	35
010E	34	YES	811	811	16.4	4.4	12.0	14,842	£11,138,407	£13,734	£0.93	50	93	42
011A	18	YES	627	627	14.0	3.0	11.0	17,529	£10,837,555	£17,285	£0.99	48	90	43
011B	44	YES	996	996	19.6	5.8	13.7	13,797	£15,081,335	£15,142	£1.10	46	93	47
011C	7	YES	868	868	20.9	4.0	16.9	19,451	£15,601,655	£17,974	£0.92	53	92	39
011D	2	YES	946	946	24.2	4.9	19.2	20,315	£17,206,720	£18,189	£0.90	39	94	55
012A	1	YES	621	621	16.6	3.2	13.4	21,651	£11,594,325	£18,670	£0.86	40	92	53
012B	24	YES	841	841	18.7	4.7	13.9	16,583	£13,558,680	£16,122	£0.97	37	93	56
012C	17	YES	757	757	17.3	3.9	13.4	17,674	£12,721,200	£16,805	£0.95	45	92	47
012D	58	YES	1166	1166	20.7	5.9	14.7	12,641	£17,326,505	£14,860	£1.18	40	93	53
012E	55	YES	964	964	17.9	5.6	12.3	12,787	£13,666,640	£14,177	£1.11	54	93	39
013A	37	YES	855	855	18.0	5.7	12.3	14,351	£7,142,595	£8,354	£0.58	54	92	38
013B	45	YES	1259	1259	25.1	7.8	17.3	13,779	£11,735,151	£9,321	£0.68	45	83	38
013C	23	YES	651	651	15.2	4.3	10.9	16,753	£6,638,911	£10,198	£0.61	45	85	40
013D	43	YES	718	718	13.6	3.6	9.9	13,830	£10,840,680	£15,098	£1.09	37	84	47
014C	21	YES	1489	1489	33.1	7.8	25.3	17,017	£23,659,580	£15,890	£0.93	53	93	39
014D	9	YES	835	835	20.7	4.8	15.9	19,100	£14,176,735	£16,978	£0.89	42	93	51
014E	6	YES	1537	1537	38.9	8.5	30.3	19,739	£27,371,190	£17,808	£0.90	40	92	52
015A	66	YES	1008	1008	18.2	6.9	11.2	11,153	£7,123,395	£7,067	£0.63	40	92	52
015B	8	YES	787	787	19.5	4.3	15.1	19,199	£11,483,701	£14,592	£0.76	55	83	28
015C	10	YES	523	523	12.9	3.0	9.9	18,969	£9,038,080	£17,281	£0.91	38	90	52
015D	13	YES	697	697	17.9	5.1	12.8	18,381	£6,682,563	£9,588	£0.52	43	92	49
016A	33	YES	718	718	15.4	4.4	11.0	15,273	£10,669,580	£14,860	£0.97	42	83	41
016B	46	YES	715	715	13.5	3.8	9.8	13,659	£11,431,680	£15,988	£1.17	52	91	39
016C	11	YES	799	799	20.6	5.6	15.0	18,781	£7,914,366	£9,905	£0.53	51	93	41
016D	52	YES	724	724	14.4	4.9	9.5	13,114	£6,387,278	£8,822	£0.67	41	84	42
016E	69	YES	762	762	13.1	5.3	7.8	10,173	£5,454,596	£7,158	£0.70	47	83	36
017C	27	YES	1297	1297	29.5	8.1	21.4	16,494	£12,621,137	£9,731	£0.59	56	83	26
017D	67	YES	1037	1037	16.9	5.7	11.3	10,876	£13,792,910	£13,301	£1.22	40	84	45
017E	63	YES	817	817	13.9	4.2	9.7	11,871	£11,537,365	£14,122	£1.19	58	92	34
017F	54	YES	1652	1652	31.5	10.4	21.1	12,792	£14,399,114	£8,716	£0.68	55	93	37

Results for Areas with the Greatest Potential

Figure 21 and table 11 show the areas with the greatest average reduction in energy consumption per suitable property for NEST, ARBED and 2050. The 3 specified CSCO areas are also shown in table 11 and figure 21. Detailed results for these areas can be seen in appendix 6.

Figure 21: Areas with the greatest potential / specified areas

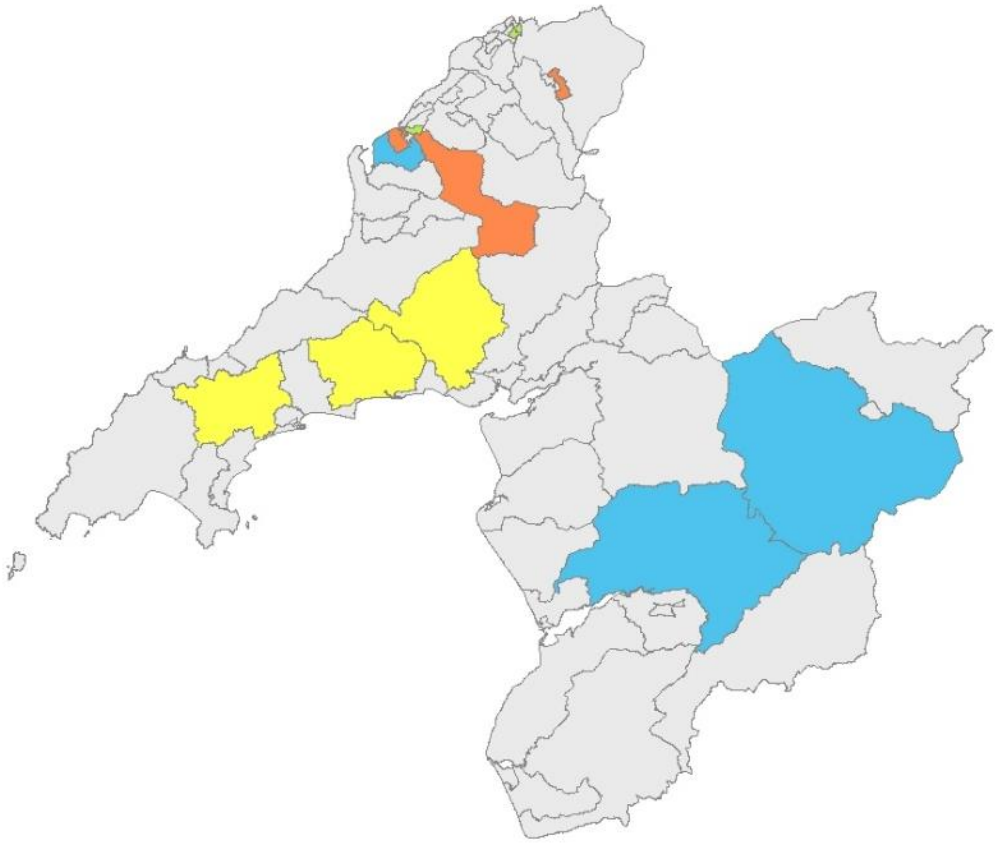


Table 11: Areas with the greatest potential / specified areas

	NEST	ARBED	CSCO Specified areas	2050
1st	007A: Bontnewydd	004B: Bethel a Cwm-y-Glo 2	006C: Cadnant (Gwynedd)	012A: Efail-newydd/Buan
2nd	016C: Brithdir and Llanfachreth / Ganllwyd / Llanelltyd	005D: Pentir 2	001D: Marchog 1	011D: Llanystumdwy
3rd	015D: Llandderfel a Llanuwchllyn 2	005A: Deiniolen	002D: Marchog 2	010A: Llanystumdwy

Detailed results for all areas can be viewed and compared in the attached spreadsheets and/or web page.

Discussion

Results for the 12 top ranking/specified areas draw attention to the complexity of decisions facing Local Authorities in improving the energy efficiency of dwellings. Although figures 22-24 have the same context, they expose different aspects of the relationship between the current state of the properties and the possible pathways to improvement. Analysing the relationships within the figures raises a few critical questions:

Figure 22: Potential Improvement and costs of top ranking LSOAs

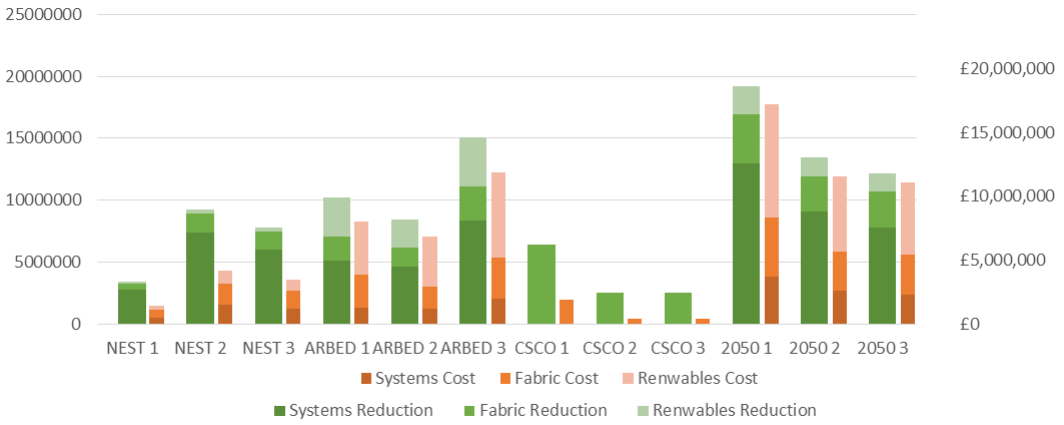


Figure 23: Average improvement and cost per suitable property for top ranking LSOAs

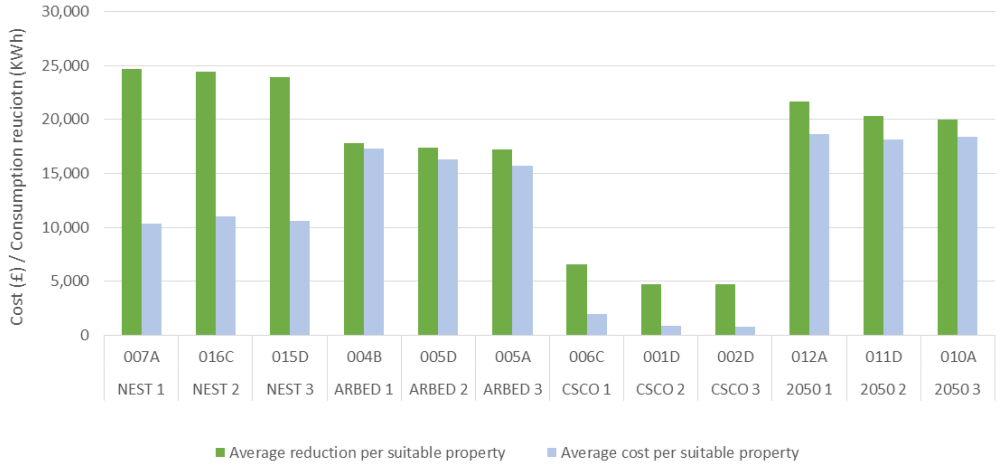
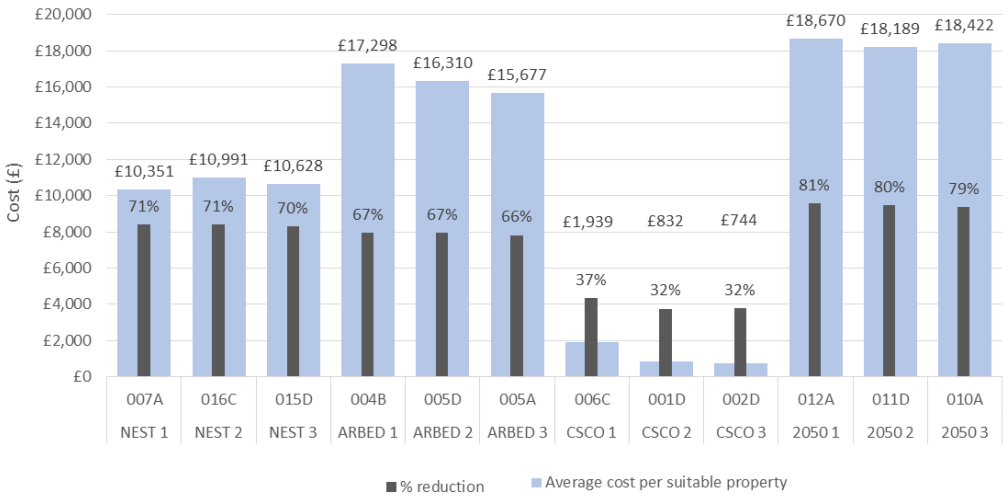


Figure 25: % reduction vs cost per suitable property for top ranking LSOAs



Systems, Fabrics or Renewables

Figure 22 shows that the reduction associated with improving heating systems generally results in significant consumption reduction at a comparatively low percentage of the overall cost. Fabric measures for CSCO areas seem to offer a better value for money than fabric measures for areas under other schemes. This suggests that the reduction/cost ratio for types of improvement is affected by the order of applying the measures as well as the type of improvement considered.

Figure 25 shows an example of the relationship between the consumption reduction / costs of measure types and the order in which they are applied. 2050 results for all areas were used to calculate the effect of systems first and fabric second while CSCO results for all areas were used to calculate the impact of fabric first (Both 2050 and CSCO assume that all fabric measures are applied when suitable). It is evident from figure 25 that the impact of fabric measures on consumption reduction for the same cost is significantly smaller (less than half) if dwellings are already more efficient from having newly installed heating systems.

It is also apparent from figure 25 that the consumption reduction/cost of installing efficient heating systems as the primary step is only slightly better than the ratio achieved if improving the fabric of dwellings first. Applying systems, fabric or renewables alone would only improve efficiency up to a certain point. Going beyond this requires a mixture of improvement types applied in combination or succession over a period of time but the order in which these are applied can be far more complex than just the installation cost and consumption reduction.

Figure 25: Order of measures

Cost or Efficiency

In an ideal world, dwellings' energy efficiency could be drastically improved for little or no money. In reality, notable improvements come at a notable monetary cost and saving. The relationship between the energy consumed and its cost is not included within this model but could be easily calculated from knowing the energy consumed per fuel type and projected future energy costs. This type of analysis and proof could provide a case for investing larger amounts of money in order to drastically reduce consumption and therefore minimise the effect of possible rise in future energy prices.

Whole areas or subsets

NEST concentrates on the least efficient dwellings within areas while other schemes aim to improve inefficient aspects of all dwellings. Comparing NEST and ARBED results in figure 23 (which have a similar range of measures), it is evident that targeting the worst rated properties only gives a much larger reduction in consumption per suitable property. Figure 24 proves that even though dwellings considered within the NEST scheme have a much higher current average consumption, the average % reduction for these properties are still slightly higher than achieved under the ARBED scheme. The cost per property might not be such a fair comparison; ARBED only considers installing heat pumps in off gas properties with inefficient heating systems while NEST has the option of upgrading oil systems at less than half the cost. Nevertheless, it is evident that if subsets of properties are targeted rather than whole areas, concentrating on the least efficient properties would most definitely have the greatest impact on overall consumption reduction.

Economics or Equality

In all 3 figures (22-24), the 3 CSCO areas are of noticeably lower cost and consumption reduction. Unlike the other 9 areas, these areas were chosen on the basis of deprivation, rather than because of substantial potential reduction in energy consumption. CSCO properties are mostly cavity walled and connected to the gas network therefore these properties' current energy consumption might already have relatively low consumption and therefore a lower potential for reduction. Figure 24 clearly shows that the cost per property of improving these properties would be also considerably less than in other areas. A reduction of 32-40% might seem small when comparing to the 66-81% seen in other chosen areas but its impact on householders might be much more significant than for example improving an F or G rated property in an affluent area to band A. Combining this model's result with work such as the Fuel Poverty in Gwynedd Report (Service 2013) would mean that decisions can be made combining both economic and social arguments.

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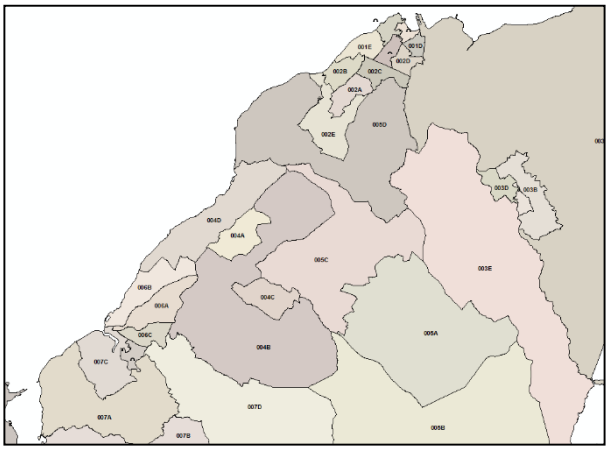
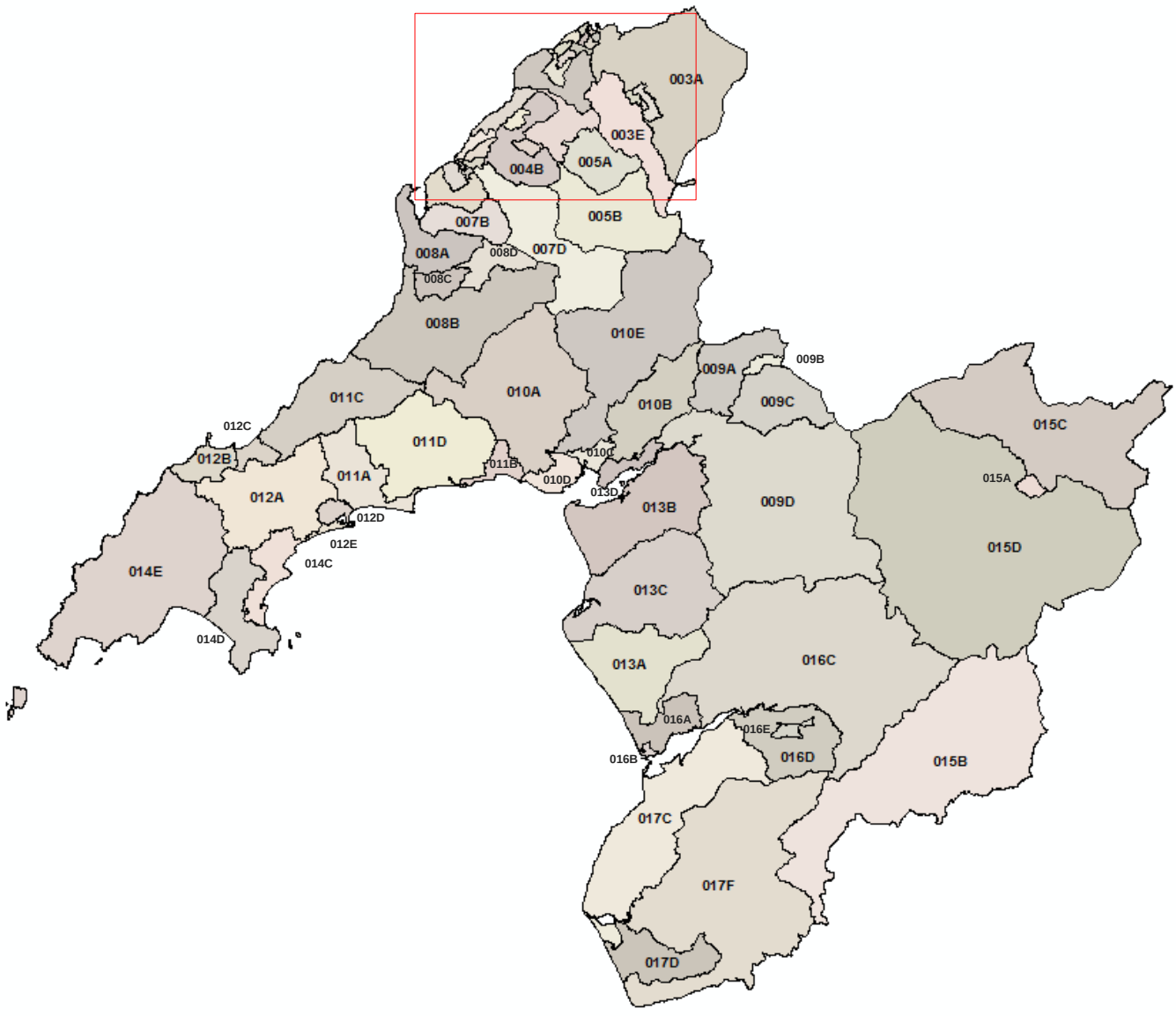
Appendices

Appendix 1: Description of Geographical Areas and Map of LSOAs

Level	Number in Gwynedd	Approx. Number of dwellings
SOA	1	60,000
MLSOAs	17	3,500
LSOAs	73	800
OAS	404	150
Postcodes	5,203	12
Residential Buildings	55,505	1-80
Addressed Residential Dwellings	61,525	1





Appendix 2: EPC Variables

Field	Feature	Type
LMK_KEY	General	Unique
ADDRESS1	General	Address
ADDRESS2	General	Address
ADDRESS3	General	Address
POSTCODE	General	Address
ENERGY_RATING_CURRENT	Performance	Interval / Ratio
ENERGY_RATING_POTENTIAL	Performance	Interval / Ratio
PROPERTY_TYPE	Built Form	Nominal
INSPECTION_DATE	General	Date
REGION	General	Address
LOCAL_AUTHORITY	General	Address
CONSTITIUENCY	General	Address
COUNTY	General	Address
LODGEMENT_DATE	General	Date
TRANSACTION_TYPE	General	Nominal
ENVIRONMENT_IMPACT_CURRENT	Performance	Interval / Ratio
ENVIRONMENT_IMPACT_POTENTIAL	Performance	Interval / Ratio
ENERGY_CONSUMPTION_CURRENT	Performance	Interval / Ratio
ENERGY_CONSUMPTION_POTENTIAL	Performance	Interval / Ratio
CO2_EMISSIONS_CURRENT	Performance	Interval / Ratio
CO2_EMISS_CURR_PER_FLOOR_AREA	Performance	Interval / Ratio
CO2_EMISSIONS_POTENTIAL	Performance	Interval / Ratio
LIGHTING_COST_CURRENT	Cost	Interval / Ratio
LIGHTING_COST_POTENTIAL	Cost	Interval / Ratio
HEATING_COST_CURRENT	Cost	Interval / Ratio
HEATING_COST_POTENTIAL	Cost	Interval / Ratio
HOT_WATER_COST_CURRENT	Cost	Interval / Ratio
HOT_WATER_COST_POTENTIAL	Cost	Interval / Ratio

Field	Feature	Type
TOTAL_FLOOR_AREA	Built Form	Interval / Ratio
ENERGY_TARIFF	System	Nominal
MAIN_GAS	System	Nominal
FLOOR_LEVEL	Built Form	Interval / Ratio
FLAT_STOREY_COUNT	Built Form	Interval / Ratio
FLAT_TOP_STOREY	Built Form	Nominal
BUILT_FORM	Built Form	Nominal
CONSERVATORY_TYPE	Built Form	Nominal
MULTI_GLAZE_PROPORTION	Fabric	Interval / Ratio
GLAZED_TYPE	Fabric	Nominal
EXTENSION_COUNT	Built Form	Interval / Ratio
GLAZED_AREA	Fabric	Ordinal
NUMBER_HABITABLE_ROOMS	Built Form	Interval / Ratio
NUMBER_HEATED_ROOMS	Built Form	Interval / Ratio
LOW_ENERGY_LIGHTING	Lighting	Interval / Ratio
NUMBER_OPEN_FIREPLACES	Built Form	Interval / Ratio
SCHEME	General	Nominal
LANGUAGE_CODE	General	Nominal
HOTWATER_DESCRIPTION	System	Nominal
HOT_WATER_ENERGY_EFF	System	Ordinal
HOT_WATER_ENV_EFF	System	Ordinal
FLOOR_DESCRIPTION	Fabric	Nominal
FLOOR_ENERGY_EFF	Fabric	Ordinal
FLOOR_ENV_EFF	Fabric	Ordinal
WINDOWS_DESCRIPTION	Fabric	Nominal
WINDOWS_ENERGY_EFF	Fabric	Ordinal
WINDOWS_ENV_EFF	Fabric	Ordinal
WALLS_DESCRIPTION	Fabric	Nominal

Field	Feature	Type
WALLS_ENERGY_EFF	Fabric	Ordinal
WALLS_ENV_EFF	Fabric	Ordinal
SECONDHEAT_DESCRIPTION	System	Nominal
SHEATING_ENERGY_EFF	System	Ordinal
SHEATING_ENV_EFF	System	Ordinal
ROOF_DESCRIPTION	Fabric	Nominal
ROOF_ENERGY_EFF	Fabric	Ordinal
ROOF_ENV_EFF	Fabric	Ordinal
MAINHEAT_DESCRIPTION	System	Nominal
MAINHEAT_ENERGY_EFF	System	Ordinal
MAINHEAT_ENV_EFF	System	Ordinal
MAINHEATCONT_DESCRIPTION	System	Nominal
MAINHEATC_ENERGY_EFF	System	Ordinal
MAINHEATC_ENV_EFF	System	Ordinal
LIGHTING_DESCRIPTION	Lighting	Interval / Ratio
LIGHTING_ENERGY_EFF	Lighting	Ordinal
LIGHTING_ENV_EFF	Lighting	Ordinal
MAIN_FUEL	System	Nominal
WIND_TURBINE_COUNT	Renwables	Interval / Ratio
HEAT_LOSS_CORRIDOOR	Other	Nominal
UNHEATED_CORRIDOR_LENGTH	Other	Interval / Ratio
FLOOR_HEAT_LOSS	Other	Nominal
PHOTO_SUPPLY	Renwables	Interval / Ratio
SOLAR_WATER_HEATING	Renwables	Nominal
MECHANICAL_VENTILATION	Other	Nominal

Appendix 3: Bitly Links for Clusters

BITLY LINKS		Detached				Semi D / End T				Mid T				Flat-Solid-Large			
		Solid		Cavity		Solid		Cavity		Solid		Cavity		Solid		Cavity	
		Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small
Gas / LPG	A B C	http://bit.ly/1cOOhLp	http://bit.ly/1beyOzE	http://bit.ly/1beBMUJ	http://bit.ly/1iCUEpu	http://bit.ly/1cCwuUf	http://bit.ly/1cCz4ts	http://bit.ly/1cCwaot	http://bit.ly/1cCxeIN	http://bit.ly/18AKUse	http://bit.ly/1cCuHOZ	http://bit.ly/18AKulr	http://bit.ly/18ALhTB	http://bit.ly/1beDy8w	http://bit.ly/lXQSb0	http://bit.ly/1beD4Pz	http://bit.ly/1beDXYA
	D E	http://bit.ly/1i44nEV	http://bit.ly/1i46it9	http://bit.ly/1cCA295	http://bit.ly/1i450Ox	http://bit.ly/1dpaY73	http://bit.ly/1a9URM4	http://bit.ly/1dp621P	http://bit.ly/1a9UAsB	http://bit.ly/1dp1etp	http://bit.ly/1dp48OK	http://bit.ly/1dp0mVR	http://bit.ly/1dp1RDm	http://bit.ly/1i48gJU	http://bit.ly/1i4cNfi	http://bit.ly/1i47rkc	http://bit.ly/1i4929Q
	F G	http://bit.ly/1cd3a6b	http://bit.ly/1cd3vpn	http://bit.ly/1cd32nk	http://bit.ly/1ay1IiJ	http://bit.ly/1cd5vy4	http://bit.ly/1aWUEZo	http://bit.ly/1aWTwF7	http://bit.ly/1hivFoo	http://bit.ly/1axRvmk	http://bit.ly/1aWVeGn	http://bit.ly/1hivd9u	http://bit.ly/1aWV563	http://bit.ly/1cd4Exc	http://bit.ly/1cd4WEl	http://bit.ly/1ay2wUw	http://bit.ly/1ay2Rqt
Oil	A B C	http://bit.ly/1beBPQH	http://bit.ly/1beC0LQ	http://bit.ly/1bs8bbu	http://bit.ly/1beBVrf	http://bit.ly/1cCwSC9	http://bit.ly/1cCz8td	http://bit.ly/1cCwfsm	http://bit.ly/1cCxqYB	http://bit.ly/18AL5nd	http://bit.ly/1cCuL1c	http://bit.ly/18AKH8n	http://bit.ly/18ALoyk	http://bit.ly/1beDOnS		http://bit.ly/1beDdTp	http://bit.ly/lXQqcM
	D E	http://bit.ly/1i44sIu	http://bit.ly/1i46nNn	http://bit.ly/1cCArrU	http://bit.ly/J2yLQz	http://bit.ly/1dpb5j0	http://bit.ly/1a9UWQ2	http://bit.ly/1jlV4BD	http://bit.ly/1a9UCRh	http://bit.ly/1dp1nx7	http://bit.ly/1a9TNrz	http://bit.ly/1dp0Gnm	http://bit.ly/1dp2bBX	http://bit.ly/1i48sJ2	http://bit.ly/1dp02Gn	http://bit.ly/1i47Mn6	
	F G	http://bit.ly/1a9VEN3	http://bit.ly/1bMQ2UL	http://bit.ly/1a9V9md	http://bit.ly/1a9VVzI	http://bit.ly/1d0unfT	http://bit.ly/1cGmXL9	http://bit.ly/1cGjJqW	http://bit.ly/1cGlGUx	http://bit.ly/1cG7haW	http://bit.ly/1cGclvG	http://bit.ly/1cG4GxJ		http://bit.ly/1a9XTA4		http://bit.ly/1a9Xs8X	
Solid	A B C	http://bit.ly/1beyrVV	http://bit.ly/1beySzB	http://bit.ly/1beynp5		http://bit.ly/1cCwXpx	http://bit.ly/1cCzhwB		http://bit.ly/1cCyzj1				http://bit.ly/18AM7Q8			http://bit.ly/1beDoOw	
	D E	http://bit.ly/1i44BvB	http://bit.ly/1i46wR1	http://bit.ly/1cCAALU	http://bit.ly/1ccUc8V	http://bit.ly/1dpb9PE	http://bit.ly/1a9V0PF	http://bit.ly/1ccUSew	http://bit.ly/1ccV0ux	http://bit.ly/1dp1uJ3	http://bit.ly/1aWWo4M	http://bit.ly/1aWWcCJ	http://bit.ly/1ccUFrO				http://bit.ly/1ccUj4x
	F G	http://bit.ly/1aWWTfd	http://bit.ly/1aWX2PR	http://bit.ly/1aWWF7N	http://bit.ly/1aWWXeN	http://bit.ly/1aWXQnE	http://bit.ly/1aWY4es	http://bit.ly/1aWXFZI	http://bit.ly/1aWXY6S	http://bit.ly/1cGu2LQ	http://bit.ly/1cGulGv	http://bit.ly/1cGtN3h	http://bit.ly/1cGuaLk	http://bit.ly/1ccWfd8		http://bit.ly/1cGtd5y	http://bit.ly/1aWXkpV
Electricity	A B C	http://bit.ly/1bMWACO	http://bit.ly/1beBYUd	http://bit.ly/1beBJZf	http://bit.ly/1beyxN4	http://bit.ly/1cCwpjj	http://bit.ly/1cCyJGZ	http://bit.ly/1cCw4x0	http://bit.ly/1cCx30h	http://bit.ly/18AKQbV	http://bit.ly/1cCuwTP	http://bit.ly/18AKnGF	http://bit.ly/18ALaHv	http://bit.ly/1beDqG3	http://bit.ly/1cYtIbK	http://bit.ly/1beD16t	http://bit.ly/1beDKoi
	D E	http://bit.ly/1dB81hM	http://bit.ly/1dB8jp4	http://bit.ly/1cCA4xq	http://bit.ly/1iTJQ3C	http://bit.ly/1jlVBUl	http://bit.ly/1a9UOQy	http://bit.ly/1iTLeTU	http://bit.ly/1iTLqTe	http://bit.ly/1iTKMoH	http://bit.ly/1dB4jVo	http://bit.ly/1dp0g0f	http://bit.ly/1iTKQVB	http://bit.ly/1iTKi1K	http://bit.ly/1i4bZXN	http://bit.ly/1iTK9eW	http://bit.ly/1iTKrCu
	F G	http://bit.ly/1a9Vk0Q	http://bit.ly/1iTN4Ek	http://bit.ly/1a9V6GZ	http://bit.ly/1axUB9N	http://bit.ly/1cGkald	http://bit.ly/1aRJWn5	http://bit.ly/1iTIJ3V	http://bit.ly/1aRJ3es	http://bit.ly/1cG5vqj	http://bit.ly/1cGbH1r	http://bit.ly/1cG4deM	http://bit.ly/1cGb9IQ	http://bit.ly/1a9XMEs	http://bit.ly/1cG3vhM	http://bit.ly/1a9Xgqa	http://bit.ly/1cG2whr
Biomass	A B C		http://bit.ly/1beyCQU														
	D E		http://bit.ly/1i465Gi														
	F G																

Appendix 4: Counts of Clusters per LSOA

COUNTS	010A	010B	010C	010D	010E	011A	011B	011C	011D	012A	012B	012C	012D	012E	013A	013B	013C	013D	014C	014D	014E	015A	015B	015C	015D	016A	016B	016C	016D	016E	017C	017D	017E	017F	001A	001B	001C	001D	001E	002A	002B	002C	002D	002E	003A	003B	003C	003D	003E	004A	004B	004C	004D	005A	005B	005C	005D	006A	006B	006C	006D	007A	007B	007C	007D	008A	008B	008C	008D	009A	009B	009C	009D
ABCDLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDLCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
ABCDLCG	6	13	0	22	0	0	60	0	0	0	0	0	7	5	0	0	0	6	4	0	0	12	4	0	0	0	0	5	4	40	0	23	10	12	0	0	1	3	6	23	4	0	0	35	5	0	4	0	5	7	6	12	9	0	11	0	0	4	15	0	12	0	0	0	0	9	0	9	0	5	0	5	0
ABCDLCO	6	6	0	9	4	0	0	5	14	0	4	14	0	0	8	26	0	0	4	0	6	0	0	5	11	4	0	15	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	4	0	0	0	8	4	0	0	0	0	0	9	0	5	9	5	0	4	0	0	5	5
ABCDLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDLSE	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	4	0	4	0	13	0	0	5	0	9	0	0	0	0	4	0	0	2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	0	0	0	5	0	0	0	0	0	0
ABCDLSG	6	6	0	0	0	0	4	5	0	0	0	7	4	3	0	0	0	0	0	5	0	12	0	0	5	4	33	0	4	15	0	0	0	2	0	0	0	1	0	11	4	0	0	0	5	10	4	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	5	19	0	0	13	8	0	0	10	0
ABCDLSO	6	6	0	4	12	11	0	0	7	0	0	0	0	0	12	11	0	6	4	5	0	0	7	5	38	0	0	5	0	0	11	0	0	7	0	0	0	0	3	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	17	0	0	4	5	4	0	5	0	10	10
ABCDLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDSCE	0	6	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	6	0	0	5	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
ABCDSCG	12	6	9	26	0	0	26	0	0	0	0	0	11	13	8	0	4	6	0	0	0	16	0	0	0	4	0	0	4	37	0	52	13	24	0	0	3	3	0	23	0	8	1	9	19	5	0	8	14	21	0	4	5	0	33	0	4	19	30	0	35	0	0	0	5	4	5	9	4	0	0	19	0
ABCDSCO	0	6	0	13	0	0	0	5	14	0	8	14	4	0	12	30	13	0	30	5	44	0	7	5	11	0	0	5	4	0	4	0	0	5	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	4	0	0	0	0	0	22	0	9	9	0	0	0	0	0	0	15
ABCDSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCDSSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
ABCDSSG	0	6	0	4	0	0	0	0	0	0	0	0	4	0	0	4	0	6	0	0	0	0	4	0	0	0	0	0	18	7	0	6	0	0	0	0	0	1	0	0	0	0	0	0	0	5	4	0	9	0	0	4	0	0	11	8	4	0	35	0	0	0	0	0	33	0	0	0	0	0	0	0	0
ABCDSSO	0	0	0	0	0	0	0	0	7	0	0	11	0	0	0	4	9	0	0	0	13	0	0	0	16	0	0	10	4	0	11	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	9	0	4	0	0	0	0	0	0	9	0	5	4	0	13	8	0	0	10	0
ABCDSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5
ABCFLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLCE	0	0	0	0	0	0	0	0	0	0	0	0	2	0	18	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	9	0	5	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	5	6	30	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLCG	0	2	18	20	3	25	15	0	0	3	9	0	47	43	0	0	0	0	0	4	0	15	0	2	0	52	9	0	15	4	0	15	6	15	7	14	30	72	5	5	7	15	1	97	0	0	23	0	0	1	3	3	29	0	23	0	0	35	25	25	25	34	3	11	4	0	0	15	0	3	22	0	0
ABCFLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	6	12	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
ABCFLSG	0	1	3	17	3	0	4	0	0	2	0	0	4	26	0	0	0	0	0	2	0	39	0	1	0	0	34	0	5	7	0	29	0	41	2	2	11	0	5	8	0	0	0	0	0	0	0	9	0	1	2	3	0	0	33	0	0	0	74	0	0	0	1	0	2	0	0	0	44	0	0	0	22
ABCFLSO	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSCE	0	1	12	7	23	0	0	18	11	2	0	0	37	0	0	13	0	0	0	2	0	15	0	1	6	0	16	0	0	33	0	0	6	0	42	2	14	28	62	0	0	15	1	0	0	0	0	0	0	1	2	0	0	0	0	9	0	5	6	25	0	0	2	0	2	0	0	0	0	15	0	0	0
ABCFSCG	0	3	91	14	109	18	15	0	11	5	0	0	41	31	0	0	0	44	0	6	0	20	0	3	0	21	0	0	45	9	0	12	15	21	123	9	22	31	24	3	59	35	2	0	0	0	4	3	0	2	5	0	18	0	38	0	29	66	22	13	5	6	4	50	6	3	0	6	0	60	22	8	0
ABCFSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	20	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSSE	0	0	0	0	0	0	8	0	0	1	0	0	0	0	0	0	0	0	0	1	0	7	0	0	0	0	0	0	0	4	0	0	0	0	56	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	5	0	3	9	0	0	0	0	7	1	0	0	0	0	0	3	0	0
ABCFSSG	0	1	0	14	3	0	4	0	0	2	0	0	15	28	0	0	0	0	0	2	0	20	0	1	0	0	25	0	0	2	0	6	0	21	22	5	14	0	29	5	0	0	0	0	0	0	0	52	0	1	2	0	7	0	0	0	0	3	34	0	0	0	1	18	2	6	13	21	0	0	9	0	22
ABCFSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCFSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMLCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0
ABCMLCG	3	4	14	5	10	0	4	0	0	0	0	0	16	25	0	0	0	8	4	0	0	0	0	0	0	26	0	0	4	22	0	7	11	4	11	5	4	57	0	53	23	6	27	3	0	0	12	3	12	8	0	12	57	0	8	0	23	13	9	53	13	0	0	8	0	9	0	3	6	23	0	13	0
ABCMLCO	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	3	0	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
ABCMLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMLSE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
ABCMLSG	0	4	14	5	0	0	8	0	0	0	0	0	10	5	0	0	0	12	11	0	0	11	0	0	0	0	4	0	0	0	0	14	0	12	6	9	2	0	1	0	0	3	0	0	0	8	0	3	6	3	0	4	6	0	12	0	0	0	6	0	0	0	0	8	0	0	20	23	13	20	5	13	0
ABCMLSO	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMSCE	0	0	0	0	3	0	0	4	0	0	0	0	7	0	19	10	0	0	4	5	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	3	0	16	3	0	4	0	0	34	0	4	0	0	0	0	0	0	4	0	0	0	0	0	0
ABCMSCG	0	4	33	9	23	0	35	2	4	0	0	0	10	15	0	0	0	28	0	0	0	5	0	0	0	0	0	0	0	38	0	39	33	4	13	5	2	10	4	11	12	9	80	3	11	38	12	47	6	8	0	24	29	8	0	0	0	7	22	30	31	0	0	15	0	9	4	31	9	8	5	4	0
ABCMSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	15	0	4	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
ABCMSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCMSSE	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	6	0	0	0	0
ABCMSSG	0	0	14	0	0	0	12	6	0	0	0	0	20	0	0	0	0	4	0	2	0	5	0	0	0	0	4	0	7	5	0	0	11	19	10	0	21	0	2	14	0	15	0	0	0	15	12	13	12	8	8	12	13	0	12	0	3	0	6	8	0	73	0	38	0	0	8	57	44	12	43	21	0
ABCMSSO	0	0	0	0	3	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
ABCMSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLCG	3	14	17	3	4	8	17	0	13	0	0	0	9	26	34	0	0	7	0	0	0	12	0	0	0	0	0	7	0	15	0	13	7	13	3	5	9	21	1	70	28	8	60	7	9	26	31	16	0	18	0	27	45	4	25	0	20	15	10	83	43	23	0	6	0	29	8	33	11	21	9	22	0
ABCSLCO	0	0	0	0	0	4	0	0	0	6	5	7	0	0	0	8	13	0	2	0	0	0	0	8	0	0	0	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	4	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	4
ABCSLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLSE	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSLSG	3	14	9	0	0	0	0	3	0	0	128	0	12	0	0	0	0	0	35	6	71	0	0	0	0	0	0	0	4	0	0	13	0	6	3	0	0	0	0	0	4	6	0	0	4	7	0	0	8	0	0	7	5	7	0	0	0	0	10	0	7	0	0	0	0	0	39	7	28	3	0	11	0
ABCSLSO	0	0	0	0	0	0	0	0	10	0	9	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
ABCSLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
ABCSSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSSCE	3	0	0	0	0	0	0	6	0	0	0	0	3	0	17	16	0	0	10	3	12	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7	0	7	0	11	0	0	0	0	0	0	0	0	3	0	0	7	0	0	0
ABCSSCG	3	14	46	3	20	8	42	0	0	0	0	0	35	0	0	0	0	51	0	0	0	57	0	0	0	44	0	0	13	35	0	36	119	10	5	3	13	17	1	35	24	17	124	21	21	48	51	36	21	5	0	24	45	4	33	0	10	57	0	87	117	11	0	18	0	29	5	81	18	10	0	40	0
ABCSSCO	0	0	0	0	0	0	0	3	0	0	0	7	0	0	0	4	6	0	0	0	0	4	0	16	3	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	23	0	0	0	5	0	0	0	0	0	4
ABCSSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ABCSSSE	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	4	0	0
ABCSSSG	0	0	3	0	4	0	0	9	0	0	0	0	26	0	0	0	0	0	10	0	0	16	0	0	0	0	0	0	9	20	0	0	0	3	2	0	2	0	0	0	0	6	0	0	0	11	0	16	0	0	6	17	3	0	0	0	0	4	0	4	4	0	3	0	23	7	5	7	14	3	4	4	0
ABCSSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	4	10	0	0	0	0	0	3	0	0	6	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	4
ABCSSSS	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

COUNTS	010A	010B	010C	010D	010E	011A	011B	011C	011D	012A	012B	012C	012D	012E	013A	013B	013C	013D	014C	014D	014E	015A	015B	015C	015D	016A	016B	016C	016D	016E	017C	017D	017E	017F
DEDLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDLCE	0	0	0	4	0	0	0	5	0	0	4	0	0	0	0	4	0	6	9	5	6	0	0	0	0	0	0	0	9	0	4	0	0	2
DEDLCG	12	6	3	35	4	0	43	5	7	5	4	7	29	33	0	0	4	11	9	16	19	23	4	5	0	4	3	5	9	4	11	72	13	17
DEDLCO	12	32	6	22	0	5	9	16	27	9	21	25	0	0	16	64	13	17	48	68	44	8	4	25	11	13	0	35	27	0	30	0	0	19
DEDLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
DEDLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDLSE	12	0	0	0	4	0	0	0	0	5	8	0	0	0	0	15	13	6	9	0	6	0	0	10	5	9	0	0	0	0	4	0	0	0
DEDLSG	29	0	0	9	4	5	17	5	0	5	0	0	4	0	0	4	13	11	0	5	6	0	0	0	5	13	9	5	0	4	0	3	3	10
DEDLSO	12	6	0	13	16	16	0	16	14	23	21	7	0	0	12	26	13	6	39	21	63	8	26	20	38	22	0	15	13	0	19	0	0	10
DEDLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
DEDSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDSCE	18	26	0	26	0	87	4	5	14	14	8	14	0	0	73	68	43	17	30	37	13	4	4	5	0	9	3	70	4	0	98	43	0	46
DEDSCG	12	19	41	78	19	33	69	11	20	5	4	4	39	46	20	19	4	0	26	11	13	66	11	0	5	4	3	10	0	33	8	208	19	75
DEDSCO	12	19	0	112	4	22	9	11	41	46	45	39	7	5	85	60	52	0	113	37	57	16	11	36	38	13	0	25	13	0	98	3	0	24
DEDSCS	0	0	0	4	0	5	0	0	0	0	0	0	0	0	0	0	4	0	0	5	6	0	0	0	0	0	0	0	0	0	4	0	0	14
DEDSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
DEDSSE	6	0	0	4	0	11	0	0	20	5	4	0	0	0	4	4	0	0	4	5	6	0	15	10	0	0	0	0	0	0	15	0	0	2
DEDSSG	12	0	6	4	0	0	4	0	7	0	4	0	25	3	4	0	13	6	4	16	13	0	0	5	0	9	6	5	0	7	0	0	0	2
DEDSSO	18	19	0	4	16	5	0	27	27	18	21	18	0	0	28	23	17	6	4	26	152	0	26	25	49	9	0	25	9	0	30	0	0	12
DEDSSS	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	13	0	11	10	0	0	0	0	0	0	0	0	0	0
DEFLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLCE	0	1	3	7	0	0	0	0	0	1	0	0	2	3	0	26	0	0	15	1	0	0	0	0	0	0	22	0	5	0	5	26	6	0
DEFLCG	0	1	0	14	3	0	0	0	0	1	0	0	6	9	0	0	0	0	0	1	0	2	0	0	24	26	3	0	0	0	0	6	6	21
DEFLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	15	0	0	5
DEFLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLSE	8	1	0	7	0	0	31	0	0	1	6	0	2	14	0	4	0	15	10	1	0	3	0	1	0	0	40	0	5	0	0	3	0	10
DEFLSG	0	2	9	27	0	0	34	0	0	3	3	0	32	37	0	0	0	0	5	3	0	5	0	1	0	47	106	0	10	4	0	3	25	26
DEFLSO	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	9	0	0	15	0	0	0	12	0	0	0	0	0	0	0	29	0	0	0
DEFLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCE	0	1	35	44	13	0	0	18	22	3	6	0	22	0	0	89	0	0	0	3	0	0	0	1	12	0	12	12	0	24	0	47	71	0
DEFSCG	0	0	0	0	5	0	0	0	11	1	0	0	2	3	0	0	0	15	0	1	0	10	0	0	0	26	3	0	0	2	0	0	0	10
DEFSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
DEFSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSSE	0	1	0	10	0	0	54	18	0	2	0	47	0	17	0	0	0	0	10	2	0	7	0	1	12	0	31	0	25	13	0	12	6	26
DEFSSG	0	1	6	14	0	0	0	0	0	2	0	0	37	6	0	0	0	0	0	2	0	17	0	1	0	16	40	0	0	11	0	12	9	15
DEFSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	5	0	0	0
DEFSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLCE	0	0	0	5	6	0	0	0	0	0	0	0	0	10	0	0	0	8	15	2	0	5	0	4	4	0	0	0	0	0	5	0	0	4
DEMLCG	0	0	24	0	3	0	4	0	0	0	3	0	13	51	0	3	0	24	8	0	0	16	0	0	0	34	0	0	0	16	0	28	22	16
DEMLCO	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	11	0	0	0	9	0	0	5	0	0	0
DEMLCS	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLSE	0	0	0	5	10	9	4	23	0	3	0	4	0	0	0	14	0	0	0	0	0	0	21	0	4	0	11	0	0	0	9	4	0	8
DEMLSG	0	9	128	109	13	0	88	0	0	0	3	0	85	66	0	0	0	32	0	0	0	47	8	0	0	17	44	0	22	27	0	0	56	43
DEMLSO	3	9	0	0	3	5	0	15	7	0	3	11	0	0	0	14	0	0	8	2	0	0	17	0	0	0	0	9	0	0	0	0	0	12
DEMLSS	0	0	0	0	0	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	4
DEMSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMSCE	0	0	0	43	0	0	0	6	4	0	6	0	7	0	0	31	0	8	45	2	0	11	0	0	0	0	0	0	0	0	19	18	6	12
DEMSCG	0	0	0	14	0	5	8	0	7	0	0	0	16	20	0	3	3	12	8	0	12	16	0	0	4	0	0	9	7	0	0	32	11	12
DEMSCO	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMSCS	0	0	0	0	0	0	0	4	0	0	0	0	3	0	0	3	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
DEMSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMSSE	20	9	5	0	23	14	0	49	4	12	12	8	10	0	0	24	3	0	11	5	0	11	34	4	4	0	0	9	7	5	24	0	0	62
DEMSSG	0	4	71	33	23	9	35	8	11	0	0	0	143	0	0	0	0	68	4	0	4	79	0	0	4	17	26	0	26	70	5	4	39	78
DEMSSO	0	4	0	0	0	5	0	11	4	0	6	8	0	0	0	0	10	0	0	0	0	0	17	0	19	0	0	0	0	0	0	0	0	4
DEMSSS	10	9	0	0	3	9	0	21	0	6	3	0	0	0	0	0	0	0	8	0	4	0	0	0	4	0	0	0	0	5	0	0	0	19
DESLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESLCE	0	3	9	0	0	27	6	6	6	6	9	7	0	0	8	4	0	11	5	6	0	4	0	0	3	3	0	7	0	0	10	3	4	0
DESLCG	0	0	37	16	4	8	8	0	13	13	5	0	15	150	0	0	0	25	5	0	0	33	0	0	0	13	0	7	13	15	3	20	36	19
DESLCO	10	3	0	3	0	0	6	6	0	13	18	28	0	0	8	16	0	0	12	0	15	4	0	4	3	3	0	7	4	0	14	0	0	10
DESLCS	0	0	0	0	4	0	0	0	0	6	5	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
DESLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESLSE	3	0	0	3	4	0	0	3	0	0	0	3	0	0	0	4	6	0	0	3	0	0	0	0	0	0	0	0	4	0	7	0	0	3
DESLSG	3	10	26	34	8	12	31	0	6	0	23	0	26	33	0	0	0	4	2	3	0	8	0	20	0	28	19	0	9	20	0	13	4	19
DESLSO	10	0	6	5	16	0	3	3	29	6	5	14	0	0	0	4	6	4	5	15	15	0	14	0	0	0	0	15	4	0	10	0	0	10
DESLSS	0	0	0	0	0	0	0	6	0	0	0	0	0	0	4	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
DESSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESSCE	21	0	0	16	20	16	3	9	13	19	14	14	9	0	8	60	13	15	35	12	6	12	9	8	0	9	4	7	4	0	93	13	14	25
DESSCG	3	10	26	16	8	8	22	6	10	6	5	17	12	46	8	0	0	29	10	0	0	86	0	0	0	25	0	4	18	25	14	49	61	57
DESSCO	10	0	0	0	0	0	0	22	10	0	9	10	0	0	21	8	13	0	30	12	6	4	0	0	10	0	0	4	0	0	3	0	0	6
DESSCS	0	3	0	0	0	4	0	0	0	0	0	0	0	0	4	8	0	0	0	0	3	0	0	4	0	0	0	4	0	0	0	0	0	0
DESSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESSSE	3	3	0	0	8	4	0	9	3	6	5	7	3	0	4	20	6	7	2	3	12	0	14	0	3	0	0	0	4	0	7	7	0	13
DESSSG	3	21	23	29	24	20	17	6	10	6	0	0	47	7	0	0	0	29	0	3	0	16	0	0	0	3	15	0	18	15	0	10	7	29
DESSSO	3	0	0	0	4	4	0	12	6	0	0	7	3	0	0	4	0	0	7	0	9	0	14	0	7	0	0	11	4	5	14	0	0	16
DESSSS	0	0	0	0	0	0	0	3	0	0	5	0	0	0	0	8	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	6

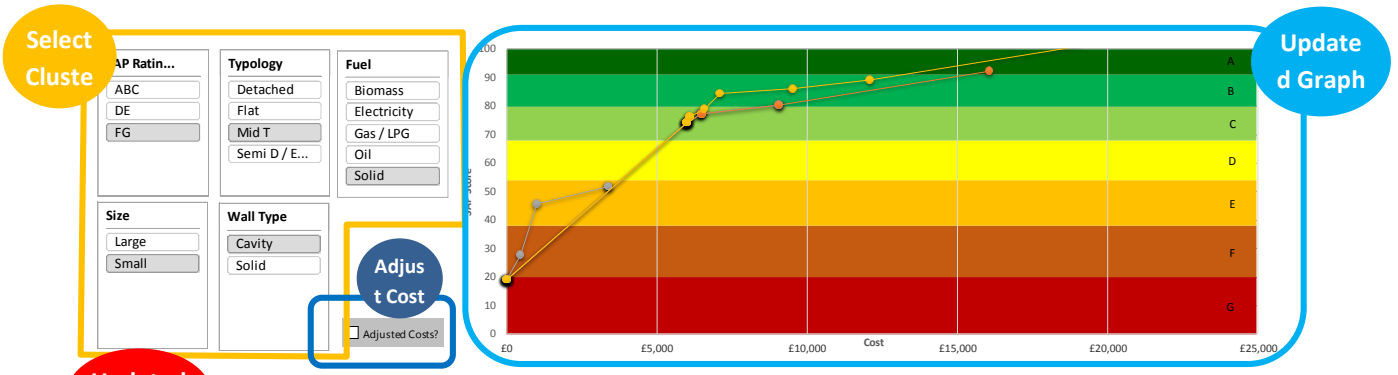
COUNTS	001A	001B	001C	001D	001E	002A	002B	002C	002D	002E	003A	003B	003C	003D	003E	004A	004B	004C	004D	005A	005B	005C	005D	006A	006B	006C	006D	007A	007B	007C	007D	008A	008B	008C	008D	009A	009B	009C	009D
DEDLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDLCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5
DEDLCG	0	11	1	8	22	25	36	0	0	43	5	24	8	24	37	21	6	28	56	0	33	4	7	19	60	9	30	19	4	0	5	9	10	0	0	0	3	0	0
DEDLCO	0	0	0	0	0	0	0	0	0	3	0	0	0	0	23	7	6	12	14	22	0	20	11	0	5	0	0	6	26	0	33	13	29	0	4	0	0	19	15
DEDLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDLSE	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
DEDLSG	1	11	0	1	18	0	4	0	0	12	24	14	4	0	9	14	6	12	19	0	0	0	4	0	25	3	6	0	9	5	5	0	5	13	12	10	3	14	10
DEDLSO	0	0	0	0	0	0	0	0	0	3	10	5	0	0	14	0	55	0	9	30	0	12	7	0	0	0	0	25	39	0	23	31	44	0	0	0	0	14	20
DEDLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDSCE	0	0	0	0	3	0	0	0	0	0	5	0	0	0	5	7	0	4	5	0	0	24	0	0	0	0	0	0	0	5	5	13	10	0	0	0	0	0	30
DEDSCG	2	11	0	11	0	14	49	8	1	58	29	29	8	8	32	35	12	106	37	0	44	20	18	53	60	6	53	25	13	18	0	66	10	17	4	10	0	14	5
DEDSCO	0	0	0	0	0	0	0	0	0	0	10	0	0	0	23	0	0	8	9	17	5	40	11	4	5	0	0	13	35	0	9	13	15	4	12	5	0	10	35
DEDSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
DEDSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEDSSE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	4	0	0	0	0	0	0	0	5	9	0	0	0	0	0	5	0
DEDSSG	1	5	1	1	9	3	9	4	0	3	24	24	12	8	5	21	6	16	5	13	5	0	14	11	0	6	0	13	0	0	0	4	10	4	8	10	10	0	5
DEDSSO	0	0	0	0	0	0	0	0	0	0	14	0	0	0	9	7	24	4	0	30	0	40	14	0	0	0	0	13	43	0	23	17	78	0	28	0	3	0	10
DEDSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	20	0	0	0	0	0	0
DEFLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLCE	0	0	3	16	5	0	0	0	0	0	0	0	0	0	0	0	1	0	43	0	0	0	0	8	3	10	0	0	1	0	1	0	0	0	0	0	0	0	0
DEFLCG	5	0	3	13	14	0	0	5	0	0	0	0	4	0	0	0	1	7	11	0	9	0	7	3	0	5	2	0	1	14	1	3	0	6	0	3	0	0	0
DEFLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFLSE	10	9	0	0	19	0	0	0	0	0	0	0	0	9	16	0	1	0	14	0	0	0	0	0	12	0	0	0	1	0	1	0	26	0	0	3	3	8	0
DEFLSG	15	0	19	0	53	0	0	0	1	0	15	33	0	11	0	1	3	14	11	0	23	0	7	5	31	18	0	0	2	4	3	0	0	3	0	6	9	0	0
DEFLSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
DEFLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCE	22	2	24	3	0	3	0	0	1	0	0	0	0	0	0	1	2	0	22	0	0	0	0	33	3	3	0	0	2	0	3	0	0	0	0	6	3	17	0
DEFSCG	7	5	8	0	5	3	0	0	0	0	0	0	0	3	16	0	1	0	14	0	0	0	0	3	12	8	0	0	1	28	1	3	0	0	0	6	0	8	0
DEFSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSCS	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	9	0	0	0
DEFSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEFSSE	25	12	8	0	0	0	0	0	0	0	0	0	23	26	0	1	2	0	0	0	0	0	0	15	22	0	0	0	1	14	2	0	13	6	0	0	3	0	0
DEFSSG	10	7	5	0	86	0	0	0	1	0	10	0	0	14	0	1	2	3	4	0	9	0	0	5	25	10	0	0	2	35	2	0	0	15	0	3	13	0	0
DEFSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0
DEFSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLCE	2	0	0	0	0	0	4	0	7	0	0	0	4	0	0	0	0	4	6	4	0	0	8	10	0	0	0	3	0	0	0	0	0	0	3	4	0	4	13
DEMLCG	6	5	14	63	1	25	19	21	33	6	0	4	24	0	12	5	4	12	41	8	24	4	8	7	13	38	6	6	7	8	4	5	8	14	0	8	14	4	4
DEMLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	5	0	0	0	0	3	4	0	0	9	8	0	9	0	5	0	13
DEMLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
DEMLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMLSE	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0	3	0	0	0	0	0	0	5	8	3	0	0	4	0	8	9
DEMLSG	39	76	95	0	53	25	4	55	0	0	11	38	20	37	12	8	0	32	86	12	61	0	0	34	91	128	0	3	0	96	0	9	0	62	38	110	43	93	0
DEMLSO	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	4	0	12	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	13
DEMLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0
DEMSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMSCE	16	0	10	5	1	4	0	3	7	0	0	4	0	3	6	5	0	16	32	8	12	0	3	37	3	0	0	3	7	4	4	0	24	0	0	12	5	0	0
DEMSCG	16	5	10	10	1	4	4	12	7	6	0	34	4	5	0	5	4	4	6	24	12	4	0	7	9	41	38	0	7	23	8	18	0	9	16	8	10	8	0
DEMSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	8	3	0	0	0	0	3	0	0	0	5	0	0	0	0	0	0	0
DEMSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
DEMSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMSSE	5	0	0	0	4	11	0	0	0	0	0	15	0	0	6	0	8	0	13	8	8	4	5	7	0	0	0	0	4	4	31	0	20	17	19	35	10	17	17
DEMSSG	63	19	52	0	40	14	0	103	0	15	11	137	51	37	18	20	8	16	60	24	113	15	0	67	104	19	0	3	0	142	11	14	48	97	53	82	110	105	0
DEMSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	4	0	3	8	4	0	3	0	0	0	0	0	19	0	4	0	8	0	6	0	0	0	13
DEMSSS	0	0	0	0	0	0	0	0	0	0	0	4	0	3	23	0	17	4	0	8	0	23	5	0	0	0	0	0	19	0	4	5	20	3	13	20	0	0	17
DESLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESLCE	0	0	0	0	0	0	0	0	4	0	4	0	0	7	4	5	0	3	3	0	0	11	3	8	5	0	0	6	13	0	0	0	3	0	0	14	0	7	8
DESLCG	17	36	26	47	4	175	175	40	69	64	21	19	28	23	17	42	10	40	48	7	16	4	17	50	66	79	57	17	7	36	4	7	0	10	11	0	0	7	0
DESLCO	0	0	0	0	0	0	0	0	0	0	9	4	0	0	0	5	0	3	3	4	0	0	10	0	0	0	0	0	10	0	19	4	5	0	0	3	0	0	4
DESLCS	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	0	4	0	4	7	0	0	0	4	0	0	0	0	0	3	0	4	3	0	0	0
DESLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESLSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	4	0	4	7	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	8
DESLSG	28	41	32	0	28	27	64	57	4	21	38	67	55	26	42	37	10	24	25	7	45	4	7	23	76	34	7	11	0	42	11	18	11	29	42	38	35	40	27
DESLSO	0	0	0	0	0	0	0	0	0	0	26	4	0	0	38	0	10	0	0	7	0	7	17	0	0	0	0	6	3	0	15	7	8	0	14	7	0	7	0
DESLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	11	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	3	0	4	0
DESSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESSCE	0	0	11	13	1	0	0	17	9	7	0	11	0	0	4	9	0	47	18	19	8	18	10	100	0	0	7	0	16	0	8	11	11	0	4	24	0	0	15
DESSCG	10	5	9	39	8	74	71	34	90	21	26	30	39	20	25	9	6	27	28	41	58	25	17	103	5	132	100	17	3	18	11	36	11	23	21	14	22	22	12
DESSCO	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	7	0	4	0	7	7	0	0	0	0	0	26	0	11	14	8	0	4	0	0	0	4
DESSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	7	0	0	0	0	0	0	0	0	0	0	3	0	4	0	0	0	8
DESSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DESSSE	0	0	0	0	0	0	0	3	0	0	0	0	0	7	4	0	6	0	10	4	0	4	0	0	0	0	0	0	13	0	11	0	8	0	7	0	0	0	15
DESSSG	18	18	17	0	9	12	8	45	0	14	21	193	43	23	25	51	13	30	40	19	70	4	0	23	45	8	4	28	7	33	4	40	13	33	39	56	57	43	0
DESSSO	0	0	0	0	0	0	0	0	0	0	4	0	0	0	21	0	6	3	5	7	4	7	7	0	0	0	0	0	13	3	15	4	13	0	7	10	0	4	8
DESSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	3	0	0	0	0	0	7	0	0	0	3	0	0	3	0	7	0

COUNTS	010A	010B	010C	010D	010E	011A	011B	011C	011D	012A	012B	012C	012D	012E	013A	013B	013C	013D	014C	014D	014E	015A	015B	015C	015D	016A	016B	016C	016D	016E	017C	017D	017E	017F
FGDLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDLCE	6	0	0	0	0	5	9	0	0	0	8	0	0	0	4	11	4	0	17	26	19	8	4	5	5	9	0	5	0	0	4	0	3	2
FGDLCG	0	0	0	13	8	0	9	5	7	0	8	11	0	0	8	26	0	0	22	21	0	0	4	0	0	4	3	10	0	0	11	0	0	2
FGDLCO	6	0	0	4	0	5	4	11	0	9	12	18	0	0	4	15	13	0	43	5	6	4	4	5	11	9	0	5	0	0	19	3	6	12
FGDLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	9	5	0	0	0	5	5	4	0	0	0	0	4	0	0	0
FGDLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDLSE	18	6	0	0	12	0	0	5	61	9	12	11	4	0	0	11	9	0	13	11	57	0	7	0	0	0	0	20	0	4	11	0	0	7
FGDLSG	18	19	0	9	8	5	17	22	7	23	8	0	7	0	12	8	13	6	22	11	32	8	0	0	22	17	6	5	36	7	8	0	3	22
FGDLSO	35	13	0	4	27	60	13	38	88	46	37	18	0	0	16	11	35	6	39	32	82	4	41	30	49	13	3	85	13	0	38	3	0	29
FGDLSS	6	6	0	0	0	5	0	5	14	5	0	7	4	0	4	4	0	6	4	0	19	0	7	0	5	4	0	10	0	4	15	0	0	2
FGDSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDSCE	6	6	0	26	4	11	13	0	14	28	33	7	4	0	69	11	26	6	43	58	44	4	4	0	0	4	0	20	4	0	53	35	6	94
FGDSCG	0	13	0	17	12	0	0	22	20	5	21	7	18	5	32	34	13	0	74	11	13	8	11	0	5	9	0	10	9	4	26	12	13	24
FGDSCO	0	0	0	4	4	5	9	5	14	5	21	21	4	3	12	19	13	6	56	32	13	0	7	5	5	4	0	10	4	4	23	0	0	5
FGDSCS	0	0	0	4	0	0	0	0	7	14	17	0	0	0	8	0	9	0	4	0	13	4	4	0	0	0	0	5	0	0	15	3	3	10
FGDSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDSSE	41	19	9	9	19	11	9	33	41	32	21	18	11	0	20	30	13	11	26	53	158	0	37	30	33	9	3	20	36	4	49	3	3	19
FGDSSG	12	0	6	4	31	5	9	16	27	14	12	7	4	0	20	4	9	0	22	21	38	4	11	20	16	4	0	15	4	4	4	0	0	7
FGDSSO	12	0	0	0	16	11	0	27	27	41	21	7	4	3	40	23	9	0	22	63	95	0	33	56	43	17	0	30	9	4	38	0	0	10
FGDSSS	24	13	0	4	19	5	0	16	27	18	8	4	0	0	0	11	9	0	0	16	76	0	7	10	33	0	0	25	0	0	30	0	0	0
FGFLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCE	0	0	0	17	0	0	0	0	0	0	6	0	0	0	0	9	0	0	25	0	0	0	0	0	0	5	0	0	0	2	5	6	0	0
FGFLCG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
FGFLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
FGFLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLSE	0	1	6	7	0	0	27	0	0	1	12	0	11	48	0	13	34	0	25	2	46	5	0	1	6	5	16	12	25	2	0	6	12	21
FGFLSG	0	0	0	3	3	0	0	0	0	0	3	0	0	0	0	0	0	0	10	0	0	2	0	0	0	16	12	0	0	0	0	3	0	0
FGFLSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	10	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
FGFLSS	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	24	0	0	0	0	0	0	0	0	0	0	0
FGFSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCE	0	0	0	31	0	0	0	0	0	1	0	7	2	0	0	38	0	0	20	1	0	0	0	0	0	0	0	0	0	0	5	18	9	5
FGFSCG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSE	8	1	3	3	5	0	27	0	0	1	9	7	6	51	0	0	34	0	30	2	0	2	12	1	0	5	37	0	30	7	10	0	6	10
FGFSSG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	3	0	0	0	0	0	0	0
FGFSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCE	3	0	0	0	6	0	0	0	0	0	0	4	0	5	0	7	0	8	4	2	0	5	4	0	0	0	0	0	0	0	5	0	0	8
FGMLCG	0	0	0	5	3	0	4	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCS	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5	0	0	0
FGMLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLSE	3	0	14	19	13	9	12	21	7	3	3	34	16	5	0	7	0	4	0	0	0	11	8	4	0	0	4	0	11	0	19	4	11	12
FGMLSG	3	0	14	9	0	5	15	0	0	0	0	19	3	5	10	3	0	0	0	2	0	21	4	0	0	0	22	0	7	0	9	0	0	4
FGMLSO	0	0	0	0	0	0	0	2	4	0	0	4	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0
FGMLSS	0	0	0	0	0	5	0	13	0	0	0	8	7	0	0	3	0	20	0	0	0	11	4	0	0	0	4	0	0	0	9	0	0	0
FGMSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSCE	0	0	0	14	0	0	0	6	0	3	0	0	0	10	0	3	0	0	11	7	4	16	0	4	0	0	0	0	4	0	0	0	0	8
FGMSCG	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	0	17	0
FGMSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSCS	0	0	5	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
FGMSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSSE	3	13	19	9	19	5	8	25	22	29	27	38	52	0	10	28	0	12	15	2	16	5	34	15	4	9	7	0	18	27	19	0	6	70
FGMSSG	0	0	0	9	6	0	0	6	4	0	3	0	16	0	0	3	0	8	0	0	0	16	4	0	4	0	0	0	11	5	0	0	17	4
FGMSSO	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSSS	3	17	5	0	13	9	4	11	4	0	0	4	7	0	19	7	3	12	4	0	0	5	21	4	8	0	0	0	7	0	0	0	0	23
FGSLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSLCE	0	0	0	3	4	4	0	3	6	0	0	0	3	0	0	12	0	0	17	0	6	4	0	0	0	3	0	0	0	0	10	7	0	3
FGSLCG	0	0	6	8	4	0	0	0	0	0	0	3	0	7	4	0	0	0	7	0	0	0	0	0	0	3	0	0	0	0	10	7	0	6
FGSLCO	0	0	0	0	0	4	3	3	0	0	0	0	0	0	4	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	3	0	0	0
FGSLCS	0	0	0	0	0	0	0	12	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
FGSLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSLSE	3	10	0	16	8	8	6	19	26	6	5	31	3	0	4	24	19	4	7	12	18	4	14	8	0	3	15	4	4	10	24	3	7	19
FGSLSG	3	0	9	13	4	0	8	0	10	13	5	3	12	13	0	4	6	0	10	3	6	8	12	12	7	0	30	11	13	15	7	7	22	6
FGSLSO	17	0	0	3	4	8	3	3	3	13	18	10	3	0	8	4	19	0	27	6	0	0	9	0	7	6	0	4	0	10	3	0	4	13
FGSLSS	3	0	0	3	4	0	0	6	3	6	0	3	0	0	4	0	0	0	0	6	0	0	3	0	3	3	0	7	0	0	3	0	0	0
FGSSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSCE	7	0	0	3	4	4	0	12	10	0	5	3	3	7	8	28	0	4	32	6	0	0	0	4	3	3	0	7	0	0	14	10	7	38
FGSSCG	0	0	0	0	4	0	3	12	0	0	0	7	0	13	8	0	0	0	5	0	0	4	3	0	3	0	4	0	0	0	14	0	0	3
FGSSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	7	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSCS	7	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4	0	4	7	0	0	0	3	0	3	0	0	4	0	0	3	0	0	6
FGSSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSSE	17	27	11	18	20	8	3	25	23	6	14	35	23	0	4	32	45	15	25	6	30	21	40	4	16	3	15	15	22	35	45	0	0	48
FGSSSG	7	3	6	3	8	0	11	19	6	6	0	10	3	0	8	0	0	0	2	15	18	4	9	0	13	0	0	7	13	0	0	0	4	3
FGSSSO	0	3	0	0	8	0	0	0	3	0	5	3	0	0	0	0	6	4	2	3	6	0	3	4	10	3	0	4	0	0	14	0	0	0
FGSSSS	7	3	0	0	0	4	3	19	6	6	5	10	9	0	13	20	0	4	0	3	12	8	20	4	7	0	0	15	4	5	7	0	0	10

COUNTS	001A	001B	001C	001D	001E	002A	002B	002C	002D	002E	003A	003B	003C	003D	003E	004A	004B	004C	004D	005A	005B	005C	005D	006A	006B	006C	006D	007A	007B	007C	007D	008A	008B	008C	008D	009A	009B	009C	009D
FGDLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDLCE	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0	0	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5	0	4	0	0	5	0
FGDLCG	0	0	0	0	0	0	0	0	0	9	5	0	8	0	14	0	12	4	0	9	5	12	4	0	10	0	0	6	22	0	9	4	10	4	0	0	0	5	0
FGDLCO	0	0	0	0	3	0	4	0	0	3	5	0	0	0	9	0	12	0	0	4	0	8	0	0	0	0	0	6	13	0	0	9	10	0	0	0	0	5	10
FGDLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDLSE	0	0	0	0	0	0	0	0	0	3	5	0	0	0	5	0	6	0	5	4	0	0	0	0	5	0	0	0	9	0	0	4	25	13	0	5	0	5	15
FGDLSG	2	0	0	0	9	3	0	4	0	0	19	10	8	8	9	0	12	4	9	22	5	8	22	0	10	0	0	6	13	5	19	26	20	9	12	15	0	5	25
FGDLSO	0	5	0	0	0	0	0	0	0	6	10	0	0	0	18	0	30	4	5	17	0	24	14	8	5	0	0	19	30	5	47	17	39	4	0	10	0	10	35
FGDLSS	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	4	0	5	4	20	0	0	10	0	0	0
FGDSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDSCE	0	0	0	0	0	0	4	0	0	0	0	0	0	0	5	0	0	4	0	0	0	8	0	0	0	0	0	6	4	0	14	4	10	17	8	0	0	14	10
FGDSCG	0	0	0	1	3	0	0	0	0	6	5	0	0	0	5	14	0	12	0	9	0	36	4	0	5	0	0	13	0	0	5	9	0	4	8	0	0	5	0
FGDSCO	0	0	0	0	0	0	4	0	0	0	0	0	0	0	14	14	0	4	5	17	0	4	0	0	0	0	0	0	17	0	9	13	5	0	4	0	0	0	0
FGDSCS	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	9	0	0	4	0	0	0	0	6	0	0	0	4	5	0	0	0	0	0	5
FGDSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGDSSE	0	0	0	0	3	0	4	0	0	0	5	5	0	0	14	0	6	4	0	17	5	28	14	0	5	0	0	0	35	0	14	13	74	0	24	15	3	24	5
FGDSSG	2	5	0	0	6	0	9	4	0	3	10	19	0	8	32	0	24	0	5	22	11	0	18	0	15	0	0	19	13	5	14	35	29	9	20	0	6	5	15
FGDSSO	0	0	0	0	0	3	4	0	0	3	14	0	0	0	14	0	12	0	9	30	16	8	11	0	0	0	0	6	26	0	51	0	34	9	20	0	0	5	10
FGDSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	7	24	0	0	26	5	12	11	0	0	0	0	0	26	0	5	9	5	0	24	5	0	0	25
FGFLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCE	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	22	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLSE	2	12	0	0	29	0	0	0	0	0	0	0	0	3	0	1	1	0	11	0	0	0	0	0	3	3	0	0	1	7	2	0	0	9	0	3	6	0	0
FGFLSG	0	0	0	0	0	0	0	0	0	0	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCE	2	2	0	0	0	0	0	5	0	0	0	0	0	11	0	0	1	0	14	0	0	0	0	3	0	0	0	0	1	0	1	0	13	0	0	0	0	0	0
FGFSCG	2	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
FGFSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSCS	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSE	2	5	3	0	5	0	0	0	0	0	0	33	0	6	0	1	1	0	4	0	0	5	0	8	0	0	0	0	1	11	2	0	0	0	0	12	3	17	0
FGFSSG	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGFSSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCE	0	0	0	0	0	4	0	0	7	0	0	0	0	0	6	0	0	0	3	0	4	0	5	3	3	0	0	0	0	0	0	0	0	0	6	8	0	8	9
FGMLCG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
FGMLCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
FGMLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMLSE	2	0	4	0	10	0	0	3	0	0	0	8	0	3	0	0	8	0	19	20	12	4	3	7	22	4	0	0	0	8	8	9	12	9	3	20	5	21	17
FGMLSG	2	2	2	0	3	0	0	9	0	0	0	0	0	3	12	0	4	8	3	8	4	4	0	7	9	8	0	0	0	15	0	0	0	6	3	16	10	4	4
FGMLSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	9
FGMLSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	4	0	16	8	0	0	0	9	4	0	6	0	0	0	0	8	6	6	0	0	0	0
FGMSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSCE	2	0	2	0	0	4	0	0	0	0	0	4	0	0	0	0	4	0	13	0	4	0	0	3	0	0	0	0	0	0	4	9	0	0	6	8	10	0	9
FGMSCG	2	0	2	0	0	0	0	0	0	3	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	8	0	0	0	0	4	0	8	0
FGMSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSCS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	0	3	4	0	4	0
FGMSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGMSSE	5	0	6	0	7	4	0	6	0	0	11	23	8	3	12	10	12	4	29	20	12	12	8	3	3	0	0	6	19	15	15	0	32	11	35	35	24	25	35
FGMSSG	0	0	4	0	2	0	0	9	0	0	0	4	0	3	0	3	4	0	3	28	12	0	15	0	3	4	0	0	0	12	4	5	8	6	6	31	24	13	4
FGMSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
FGMSSS	0	0	8	0	1	0	0	0	0	0	0	15	0	0	0	0	12	8	10	24	4	12	3	0	3	0	0	0	11	4	0	5	20	0	9	27	19	13	13
FGSLCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSLCE	0	0	0	0	0	8	4	0	0	7	4	0	4	0	0	0	0	3	5	4	0	7	3	0	0	11	0	0	7	0	0	0	8	3	4	0	0	0	4
FGSLCG	2	0	0	0	0	0	12	0	0	0	4	0	0	0	8	0	0	0	0	4	0	14	10	4	5	4	0	0	7	9	8	0	0	3	4	0	0	0	0
FGSLCO	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
FGSLCS	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4	0	5	0	0	0	0	0	0
FGSLSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSLSE	2	3	0	0	4	0	0	0	0	0	4	11	8	0	8	0	3	3	0	0	0	7	3	8	0	0	0	0	20	3	15	4	24	7	11	24	13	7	15
FGSLSG	5	13	6	4	9	4	8	11	0	7	13	19	0	7	21	0	6	0	8	15	25	7	7	8	20	4	0	0	3	21	8	11	13	7	21	17	4	18	0
FGSLSO	0	3	0	0	0	0	0	0	0	0	0	0	0	0	8	0	3	3	5	4	12	0	7	0	0	0	0	0	3	3	15	0	8	0	7	3	0	0	8
FGSLSS	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	11	4	11	0	0	0	0	0	11	3	0	0	4	0	3	4	7	0	4	4
FGSSCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSCE	2	0	2	13	0	0	0	0	0	0	0	11	0	3	0	0	0	3	0	4	0	11	10	8	0	11	4	0	0	3	11	7	3	3	4	3	0	18	4
FGSSCG	0	0	0	0	0	4	0	3	0	0	0	0	0	0	13	0	3	0	5	19	4	11	10	4	0	4	0	11	3	0	11	0	0	3	7	0	0	0	12
FGSSCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSCS	0	0	2	0	0	4	0	0	0	0	4	4	0	0	4	0	0	0	0	0	0	4	3	0	0	4	0	0	13	0	11	0	0	0	7	0	0	0	19
FGSSSB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FGSSSE	2	3	0	4	5	0	0	6	0	0	13	30	4	10	33	5	22	7	0	4	16	11	7	0	5	0	0	0	26	0	23	22	21	23	28	14	13	22	35
FGSSSG	7	5	11	0	1	8	0	0	0	7	13	15	12	0	33	5	13	10	8	26	12	11	23	0	5	0	0	11	16	0	19	0	8	0	14	7	35	7	19
FGSSSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	3	0	0	0	4	0	0	0	0	0	0	7	0	0	7	5	0	11	0	0	4	8
FGSSSS	0	0	0	0	0	0	0	0	0	0	0	15	4	3	13	5	3	3	3	15	0	4	17	0	5	0	0	6	7	0	11	14	8	0	7	14	4	7	0

Appendix 5: Data Guidance

SAP results for Clusters



Updated Data

	NEST				ARBED				CSCO				2050			
	link	SAP rating	Cost	Cost (cummulative)	link	SAP rating	Cost	Cost (cummulative)	link	SAP rating	Cost	Cost (cummulative)	link	SAP rating	Cost	Cost (cummulative)
Original	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0
System (Oil)	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1cGu	19.1	£0	£0
System (HP)	tp://bit.ly/1d0lu	74.3	£6,000	£6,000	tp://bit.ly/1d0lu	74.3	£6,000	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1d0lu	74.3	£6,000	£6,000
System (Gas)	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1d0lu	74.3	£0	£6,000
Roof	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1d0lu	74.3	£0	£6,000
Draught	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1fFuy	76.1	£100	£6,100
Wall (Ext)	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1fFuy	76.1	£0	£6,100
Wall (Int)	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1d0lu	74.3	£0	£6,000	tp://bit.ly/1cGu	19.1	£0	£0	tp://bit.ly/1fFuy	76.1	£0	£6,100
Wall (Cavity)	tp://bit.ly/1d0lz	77.2	£475	£6,475	tp://bit.ly/1d0lz	77.2	£475	£6,475	p://bit.ly/1dB9C	27.6	£475	£475	tp://bit.ly/1fFuA	79.1	£475	£6,575
Floor	tp://bit.ly/1d0lz	77.2	£0	£6,475	tp://bit.ly/1d0lz	77.2	£0	£6,475	p://bit.ly/1dB9I	45.5	£530	£1,005	tp://bit.ly/1fFu	84.5	£530	£7,105
Windows	tp://bit.ly/1d0lz	77.2	£0	£6,475	tp://bit.ly/1d0lz	77.2	£0	£6,475	p://bit.ly/1dB9T	51.8	£2,400	£3,405	tp://bit.ly/1fFuE	86	£2,400	£9,505
Solar	p://bit.ly/1d0lC	80.3	£2,600	£9,075	p://bit.ly/1d0lCr	80.3	£2,600	£9,075	p://bit.ly/1dB9T	51.8	£0	£3,405	tp://bit.ly/1fFuC	89.1	£2,600	£12,105
PV	p://bit.ly/1d0lC	80.3	£0	£9,075	tp://bit.ly/1ff5b	92.2	£7,000	£16,075	p://bit.ly/1dB9T	51.8	£0	£3,405	p://bit.ly/1fFuD	101	£7,000	£19,105
Total		61.2	£9,075			73.1	£16,075			32.7	£3,405			81.9	£19,105	

1. **Select Cluster** by selecting 1 option for each of the five variables

2. **Updated Graph** of SAP improvement vs cost for the 4 schemes and selected cluster

3. **Updated Data** for the 4 schemes and selected cluster:
    a. SAP Sensitivity tool links
    b. Predicted SAP rating of improvements
    c. Costs of measures applied
    d. Cumulative cost of measures applied

* If **adjusted cost** option is selected, inputted data in the “adjusted cost” column of sheet “cost look up” will be used

Individual Measures Results for Clusters

	Difference	Cost	Consumption Reduction (kWh/year)
Original	0	£0	0
System (Oil)	33.2	£500	11,956
System (HP)	39.2	£500	18,647
System (Gas)	0	£0	0
Draught	2.4	£500	1,025
Roof	4.4	£50	1,832
Wall (Ext)	9.9	£500	3,904
Wall (Int)	9.9	£500	3,904
Wall (Cavity)	0	£0	0
Floor	12.1	£500	4,696
Windows	0	£0	0
Solar	5.3	£50	2,564
PV	9.8	£500	1,663

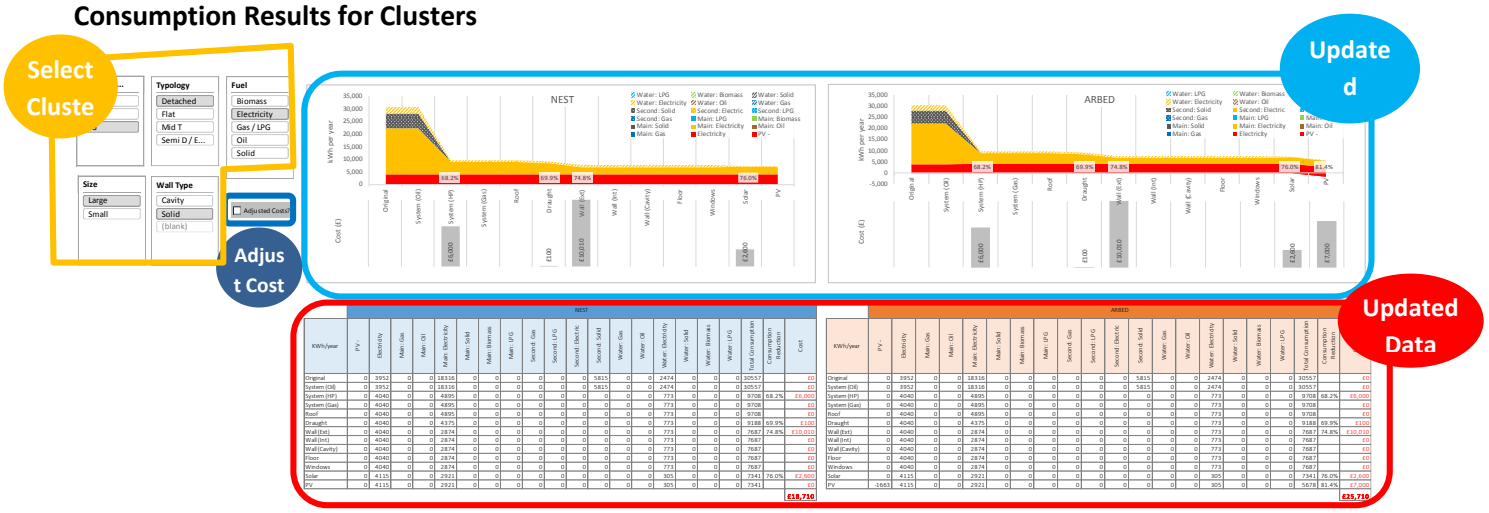
1. **Select Cluster** by selecting 1 option for each of the five variables

2. **Updated Graphs** of individual measures for the selected cluster:
   a. SAP score difference (increase from original)
   b. Cost applied
   c. Consumption reduction (kWh per year)
   d. Disturbance factor of measures

3. **Updated Data** for selected cluster:
   a. SAP score difference (increase from original)
   b. Cost applied
   c. Consumption reduction (kWh per year)

* If **adjusted cost** option is selected, inputted data in the "adjusted cost" column of sheet "cost look up" will be used

Consumption Results for Clusters



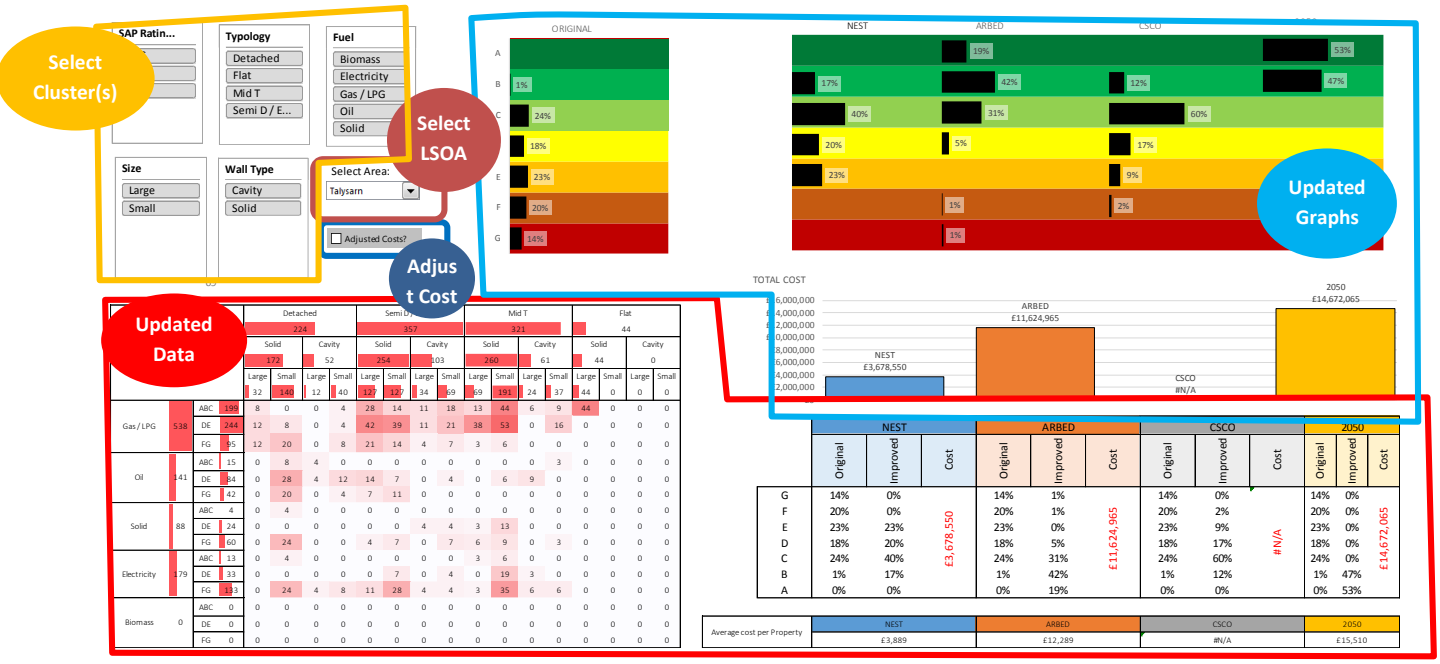
1. **Select Cluster** by selecting 1 option for each of the five variables

2. **Updated Graphs** of consumption reduction, % reduction and cost of measures for the 4 schemes and selected cluster:
    a. Area chart: Consumption after applying measures per use and fuel type (kWh/year)
    b. Bar chart: Cost of measures applied

3. **Updated Data** for selected cluster including:
    a. Consumption after applying measures per use and fuel type (kWh/year)
    b. Total consumption after applying measures (kWh/year)
    c. % reduction in consumption after applying measure
    d. Cost of measures applied
    e. Total Cost of scheme for selected cluster

* If **adjusted cost** option is selected, inputted data in the “adjusted cost” column of sheet “cost look up” will be used

SAP results for LSOAs



1. **Select Cluster(s)** by selecting options for each of the five variables. Click on to select all options and ctrl to select more than one option

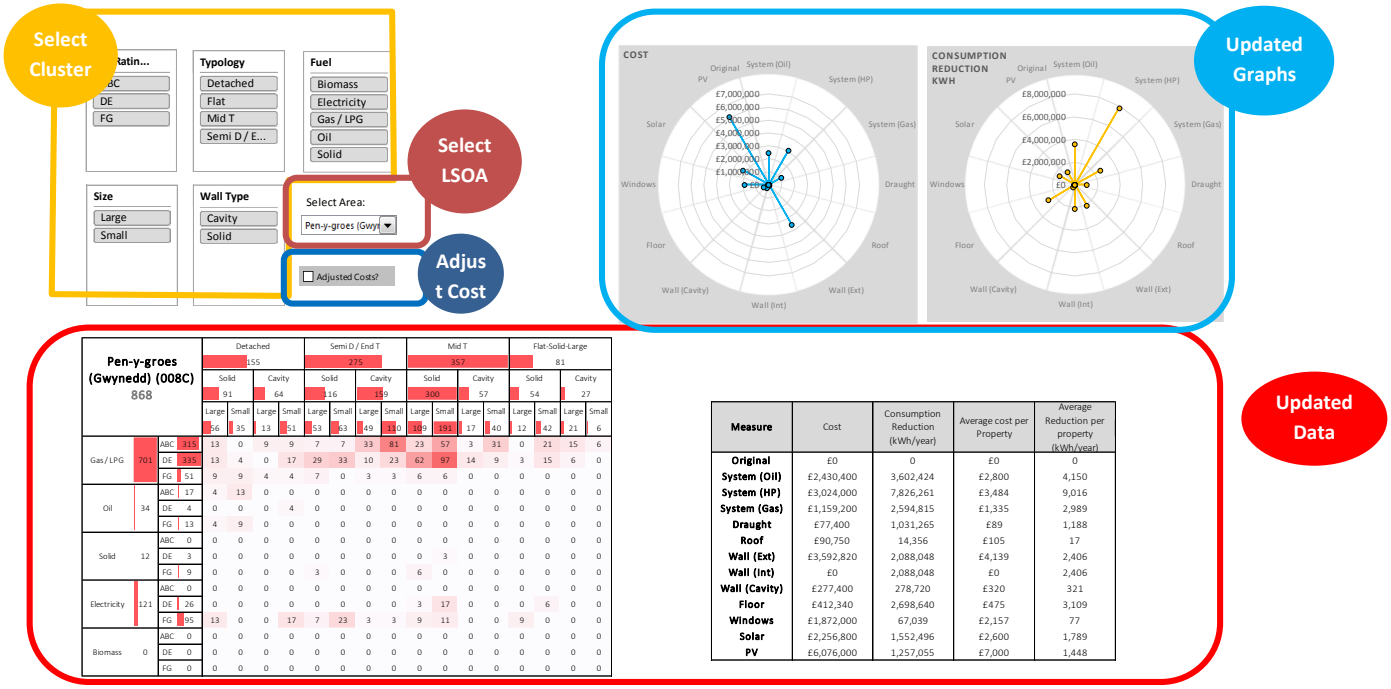
2. **Select LSOA** by selecting one LSOA from list

3. **Updated Graphs** of SAP bands distribution and cost for the 4 schemes, the selected LSOA and cluster(s):
    a. Original distribution of properties per SAP rating band
    b. Predicted distribution of properties per SAP rating band after applying schemes
    c. Cost of schemes for selected LSOA and cluster(s)

4. **Updated Data** for the selected LSOA and cluster(s):
    a. Approximated number of each selected cluster in selected LSOA
    (Top right - total number of properties selected)
    b. Comparison of SAP rating band distribution before and after applying schemes
    c. Cost of schemes for selected LSOA and cluster(s)
    d. Average cost per property of schemes

* If **adjusted cost** option is selected, inputted data in the "adjusted cost" column of sheet "cost look up" will be used

Individual Measures Results for LSOAs



Measure	Cost	Consumption Reduction (kWh/year)	Average cost per Property	Average Reduction per property (kWh/year)
Original	£0	0	£0	0
System (Oil)	£2,430,400	3,602,424	£2,800	4,150
System (HP)	£3,024,000	7,826,261	£3,484	9,016
System (Gas)	£1,159,200	2,594,815	£1,335	2,989
Draught	£77,400	1,031,265	£89	1,188
Roof	£90,750	14,356	£105	17
Wall (Ext)	£3,592,820	2,088,048	£4,139	2,406
Wall (Int)	£0	2,088,048	£0	2,406
Wall (Cavity)	£277,400	278,720	£320	321
Floor	£412,340	2,698,640	£475	3,109
Windows	£1,872,000	67,039	£2,157	77
Solar	£2,256,800	1,552,496	£2,600	1,789
PV	£6,076,000	1,257,055	£7,000	1,448

1. **Select Cluster(s)** by selecting options for each of the five variables. Click on to select all options and ctrl to select more than one option

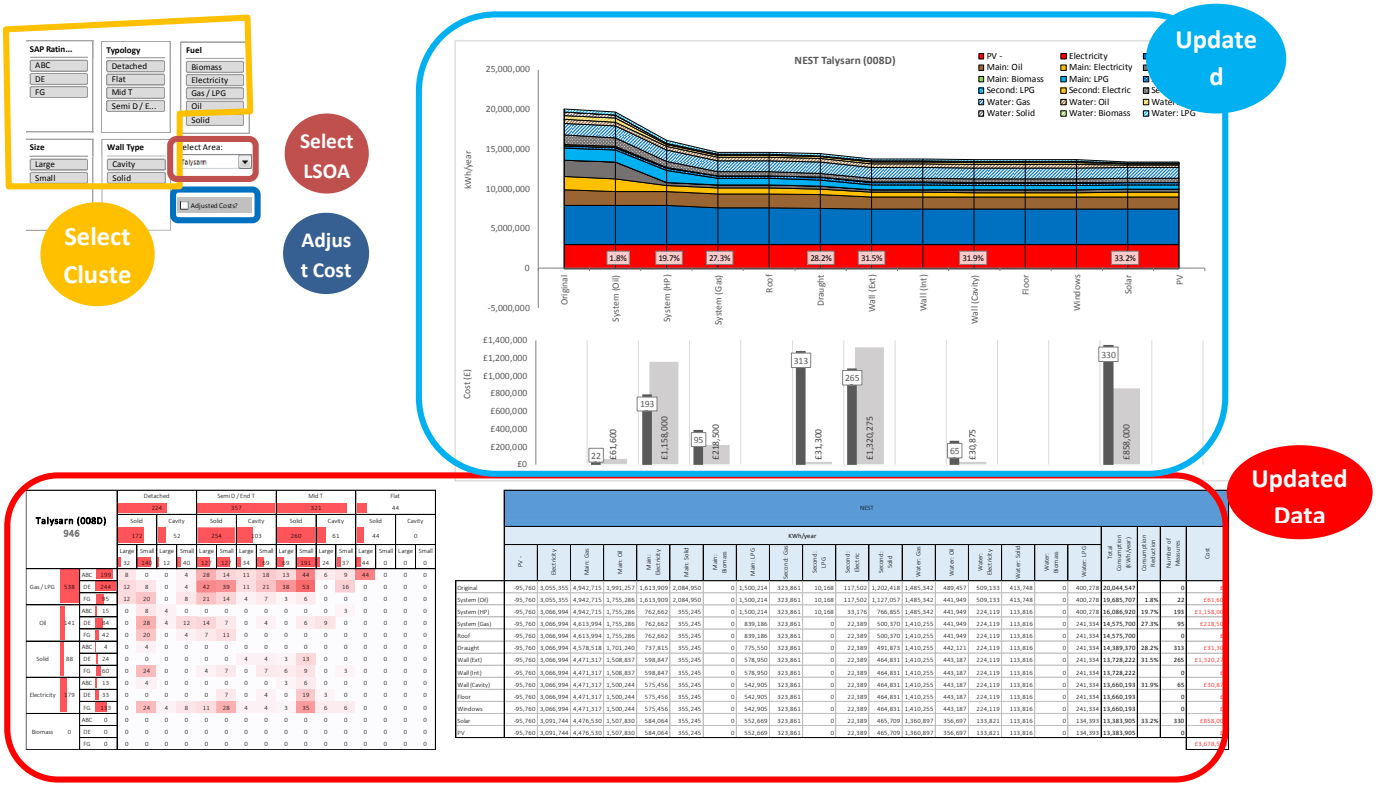
2. **Select LSOA** by selecting one LSOA from list

3. **Updated Graphs** for individual measures for the selected LSOA and cluster(s):
    a. Cost applied
    b. Consumption reduction (kWh per year)

4. **Updated Data** for the selected LSOA and cluster(s):
    a. Approximated number of each selected cluster in selected LSOA (Top right - total number of properties selected)
    b. Cost applied
    c. Consumption reduction (kWh per year)
    d. Average cost per property
    e. Average reduction per property

* If **adjusted cost** option is selected, inputted data in the "adjusted cost" column of sheet "cost look up" will be used

Consumption Results for LSOAs



1. **Select Cluster(s)** by selecting options for each of the five variables. Click on to select all options and ctrl to select more than one option

2. **Select LSOA** by selecting one LSOA from list

3. **Updated Graphs** of consumption and costs for the 4 schemes for the selected LSOA and cluster(s):
    a. Area chart: Consumption after applying measures per use and fuel type (kWh/year)
    b. Bar chart (dark): Number of measures applied
    c. Bar chart (light): Cost of measures applied

4. **Updated Data** for the selected LSOA and cluster(s):
    a. Approximated number of each selected cluster in selected LSOA
    (Top right - total number of properties selected)
    b. Consumption after applying measures per use and fuel type (kWh/year)
    c. Total consumption after applying measures
    d. % reduction in consumption after applying measures
    e. Number of measures applied
    f. Cost of measures applied
    g. Total cost of schemes

* If **adjusted cost** option is selected, inputted data in the “adjusted cost” column of sheet “cost look up” will be used

Other information

All workbooks contain a number of sheets with all the relevant underlying data

In all cases, the results are located in the sheet named “Output”

All data can be selected and copied but only the following two exceptions can be edited

Adjusting Costs

All excel workbooks have a sheet called “Cost look up” with costs of measures data

All measures except external and internal wall insulation are the same for all clusters

- External and internal wall insulation can vary depending on the Typology and Size of the property
- The first letter stands for the typology (D-detached, S-Semi/End T, M-Mid T, F-Flat) and the second letter stands for the size (S-Small, L-Large)

The costs in the “cost” column are default values which cannot be changed and will be used if the “adjusted costs” option is not selected in the “output” sheet

The costs in the “adjusted cost” column can be adjusted if needed and will be used if the “adjusted costs” option is selected in the “output” sheet

Measure	Cost	Adjusted Costs
Original	£0	£0
System (Oil)	£2,800	£500
System (HP)	£6,000	£500
System (Gas)	£2,300	£500
Roof	£250	£500
Draught	£100	£60,000
Wall (Cavity)	£475	£500
Floor	£530	£500
Windows	£2,400	£500
Solar	£2,600	£50
PV	£7,000	£500

External Wall Insulation		
Typology - size	Cost	Adjusted Cost
D_L	£10,010	£500
S_L	£5,225	£500
M_L	£4,785	£500
F_L	£3,135	£500
D_S	£5,720	£500
S_S	£3,795	£500
M_S	£3,740	£500
F_S	£2,145	£500

Internal Wall Insulation		
Typology - size	Cost	Adjusted Cost
D_L	£7,644	£500
S_L	£3,990	£500
M_L	£3,654	£500
F_L	£2,394	£500
D_S	£4,368	£500
S_S	£2,898	£500
M_S	£2,856	£500
F_S	£1,638	£500

Adjusting Areas with National Park Restrictions

In all LSOA workbooks there is a sheet named “NP lookup”

In this sheet, each typology within each LSOA can be identified as being within the park.
Blank = Not within park
Initial = Within park

These can be updated if needed

	In Park			
LSOA	Detached	Flat	Mid T	Semi D / End T
9B				
9C	D	F		
9D	D	F	M	S
10A				

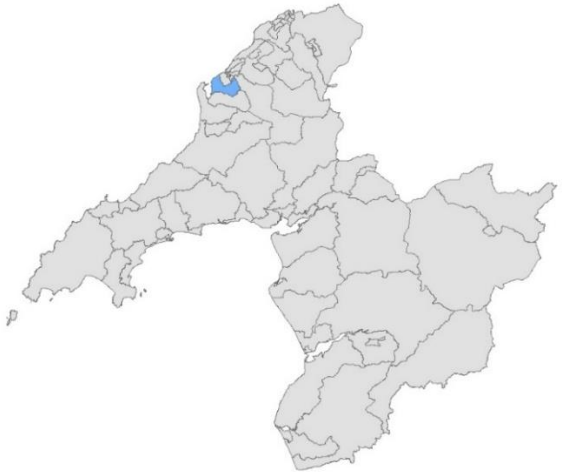
Example

- 9B has no properties within the park
- All detached properties and flats are assumed to be within the park in 9C
- All properties in 9D are assumed to be within the park

Appendix 6: Detailed Results for Top Ranking LSOAs

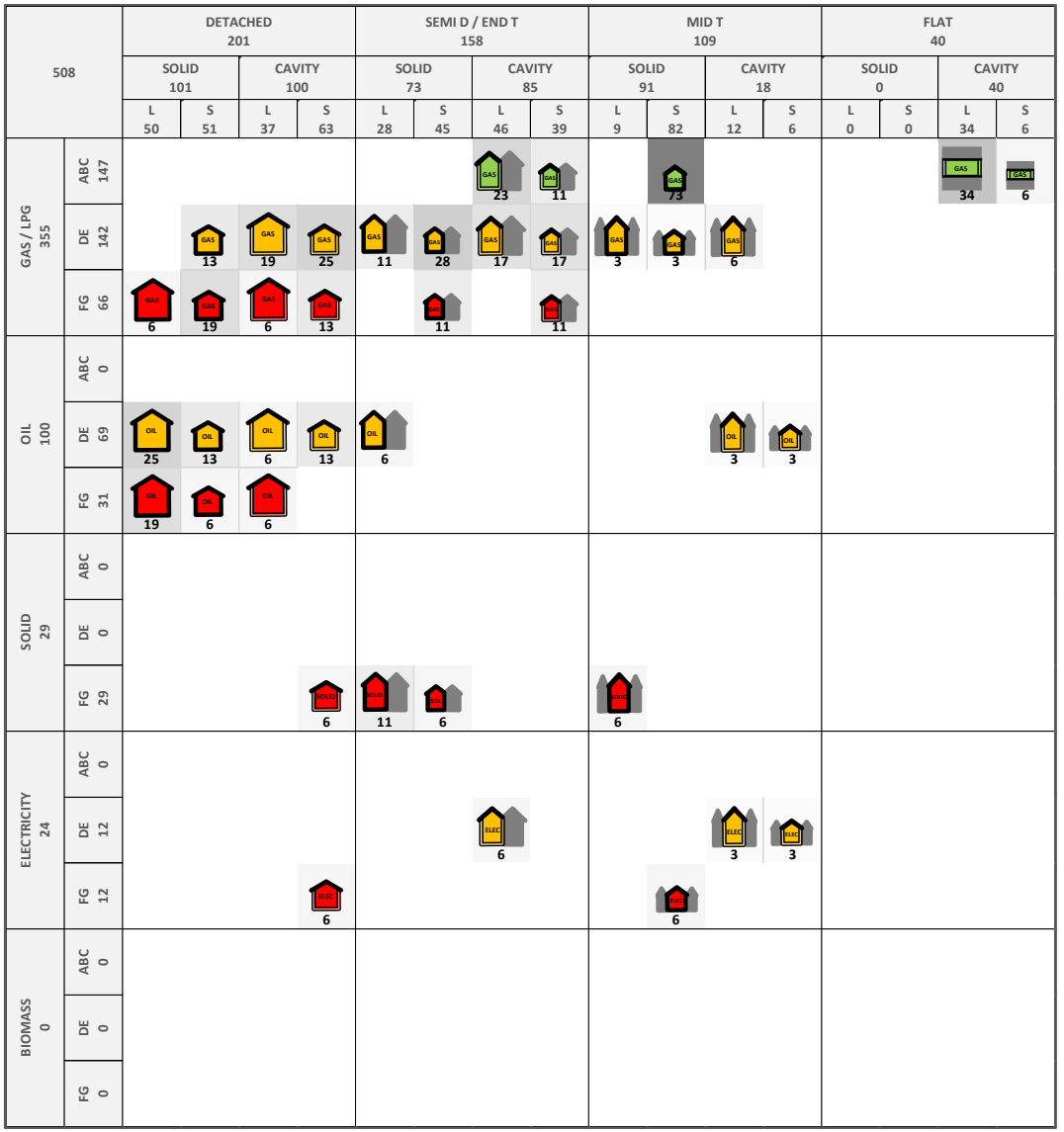
Bontnewydd (007A)

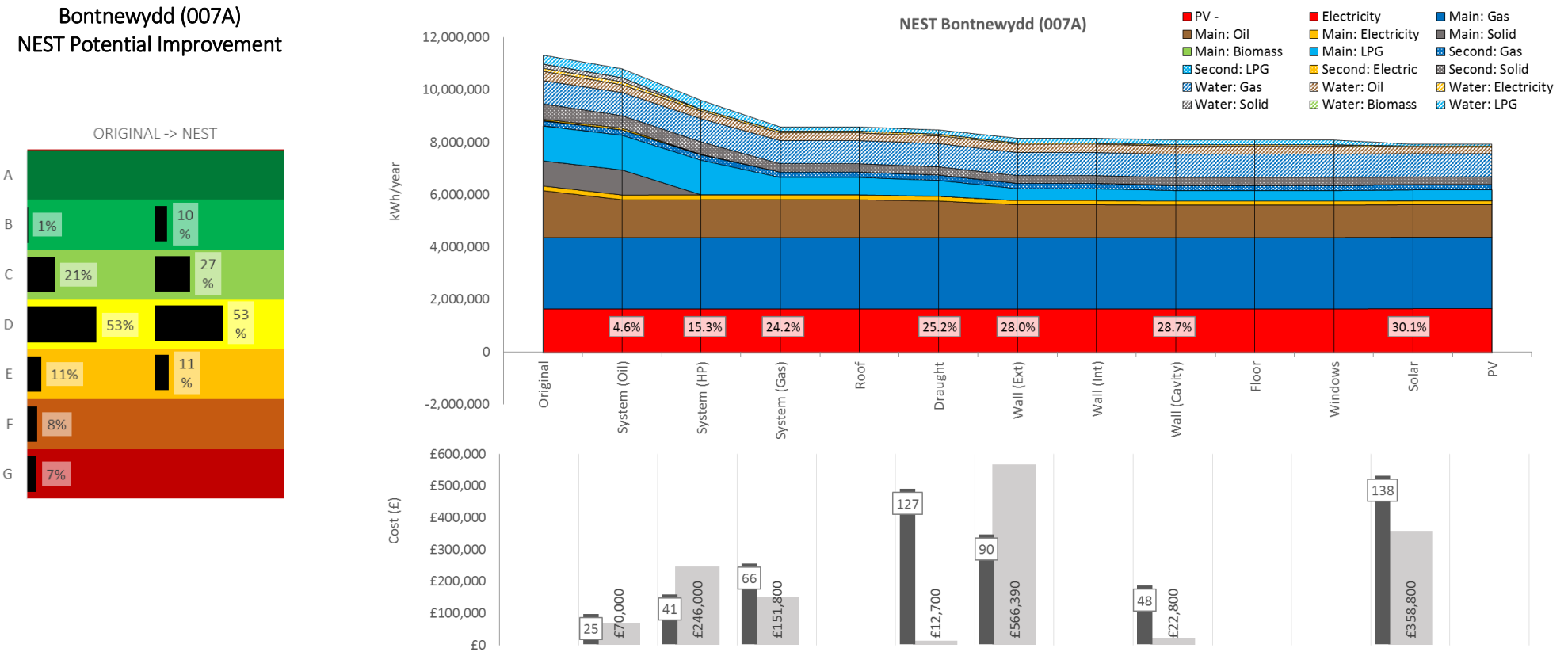
Môn a Menai Regeneration Area
Ranked 1,471 in WIMD 2011
1,090 people: Countryside communities
Village, Hamlet & Isolated Dwellings - Less Sparse (Wales)



This area has the greatest NEST potential for consumption reduction per suitable property

- 508 properties
- 355 (70%) properties use gas for heating: 289 (57%) Mains Gas, 66 (13%) LPG
- 138 (27%) FG rated properties, potentially suitable for NEST funding
- All FG rated properties are off the gas network: 66 (13%) LPG, 31 (6%) Oil, 29 (6%) Solid fuel, 12 (2%) Electricity





- **Energy consumption** could be reduced from **11.3GWh/year** to **7.9GWh/year**
- **Average reduction** per suitable property could be **24,678KWh/year** (a 71% reduction per suitable property) and would **cost** approximately **£10,386** per property
- Most inefficient **F and G** rated properties could by **transformed** to efficient **B and C** rated properties
- **Total cost** of measures would be approximately **£1,428,490**

Improvements and Costs

Systems: 32.7% of the cost (£467,800) would be to install efficient systems (132 Systems: 25 Oil, 41 Heat pumps, 66 Gas/LPG). Upgrading systems could reduce consumption by 2.7GWh per year

Fabric: 39.6% of the cost (£566,390) would be to externally insulate solid walled properties (90 properties). Draught proofing 127 properties would cost £12,700 (0.9% of the cost). 48 cavity walled properties could be insulated for £22,800 (1.6% of the cost). Fabric measures for F and G rated could reduce consumption in this area further by 0.5GWh per year

Renewables: Installing 138 solar hot water systems could cost £358,800 (25.1% of the cost) and would reduce consumption further by 0.15GWh per year.

Brithdir and Llanfachreth / Ganllwyd / Llanelltyd (016C)

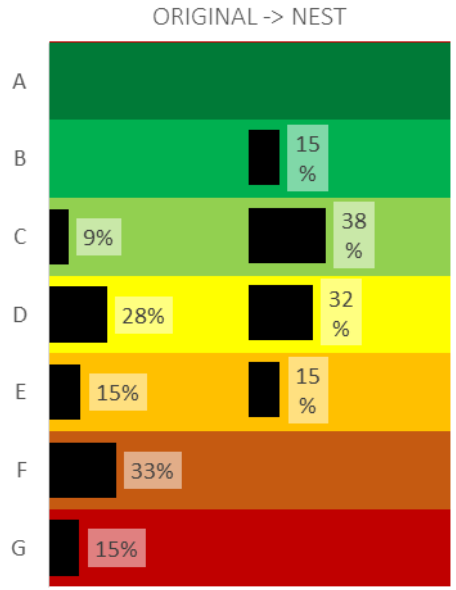
Within Snowdonia National Park
Ranked 1,403 in WIMD 2011
1,448 people: Rural Economies
Village, Hamlet & Isolated Dwellings – Sparse (Wales)

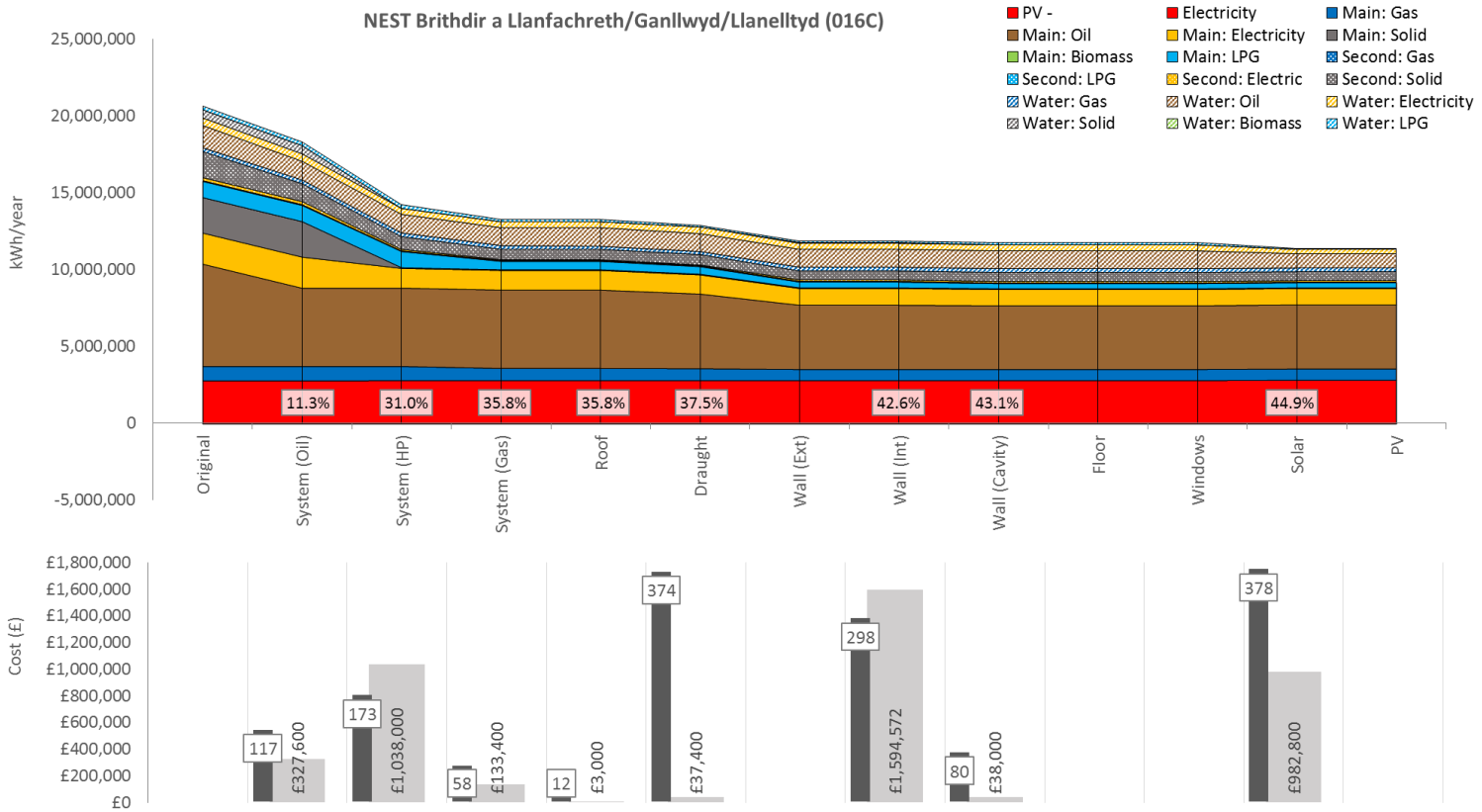
This area has the 2nd greatest NEST potential for consumption reduction per suitable property

- **799 properties**
- **731 (91%)** of properties are **off mains gas:**
  47 (6%) LPG, 390 (49%) Oil, 74 (9%) Solid, 220 (27%) Electricity
- **64%** of dwellings are **detached** properties
- **378 (47%)** are **FG** rated properties, potentially suitable for **NEST** funding
- **97% of FG** rated properties are **off gas**
  79% of FG rated properties are **solid walled**

799		DETACHED 510				SEMI D / END T 159				MID T 45				FLAT 85			
		SOLID 275		CAVITY 235		SOLID 93		CAVITY 66		SOLID 27		CAVITY 18		SOLID 36		CAVITY 49	
		L 145	S 130	L 80	S 155	L 41	S 52	L 36	S 30	L 18	S 9	L 9	S 9	L 24	S 12	L 37	S 12
GAS / LPG 115	ABC 12			GAS 5				GAS 7									
	DE 45	GAS 5	GAS 5	GAS 5	GAS 10			GAS 7	GAS 4			GAS 9					
	FG 58	GAS 5	GAS 15	GAS 10	GAS 10	GAS 11	GAS 7										
OIL 390	ABC 51	OIL 5	OIL 10	OIL 15	OIL 5			OIL 4								OIL 12	
	DE 192	OIL 15	OIL 25	OIL 35	OIL 25	OIL 15	OIL 11	OIL 7	OIL 4	OIL 9		OIL 9		OIL 12		OIL 25	
	FG 147	OIL 85	OIL 30	OIL 5	OIL 10	OIL 4	OIL 4			OIL 9							
SOLID 74	ABC 0																
	DE 4								SOL 4								
	FG 70	SOLID 10	SOLID 25		SOLID 5	SOLID 7	SOL 15	SOLID 4	SOL 4								
ELECTRICITY 220	ABC 12													ELEC 12			
	DE 105				ELEC 70			ELEC 7	ELEC 7		ELEC 9						ELEC 12
	FG 103	ELEC 20	ELEC 20	ELEC 5	ELEC 20	ELEC 4	ELEC 15		ELEC 7					ELEC 12			
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																

Brithdir and Llanfachreth / Ganllwyd / Llanelltyd (016C)
NEST Potential Improvement





- **Energy consumption** could be reduced from **20.6GWh/year** to **11.4GWh/year**
- **Average reduction** per suitable property could be **24,482KWh/year** (a 70.6% reduction per suitable property) and would **cost** approximately **£12,307** per property
- Most inefficient **F and G** rated properties could by **transformed** to efficient **B and C** rated properties
- **Total cost** of measures would be approximately **£4,154,722**

<u>Improvements and Costs</u>

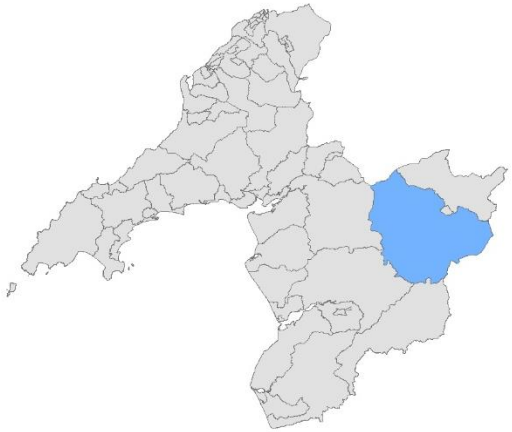
Systems: 36.1% of the cost (£1,498,400) would be to install efficient systems (348 Systems: 117 Oil, 173 Heat pumps, 58 Gas/LPG). Upgrading systems could reduce consumption by 7.3GWh/year

Fabric: Insulating the roof of 12 properties would cost £3,000 (0.1% of cost). Internally insulating 298 properties would cost £1,594,572 (38.4% of the cost). Draught proofing 374 properties would cost £37,400 (0.9%). Insulating 80 cavity walled properties would cost £38,000 (38.4% of cost). Fabric measures could reduce consumption in this area further by 1.5GWh/ year

Renewables: Installing 378 solar hot water systems could cost £982,800 (23.7% of cost) and would reduce consumption further by 0.37GWh year

Llandderfel a Llanuwchllyn 2 (015D)

Within Snowdonia National Park
Ranked 1,329 in WIMD 2011
1,289 people: Countryside communities
Village, Hamlet & Isolated Dwellings – Sparse (Wales)

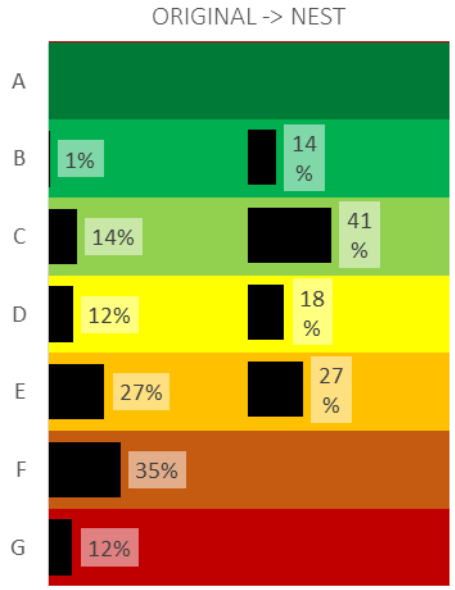


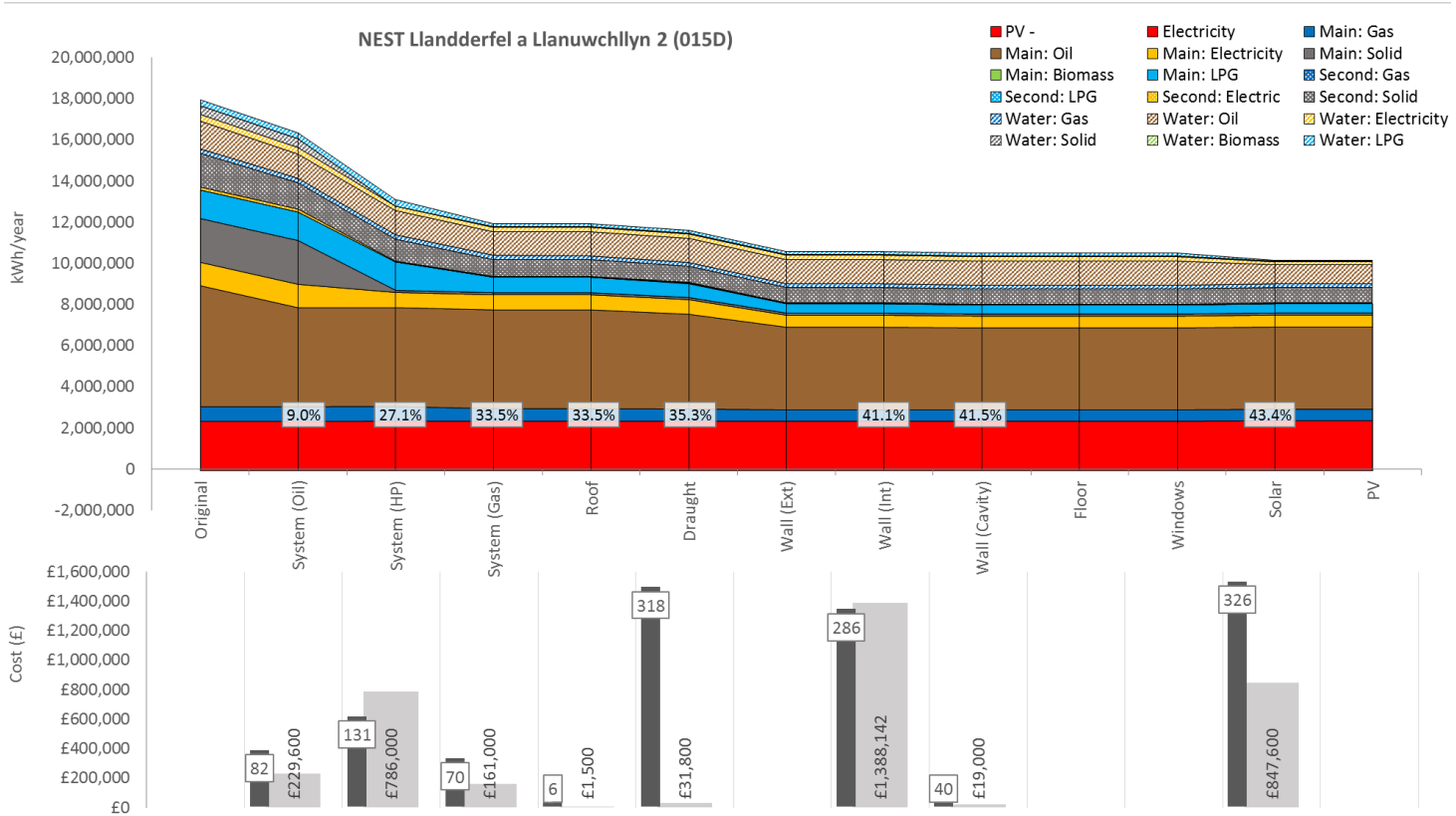
This area has the 3rd greatest NEST potential for consumption reduction per suitable property

- **697 properties**
- **639 (92%)** properties are **off mains gas:**
  59 (6%) LPG, 389 (49%) Oil, 71 (9%) Solid, 120 (27%) Electricity
- **464 (67%)** dwellings are **detached**
- **512 (73%)** properties are **solid walled**
- **326 (47%)** properties are **FG rated** and are potentially suitable for **NEST** funding
  97% (315 out of 326) of FG properties are **off mains gas**
  88% (286 out of 326) of FG properties are **solid walled**

697		DETACHED 464				SEMI D / END T 114				MID T 59				FLAT 60			
		SOLID 357		CAVITY 107		SOLID 86		CAVITY 28		SOLID 51		CAVITY 8		SOLID 18		CAVITY 42	
		L 167	S 190	L 43	S 64	L 17	S 69	L 6	S 22	L 4	S 47	L 4	S 4	L 6	S 12	L 24	S 18
GAS / LPG 117	ABC 5	5															
	DE 42	5			5						4		4			24	
	FG 70	22	16		5	7	13		3		4						
OIL 389	ABC 89	38	16	11	11		10		3								
	DE 175	38	49	11	38		7	3	10		19						
	FG 125	49	43	11	5	7	10										
SOLID 71	ABC 0																
	DE 7						3				4						
	FG 64	5	33	5		3	7		3		8						
ELECTRICITY 120	ABC 6															6	
	DE 47	5					3	3		4	4	4			12	12	
	FG 67		33	5			16		3		4			6			
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																

Llandderfel a Llanuwchllyn 2 (015D)
NEST Potential Improvement





- **Energy consumption** could be reduced from **17.9GWh/year** to **10.2GWh/year**
- **Average reduction** per suitable property could be **23,905KWh/year** (a 69.6% reduction per suitable property) and would **cost** approximately **£11,958** per property
- All inefficient **F and G** rated properties could by **transformed** to efficient **C and D** rated properties
- **Total cost** of measures would be approximately **£1,433,240**

<u>Improvements and Costs</u>

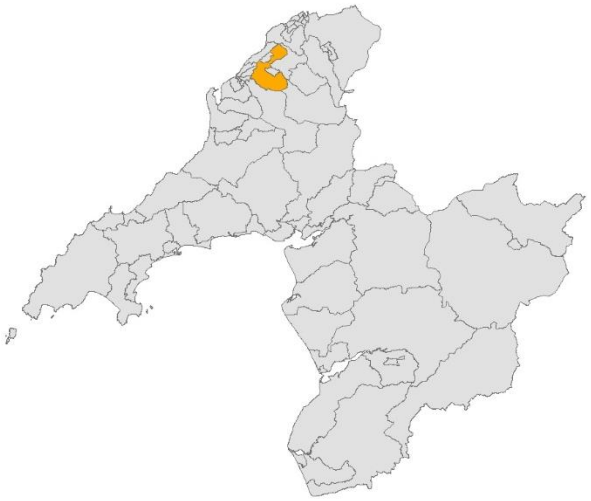
Systems: 34% of the cost (£1,176,600) would be to install efficient systems (283 Systems: 82 Oil, 131 Heat pumps, 70 Gas/LPG). Upgrading systems could reduce consumption by 6.0GWh/year

Fabric: Insulating the roof of 6 properties would cost £1,500 (0.04% of cost). Internally insulating 286 properties would cost £1,388,142 (40.1% of the cost). Draught proofing 318 properties would cost £31,800 (0.9% of the cost). Insulating 40 cavity walled properties would cost £19,000 (0.5% of cost). Fabric measures could reduce consumption in this area further by 1.4GWh/ year

Renewables: Installing 326 solar hot water systems could cost £847,600 (24.5% of cost) and would reduce consumption further by 0.35GWh year

Bethel a Cwm-y-Glo 2 (004B)

Within Môn a Menai Regeneration Area
Ranked 1,454 in WIMD 2011
1,245 people: Countryside communities
Village, Hamlet & Isolated Dwellings –Less Sparse (Wales)

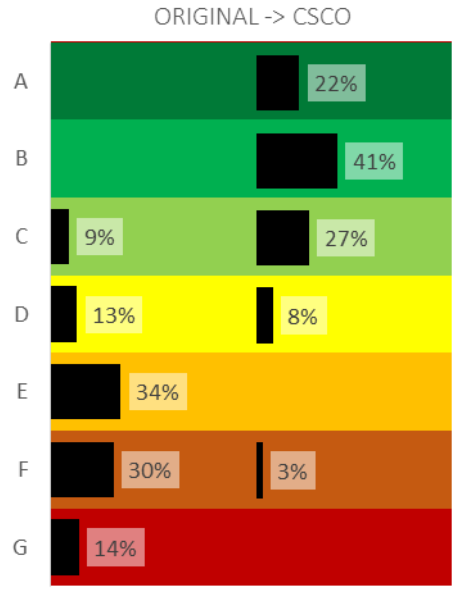


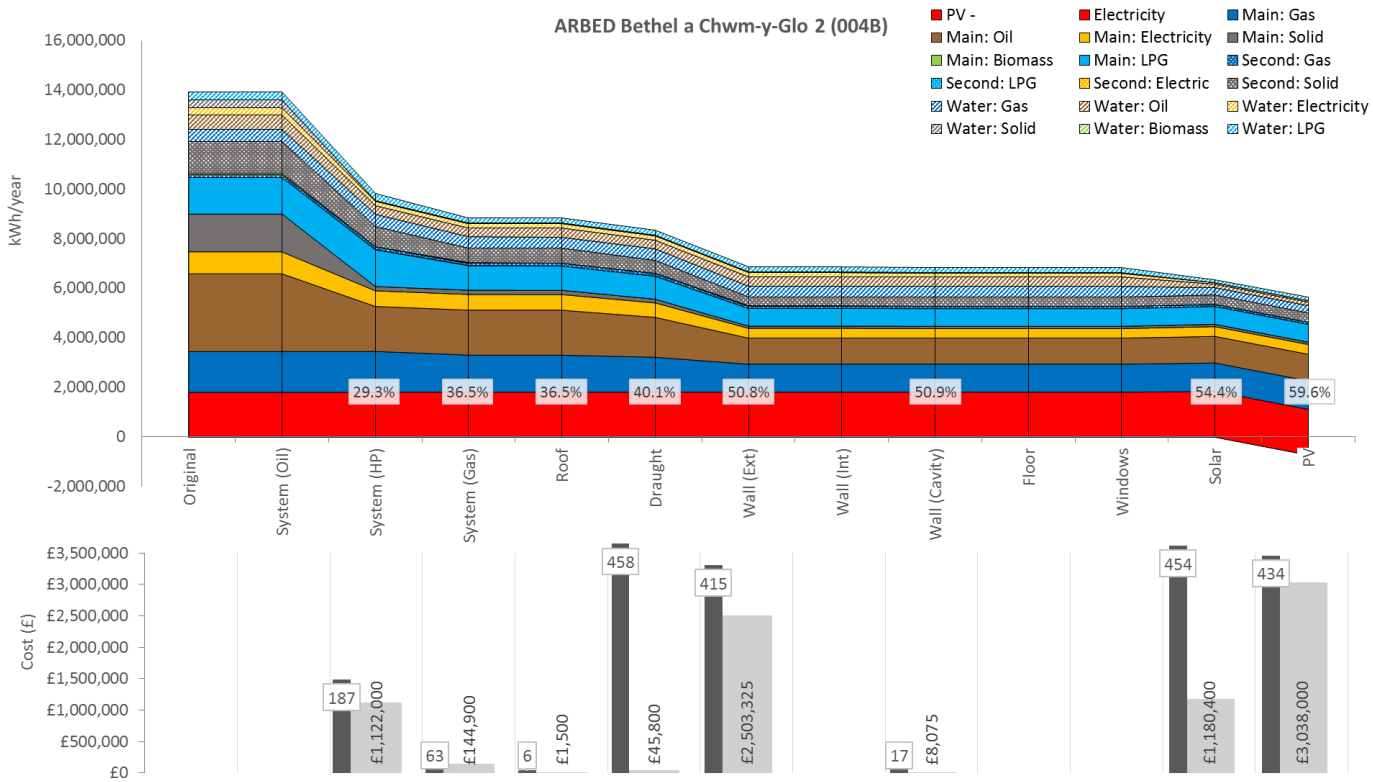
This area has the greatest ARBED potential for consumption reduction per suitable property

- **538 properties**
- **400 (74%)** of properties are **off mains gas:**
  64 (12%) LPG, 171 (32%) Oil, 68 (13%) Solid, 97 (18%) Electricity
- **437 (81%)** of properties are **solid walled**
- **465 (86%)** of properties are **solid walled or off gas** and potentially suitable for **ARBED** funding

538		DETACHED 277				SEMI D / END T 129				MID T 101				FLAT 31			
		SOLID 223		CAVITY 54		SOLID 110		CAVITY 19		SOLID 89		CAVITY 12		SOLID 15		CAVITY 16	
		L 109	S 114	L 42	S 12	L 38	S 72	L 10	S 9	L 12	S 77	L 4	S 8	L 7	S 8	L 5	S 11
GAS / LPG 202	ABC 32			GAS 6			GAS 6				GAS 8			GAS 2	GAS 2	GAS 3	GAS 5
	DE 92	GAS 6	GAS 6	GAS 6	GAS 12	GAS 10	GAS 13	GAS 10	GAS 6		GAS 8	GAS 4	GAS 4	GAS 3	GAS 2	GAS 1	GAS 1
	FG 78	GAS 12	GAS 24	GAS 12		GAS 6	GAS 13		GAS 3	GAS 4	GAS 4						
OIL 171	ABC 9		OIL 6			OIL 3											
	DE 105	OIL 55	OIL 24	OIL 6		OIL 10	OIL 6				OIL 4						
	FG 57	OIL 30	OIL 12	OIL 12		OIL 3											
SOLID 68	ABC 0																
	DE 29		SOLID 6			SOLID 3	SOL 3				SOL 17						
	FG 39		SOLID 24				SOL 3				SOL 12						
ELECTRICITY 97	ABC 7									ELEC 4				ELEC 1		ELEC 2	
	DE 26		ELEC 6				ELEC 6				ELEC 8			ELEC 1	ELEC 2	ELEC 1	ELEC 2
	FG 64	ELEC 6	ELEC 6			ELEC 3	ELEC 22			ELEC 8	ELEC 12		ELEC 4	ELEC 1	ELEC 1		ELEC 1
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																

Bethel a Cwm-y-Glo 2 (004B)
ARBED Potential Improvement





- **Energy consumption** could be reduced from **13.9/year** to **5.6GWh/year**
- **Average reduction** per suitable property could be **17,815KWh/year** (a 67% reduction per suitable property) and would **cost** approximately **£17298** per property
- The % of efficient properties in **SAP rating bands A, B or C** could be increased from **9%** to **89%**
- **Total cost** of measures would be approximately **£8,044,000**

<u>Improvements and Costs</u>

Systems: 15% of the cost (£1,146,900) would be to install efficient systems (250 Systems: 187 Heat pumps, 63 Gas/LPG). Upgrading systems could reduce consumption by 5.1GWh/year

Fabric: Insulating the roof of 6 properties would cost £1,500 (0.02% of cost). Externally insulating 458 properties would cost £2,503,325 (31.1% of the cost). Draught proofing 458 properties would cost £45,800 (0.6% of the cost). Insulating 17 cavity walled properties would cost £8,075 (0.1% of cost). Fabric measures could reduce consumption in this area further by 2.0GWh/ year

Renewables: Installing 454 solar hot water systems could cost £1,180,400 (14.7% of cost). Installing 434 PV systems could cost £3,038,000 (37.8% of the cost). Installing renewables would reduce consumption further by 1.2GWh year

Pentir 2 (005D)

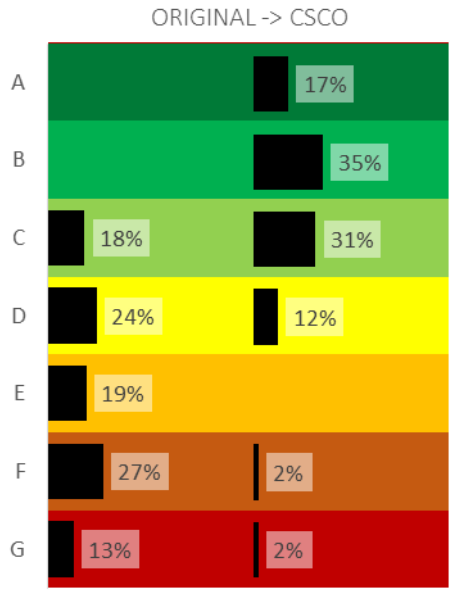
Within Môn a Menai Regeneration Area
Ranked 1,148 in WIMD 2011
1,303 people: Countryside communities
Village, Hamlet & Isolated Dwellings – Less Sparse (Wales)

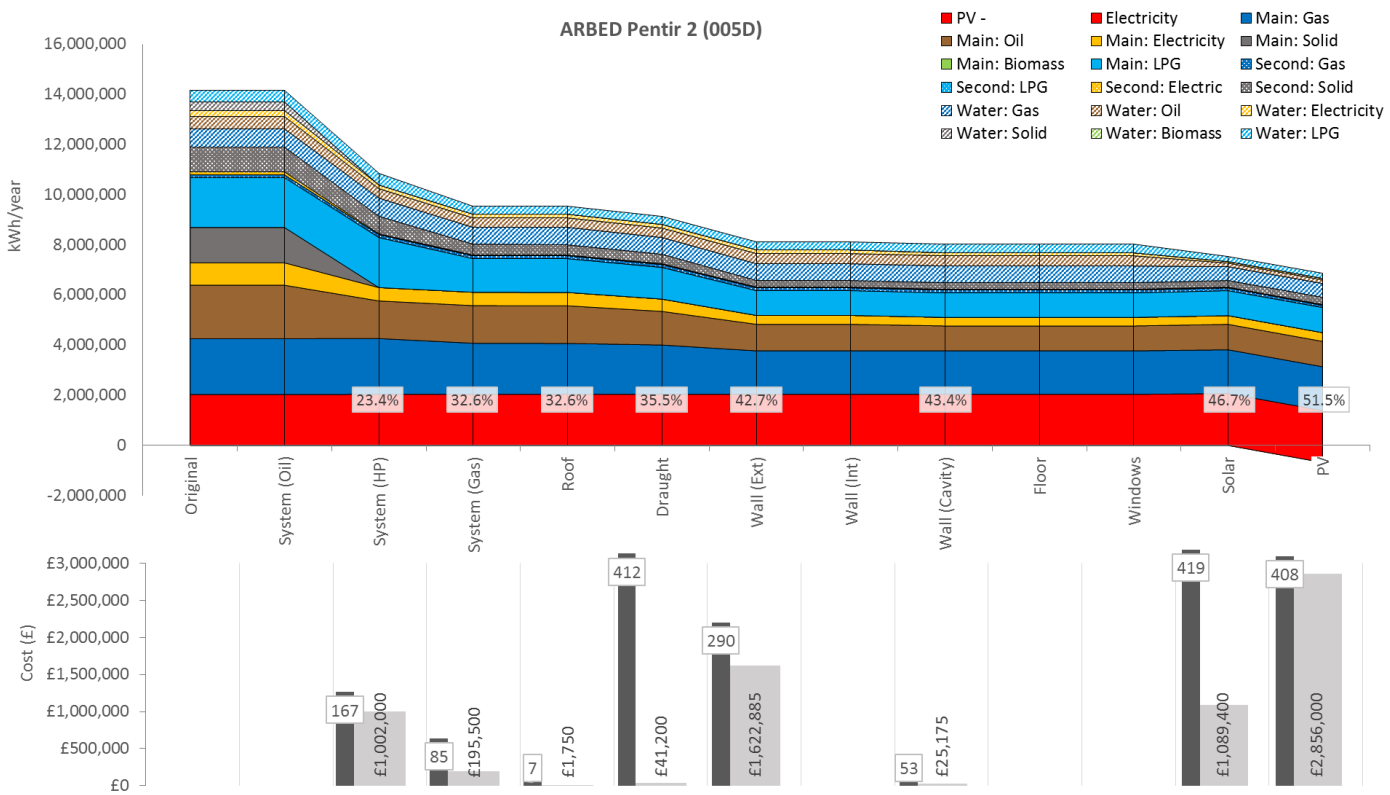
This area has the 2nd greatest ARBED potential for consumption reduction per suitable property

- **607 properties**
- **386 (64%)** of properties are **off mains gas:**
  91 (15%) LPG, 142 (23%) Oil, 60 (10%) Solid, 93 (15%) Electricity
- **298 (49%)** of properties are **solid walled**
- **419 (69%)** of properties are **solid walled or off gas** and potentially suitable for **ARBED** funding

607		DETACHED 216				SEMI D / END T 248				MID T 100				FLAT 43			
		SOLID 141		CAVITY 75		SOLID 105		CAVITY 143		SOLID 45		CAVITY 55		SOLID 7		CAVITY 36	
		L 51	S 90	L 30	S 45	L 48	S 57	L 73	S 70	L 3	S 42	L 49	S 6	L 7	S 0	L 7	S 29
GAS / LPG 312	ABC 93		4		4			20	10		3	25					29
	DE 106	4	14	7	18	7		17	17			8		7		7	
	FG 113	22	18	4	4	7	23	10	10		15						
OIL 142	ABC 15	4		4	4				3								
	DE 95	7	14	11	11	17	7	10	7		3	5	3				
	FG 32	14	11			7											
SOLID 60	ABC 0																
	DE 19			4			3	7			5						
	FG 41		11		4		17	3	3		3						
ELECTRICITY 93	ABC 0																
	DE 40		4			7		3	10		5	8	3				
	FG 53		14			3	7	3	10	3	8	5					
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																

Pentir 2 (005D)
ARBED Potential Improvement





- **Energy consumption** could be reduced from **14.1GWh/year** to **6.9GWh/year**
- **Average reduction** per suitable property could be **17,377KWh/year** (a 67% reduction per suitable property) and would **cost** approximately **£16,310** per property
- The % of efficient properties in **SAP rating bands A, B or C** could be increased from **18%** to **83%**
- **Total cost** of measures would be approximately **£6,833,910**

<u>Improvements and Costs</u>

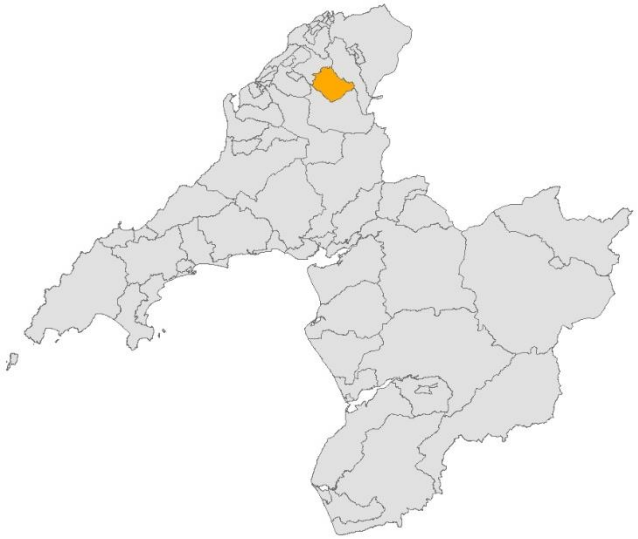
Systems: 17.5% of the cost (£1,197,500) would be to install efficient systems (252 Systems: 167 Heat pumps, 85 Gas/LPG). Upgrading systems could reduce consumption by 4.6GWh/year

Fabric: Insulating the roof of 7 properties would cost £1,750 (0.03% of cost). Externally insulating 290 properties would cost £1,622,885 (23.8% of the cost). Draught proofing 412 properties would cost £41,200 (0.6% of the cost). Insulating 53 Cavity walled properties would cost £25,175 (0.4% of cost). Fabric measures could reduce consumption in this area further by 1.5GWh/ year

Renewables: Installing 419 solar hot water systems could cost £1,089,400 (15.9% of cost). Installing 408 PV systems could cost £2,856,000 (41.8% of the cost). Installing renewables would reduce consumption further by 1.1GWh year

Deiniolen (005A)

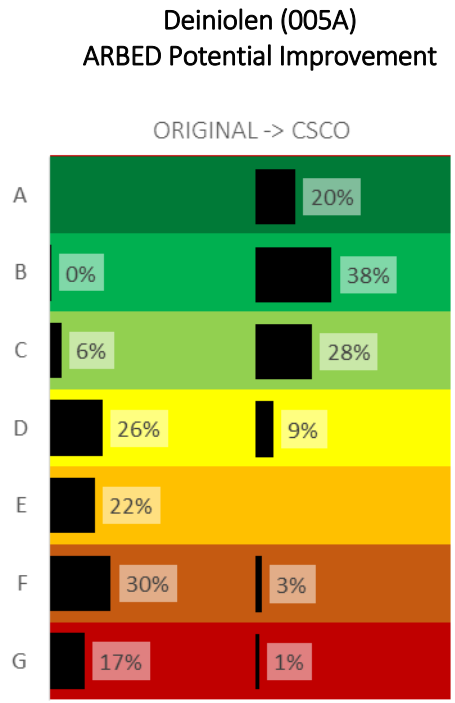
Within Môn a Menai Regeneration Area
Ranked 754 in WIMD 2011
1,887 people: Countryside communities
Town and Fringe - Less Sparse (Wales)

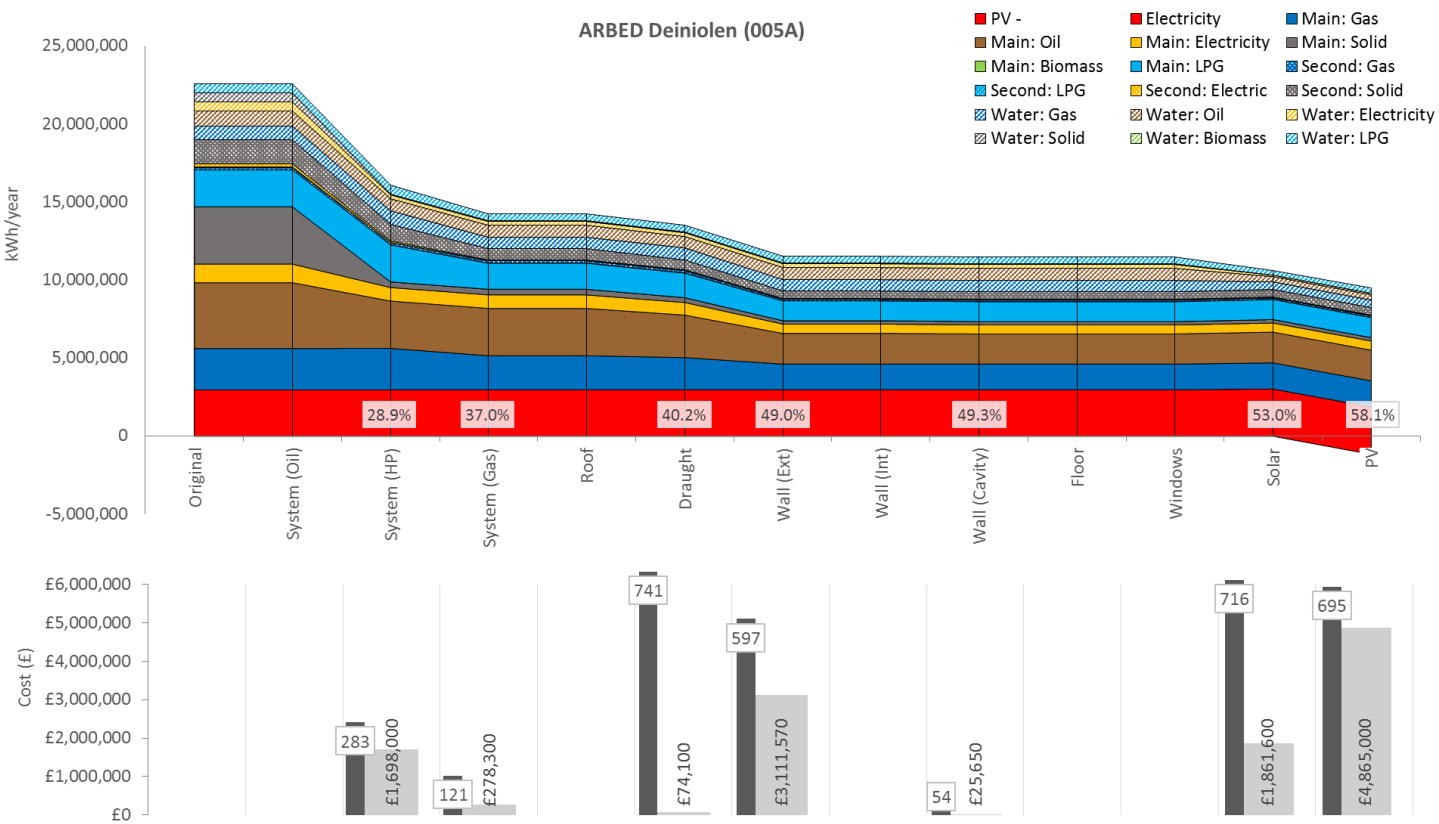


This area has the 3rd greatest ARBED potential for consumption reduction per suitable property

- 897 properties
- 675 (75%) of properties are off mains gas:
  118 (13%) LPG, 286 (32%) Oil, 140 (16%) Solid, 131 (15%) Electricity
- 617 (69%) of properties are solid walled
- 760 (85%) of properties are solid walled or off gas and potentially suitable for ARBED funding

897		DETACHED 319				SEMI D / END T 274				MID T 260				FLAT 44			
		SOLID 228		CAVITY 91		SOLID 141		CAVITY 133		SOLID 204		CAVITY 56		SOLID 44		CAVITY 0	
		L 81	S 147	L 39	S 52	L 66	S 75	L 31	S 102	L 76	S 128	L 16	S 40	L 22	S 22	L 0	S 0
GAS / LPG 340	ABC 23					7		4	4				8				
	DE 155		13			7	19	7	41	12	24	8	24				
	FG 162	22	22	9	9	15	26	4	19	8	28						
OIL 286	ABC 21		9					4			8						
	DE 189	30	30	22	17	7	7	4	4	12	8	4		22	22		
	FG 76	17	30	4	17	4				4							
SOLID 140	ABC 4	4															
	DE 31	4				11		4	4		8						
	FG 105		26	4	9	11	15			16	24						
ELECTRICITY 131	ABC 7								7								
	DE 51					4	4		19	4	8	4	8				
	FG 73	4	17				4	4	4	20	20						
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																





- **Energy consumption** could be reduced from **22,6GWh/year** to **9.5GWh/year**
- **Average reduction** per suitable property could be **17,260KWh/year** (a 66% reduction per suitable property) and would **cost** approximately **£15,677** per property
- The % of efficient properties in **SAP rating bands A, B or C** could be increased from **6%** to **86%**
- **Total cost** of measures would be approximately **£11,914,220**

<u>Improvements and Costs</u>

Systems: 17.5% of the cost (£1,976,300) would be to install efficient systems (404 Systems: 283 Heat pumps, 121 Gas/LPG). Upgrading systems could reduce consumption by 8.3GWh/year

Fabric: Externally insulating 597 properties would cost £3,111,570 (26.1% of the cost). Draught proofing 741 properties would cost £74,100 (0.6% of the cost). Insulating 54 Cavity walled properties would cost £25,650 (0.2% of cost). Fabric measures could reduce consumption in this area further by 2.8GWh/ year

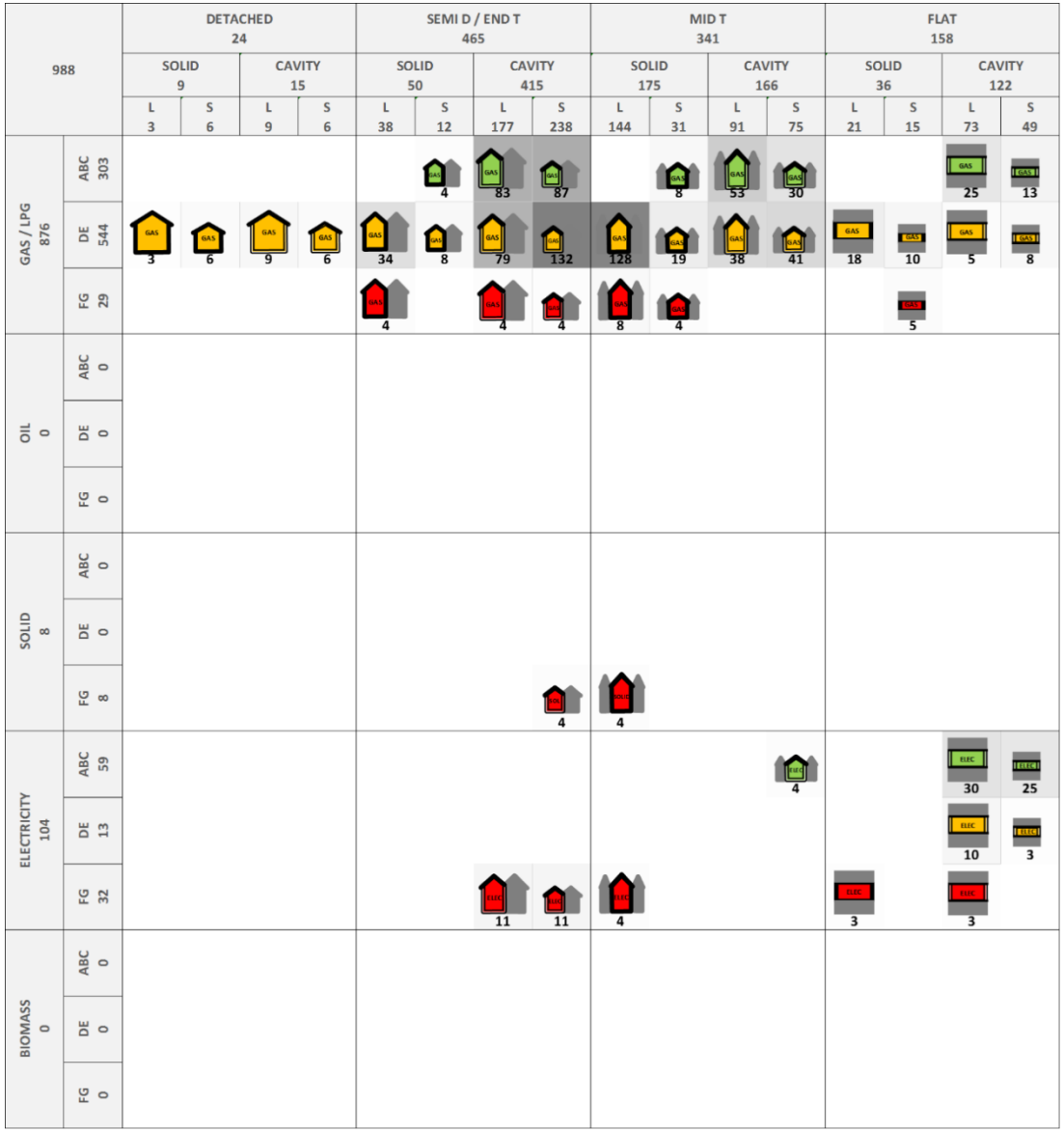
Renewables: Installing 716 solar hot water systems could cost £1,861,600 (15.6% of cost). Installing 695 PV systems could cost £4,865,000 (40.8% of the cost). Installing renewables would reduce consumption further by 2.0GWh year

Peblig (Caernarfon) (006C)

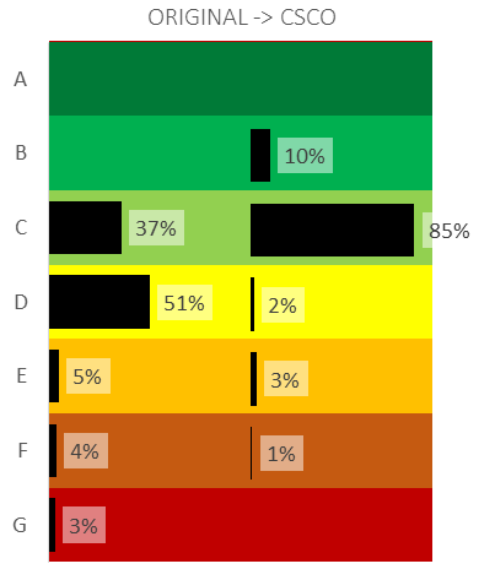
Within Môn a Menai Regeneration Area
Ranked 119 in WIMD 2011
2,325 people: Struggling Urban Families
Tow and Fringe - Less Sparse (Wales)

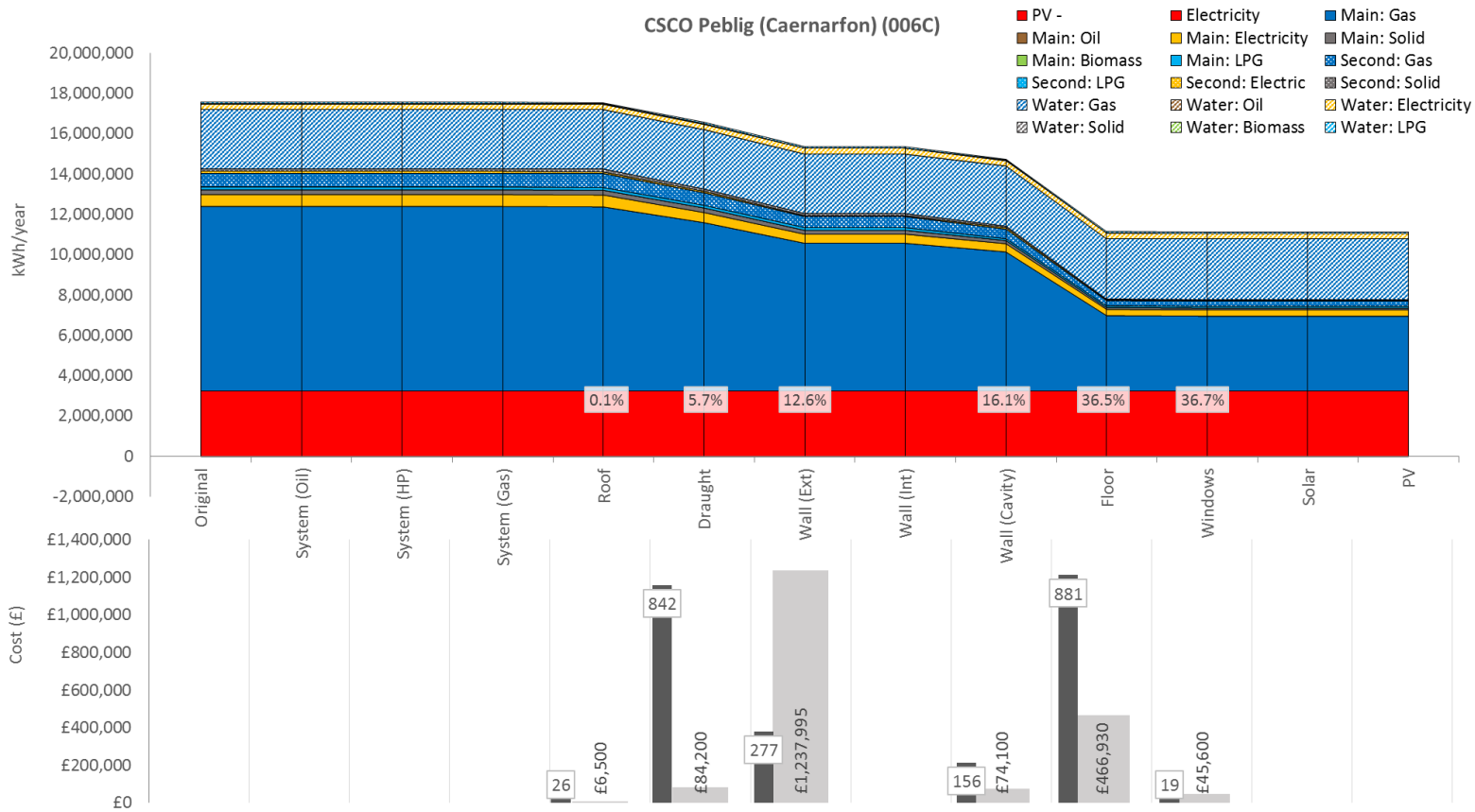
This area is a specified CSCO area

- 988 properties
- 868 (88%) of properties use mains gas, 8 (1%) LPG, 8 (1%) Solid, 104 (10%) Electricity
- 270 (27%) are solid walled, 718 (73%) are cavity walled
- 24 (2%) are detached, 465 (47%) semi d / end t, 341 (35%) mid t, 158 (16%) flats
- 362 (37%) are ABC rated, 557 (56%) DE rated and 69 (7%) FG rated



Peblig (Caernarfon) (006C)
CSCO Potential Improvement





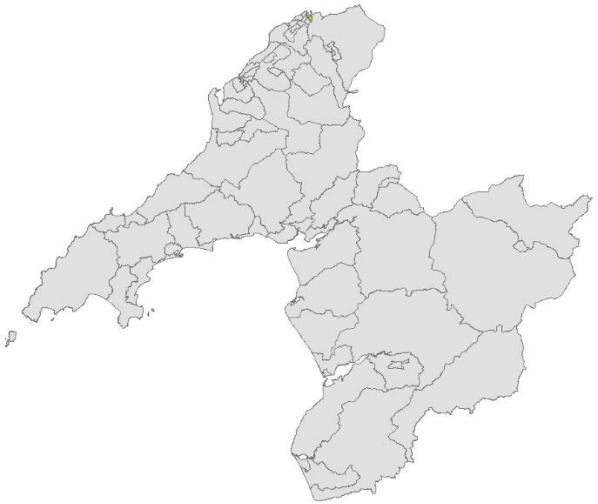
- **Energy consumption** could be reduced from **17.5GWh/year** to **11.1GWh/year**
- **Average reduction** per suitable property could be **6,520KWh/year** (a 36.7% reduction) and would **cost** approximately **£1,939** per property
- The % of efficient properties in **SAP rating bands A, B or C** could be increased from **37%** to **95%**
- **Total cost** of measures would be approximately **£1,915,325**

<u>Improvements and Costs</u>

Fabric: Insulating the roof of 26 properties would cost £6,500 (0.3% of the cost)
Draught proofing 842 properties would cost £84,200 (4.4% of the cost)
Externally insulating 277 properties would cost £1,237,995 (64.6% of the cost)
Insulating 156 Cavity walled properties would cost £74,100 (3.9% of cost)
Insulating the floors of 881 properties would cost £466,930 (24.4% of cost)
Installing efficient multiple glazing in 19 properties would cost £45,600 (2.4% of cost)

Marchog 1 (001D)

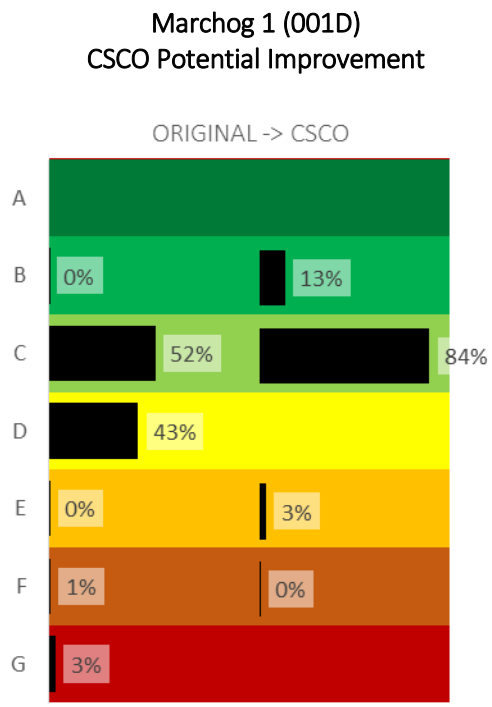
Within Môn a Menai Regeneration Area
Ranked 136 in WIMD 2011
1,456 people: Blue Collar Urban Families
Urban > 10K – Less Sparse (Wales)

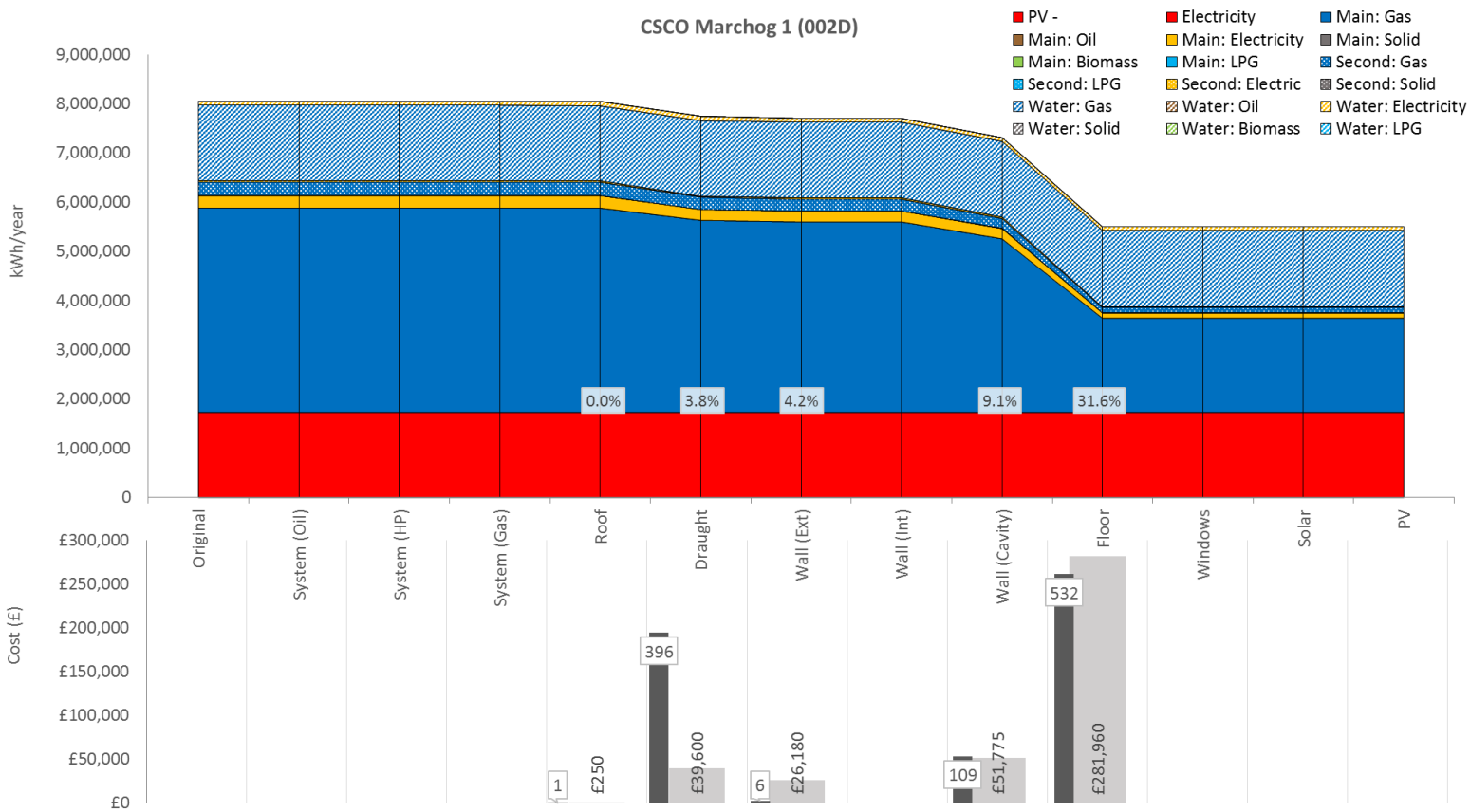


This area is a specified CSCO area

- 527 properties
- 413 (78%) of properties use mains gas, 1 (0.2%) LPG, 113 (21%) Electricity
- 12 (2%) are solid walled, 515 (98%) are cavity walled
- 31 (6%) are detached, 179 (34%) semi d / end t, 145 (28%) mid t, 172 (33%) flats
- 274 (52%) are ABC rated, 230 (44%) DE rated and 23 (4%) FG rated

527		DETACHED 31				SEMI D / END T 179				MID T 145				FLAT 172			
		SOLID 4		CAVITY 27		SOLID 8		CAVITY 171		SOLID 0		CAVITY 145		SOLID 0		CAVITY 172	
		L 2	S 2	L 12	S 15	L 4	S 4	L 68	S 103	L 0	S 0	L 120	S 25	L 0	S 0	L 110	S 62
GAS / LPG 414	ABC 216	1	1	3	3			21	17			57	10			72	31
	DE 193	1	1	8	11			47	39			63	10			13	
	FG 5				1	4											
OIL 0	ABC 0																
	DE 0																
	FG 0																
SOLID 0	ABC 0																
	DE 0																
	FG 0																
ELECTRICITY 113	ABC 58								21							9	28
	DE 37								13				5			16	3
	FG 18			1			4		13								
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																





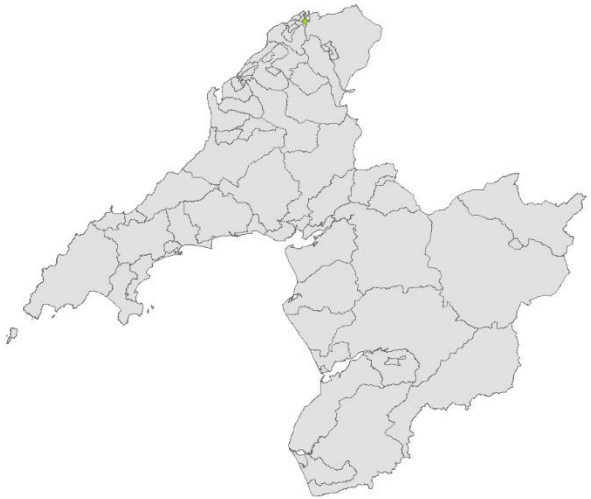
- **Energy consumption** could be reduced from **7.8GWh/year** to **5.3GWh/year**
- **Average reduction** per suitable property could be **4,716KWh/year** (a 31.6% reduction) and would **cost** approximately **£833** per property
- The % of efficient properties in SAP rating bands A, B or C could be increased from 52% to 97%
- **Total cost** of measures would be approximately **£438,820**

Improvements and Costs

Fabric: Insulating the roof of 13 properties would cost £3,250 (0.7% of the cost)
Draught proofing 402 properties would cost £40,200 (9.2% of the cost)
Externally insulating 23 properties would cost £101,145 (23% of the cost)
Insulating 115 cavity walled properties would cost £59,375 (13.5% of cost)
Insulating the floors of 425 properties would cost £225,250 (51.3% of cost)
Installing efficient multiple glazing in 4 properties would cost £9,600 (2.2% of cost)

Marchog 2 (002D)

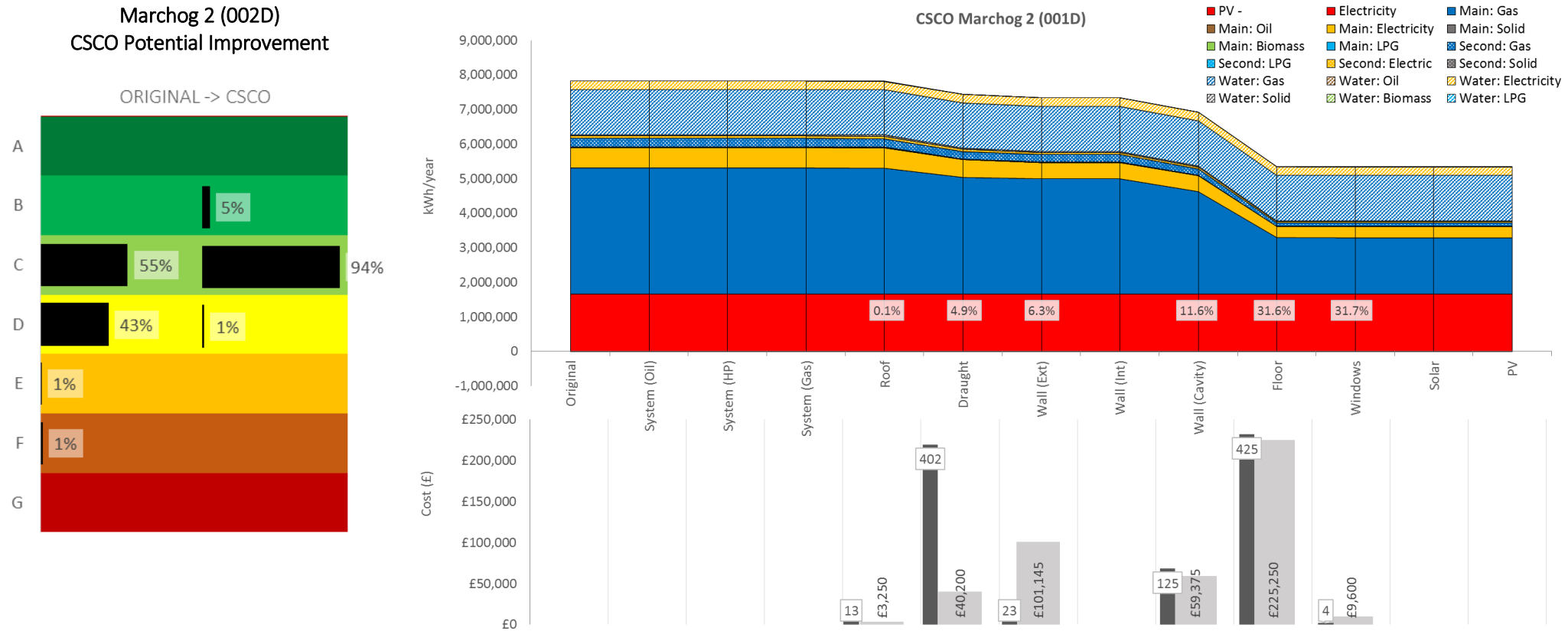
Within Môn a Menai Regeneration Area
Ranked 143 in WIMD 2011
1,151 people: Struggling Urban Families
Urban > 10K – Less Sparse (Wales)



This area is a specified CSCO area

- **537 properties**
- **501 (93%)** of properties use **mains gas, 36 (7%) Electricity**
- **6 (1%)** are **solid** walled, **531 (99%)** are **cavity** walled
- **2 (0.4%)** are **detached, 360 (67%) semi d / end t, 168 (31%) mid t, 7 (1%) flats**
- **296 (55%)** are **AB**C rated, **234 (44%) DE** rated and **7 (1%) FG** rated

537		DETACHED 2				SEMI D / END T 360				MID T 168				FLAT 7			
		SOLID 0		CAVITY 2		SOLID 4		CAVITY 356		SOLID 0		CAVITY 168		SOLID 2		CAVITY 5	
		L 0	S 0	L 0	S 2	L 4	S 0	L 133	S 223	L 0	S 0	L 74	S 94	L 1	S 1	L 1	S 4
GAS / LPG 501	ABC 295				1			60	124			27	80			1	2
	DE 206				1	4		69	90			33	7	1	1		
	FG 0																
OIL 0	ABC 0																
	DE 0																
	FG 0																
SOLID 0	ABC 0																
	DE 0																
	FG 0																
ELECTRICITY 36	ABC 1															1	
	DE 28							4	9			7	7			1	
	FG 7											7					
BIOMASS 0	ABC 0																
	DE 0																
	FG 0																



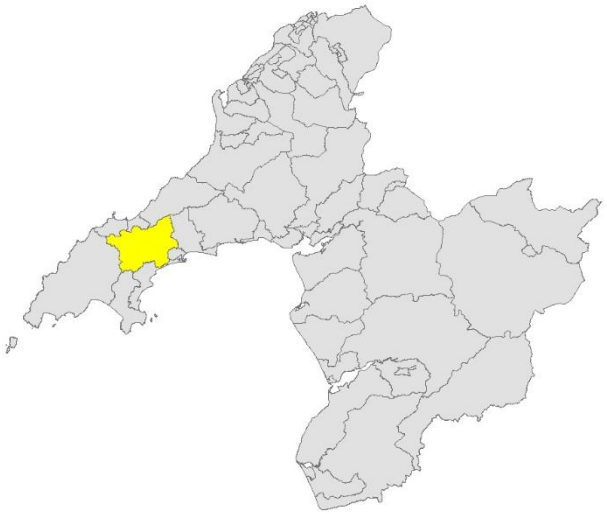
- **Energy consumption** could be reduced from **8.0GWh/year** to **5.5GWh/year**
- **Average reduction** per suitable property could be **4,735KWh/year** (a 31.7% reduction) and would **cost** approximately **£744** per property
- The % of efficient properties in SAP rating bands A, B or C could be increased from 55% to 99%
- **Total cost** of measures would be approximately **£399,765**

Improvements and Costs

Fabric: Insulating the roof of 1 property would cost £250 (0.1% of the cost)
Draught proofing 396 properties would cost £39,600 (9.9% of the cost)
Externally insulating 5 properties would cost £26,180 (6.6% of the cost)
Insulating 109 cavity walled properties would cost £51,775 (13% of cost)
Insulating the floors of 532 properties would cost £281,960 (70.5% of cost)

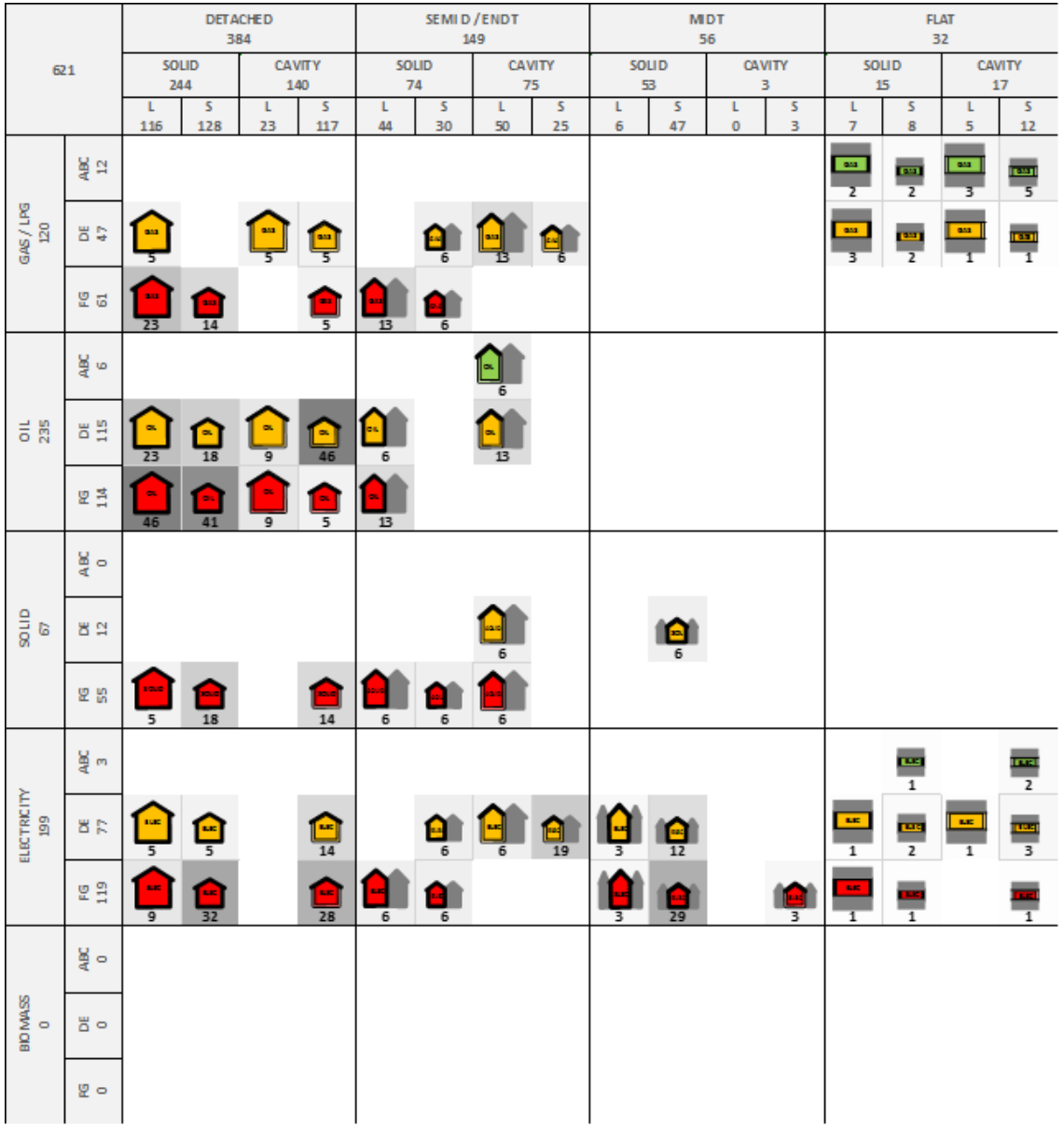
Efail-newydd/Buan (012A)

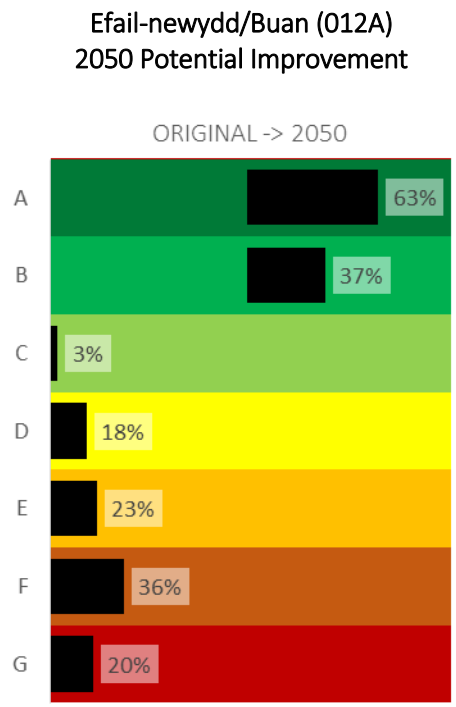
Ranked 1,075 in WIMD 2011
1,277 people: Countryside communities
Village, Hamlet & Isolated Dwellings – Sparse (Wales)

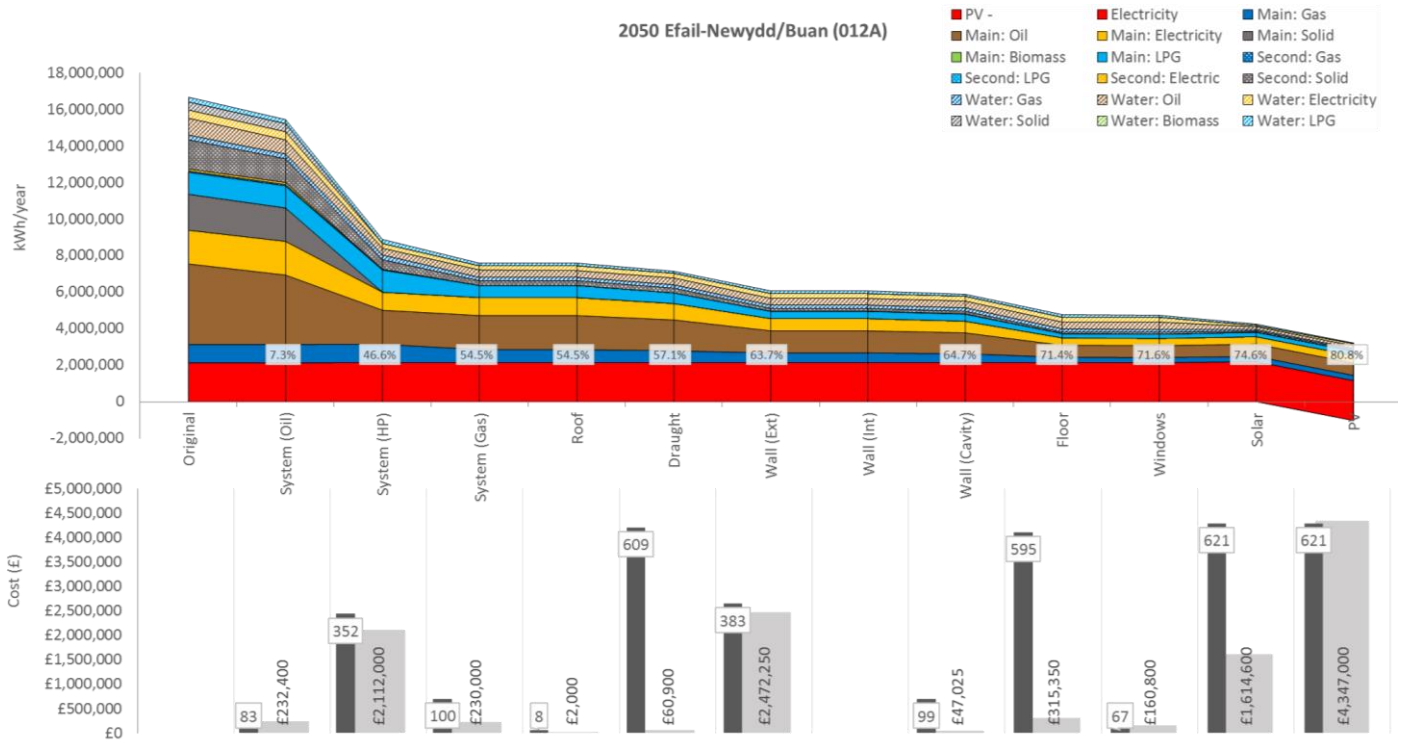


This area has the greatest 2050 potential for consumption reduction per property

- 621 properties
- 72 (12%) properties use mains gas, 48 (8%) LPG, 235 (38%) Oil, 67 (11%) Solid, 199 (32%) Electricity
- 386 (62%) are solid walled
- 384 (61%) are detached
- 21 (3%) are ABC rated, 251 (40%) DE rated and 349 (56%) FG rated







- **Energy consumption** could be reduced from **16.6GWh/year** to **3.2GWh/year**
- **Average reduction** per suitable property could be **21,651KWh/year** (a 80.8% reduction) and would **cost** approximately **£18,670** per property
- The % of efficient properties in **SAP rating bands A or B** could be increased from **3%** to **100%**
- **Total cost** of measures would be approximately **£11,594,325**

<u>Improvements and Costs</u>

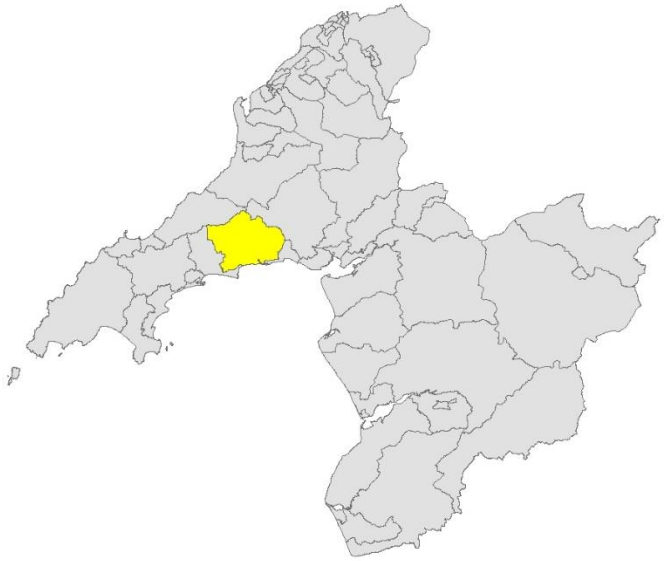
Systems: 22.2% of the cost (£2,574,400) would be to install efficient systems (535 Systems: 83 Oil, 352 Heat pumps, 100 Gas/LPG). Upgrading systems could reduce consumption by 9.1GWh/year

Fabric: Insulating the roof of 8 properties would cost £2,000 (0.02% of the cost). Draught proofing 609 properties would cost £60,900 (0.5% of the cost). Externally insulating 383 properties would cost £2,472,250 (21.3% of the cost). Insulating 99 cavity walled properties would cost £47,025 (0.4% of cost). Insulating the floor of 595 properties would cost £315,350 (2.7% of the cost). Installing efficient multiple glazing in 67 properties would cost £160,800 (1.3% of the cost). Fabric measures could reduce consumption in this area further by 2.8GWh/ year

Renewables: Installing 621 solar hot water systems could cost £1,614,600 (13.9% of cost). Installing 621 PV systems could cost £4,347,000 (37.5% of the cost). Installing renewables would reduce consumption further by 1.5GWh year

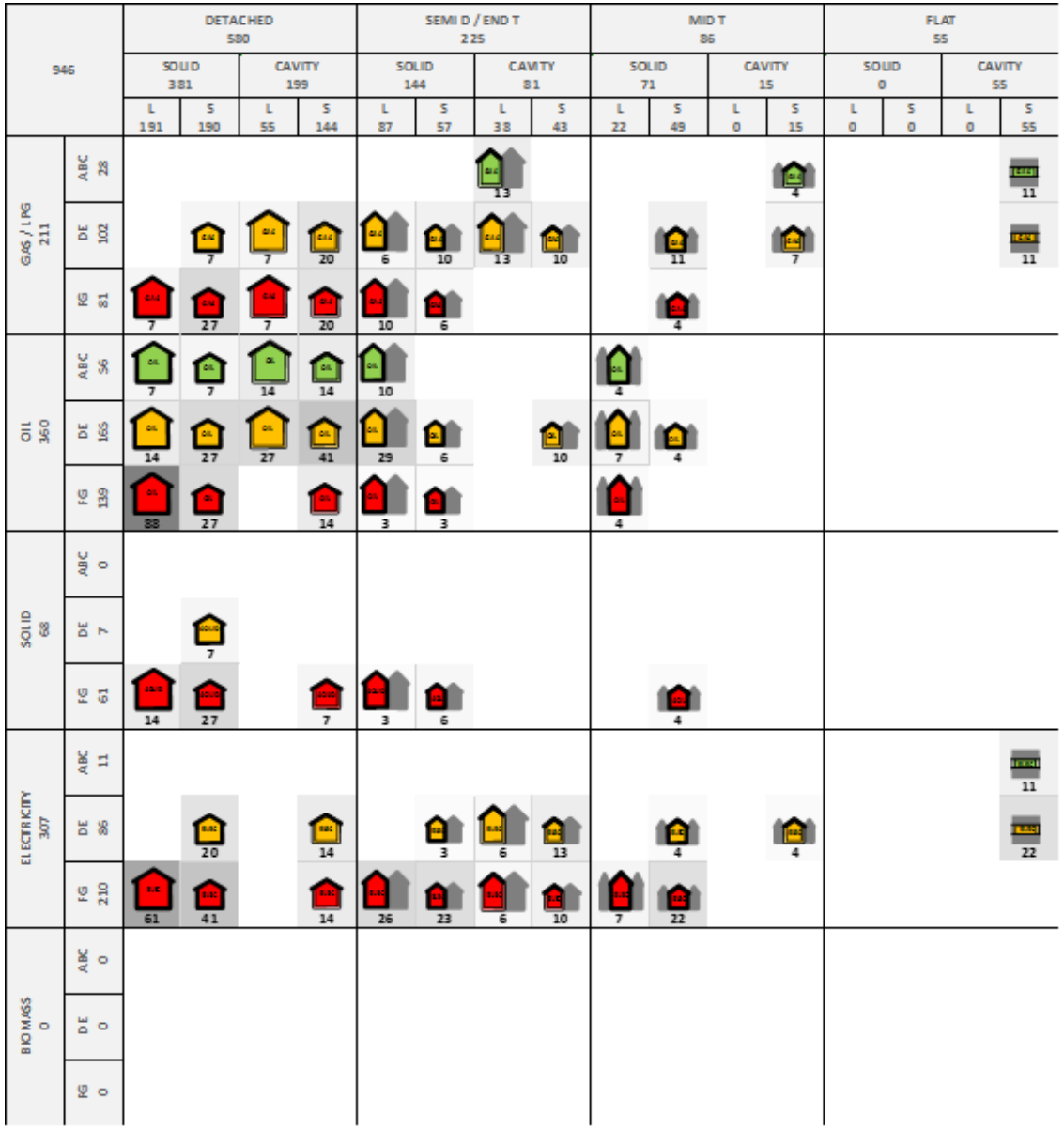
Llanystumdwy (011D)

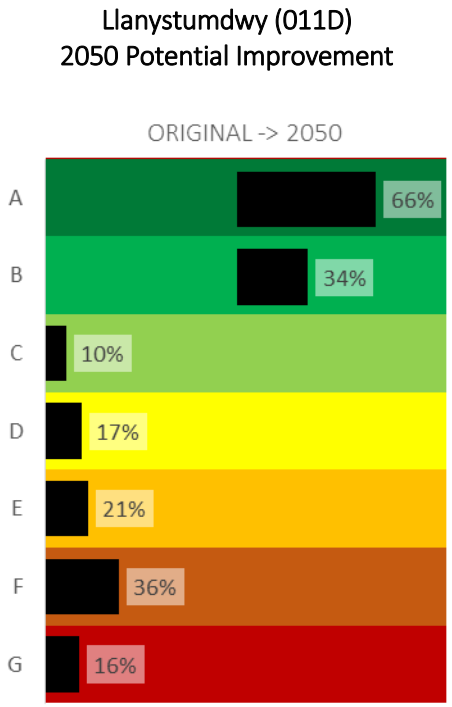
Ranked 1,2921 in WIMD 2011
2,069 people: Countryside communities
Village, Hamlet & Isolated Dwellings – Sparse (Wales)

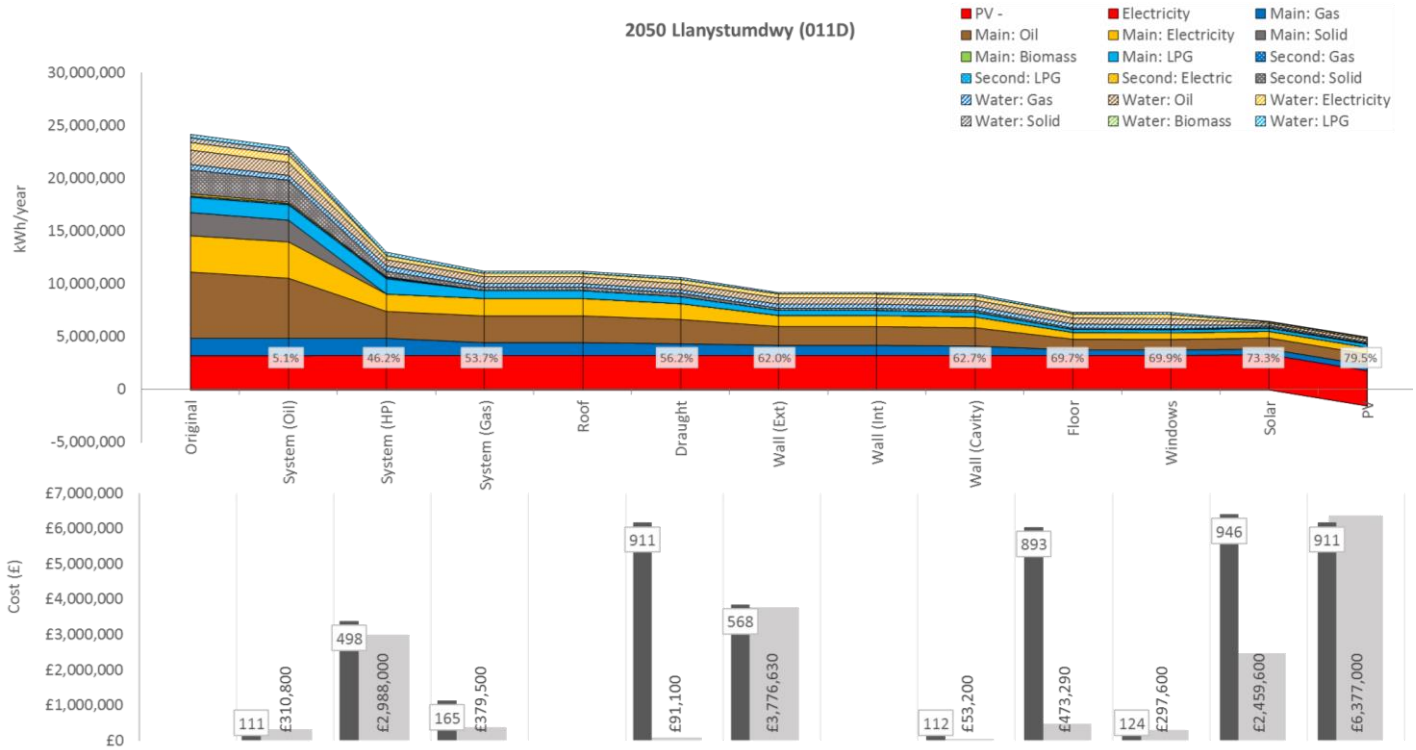


This area has the 2nd greatest 2050 potential for consumption reduction per property

- 946 properties
- 144 (15%) properties use mains gas, 67 (7%) LPG, 360 (38%) Oil, 68 (9%) Solid, 307 (32%) Electricity
- 596 (63%) are solid walled
- 580 (61%) are detached
- 95 (10%) are ABC rated, 360 (38%) DE rated and 491 (52%) FG rated







- **Energy consumption** could be reduced from **24.2GWh/year** to **4.9GWh/year**
- **Average reduction** per suitable property could be **20,315KWh/year** (a 79.5% reduction) and would **cost** approximately **£18,189** per property
- The % of efficient properties in **SAP rating bands A or B** could be increased from **0%** to **100%**
- **Total cost** of measures would be approximately **£17,206,720**

<u>Improvements and Costs</u>

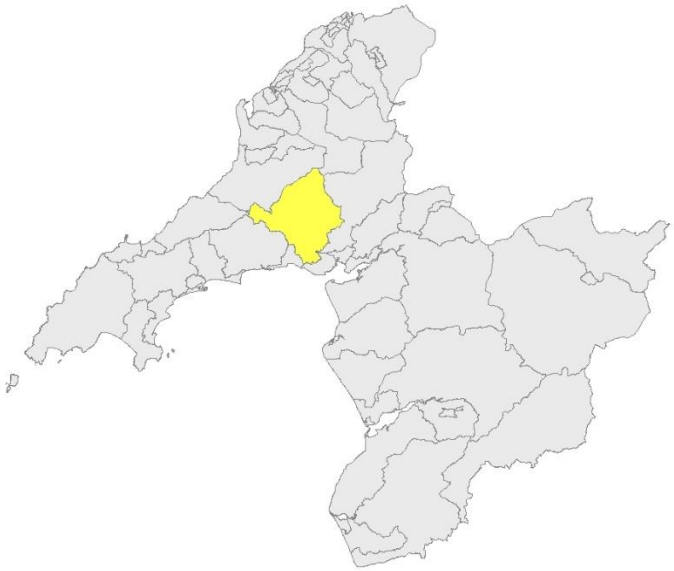
Systems: 21.4% of the cost (£3,678,300) would be to install efficient systems (774 Systems: 111 Oil, 498 Heat pumps, 165 Gas/LPG). Upgrading systems could reduce consumption by 13GWh/year

Fabric: Draught proofing 911 properties would cost £91,100 (2.2% of the cost). Externally insulating 568 properties would cost £3,776,630 (22% of the cost). Insulating 112 cavity walled properties would cost £53,200 (0.3% of cost). Insulating the floor of 893 properties would cost £473,290 (2.8% of the cost). Installing efficient multiple glazing in 124 properties would cost £297,600 (1.7% of the cost). Fabric measures could reduce consumption in this area further by 3.9GWh/ year

Renewables: Installing 946 solar hot water systems could cost £2,459,600 (14.3% of cost). Installing 911 solar hot water systems could cost £6,377,000 (37.1% of cost). Installing renewables would reduce consumption further by 2.3GWh year

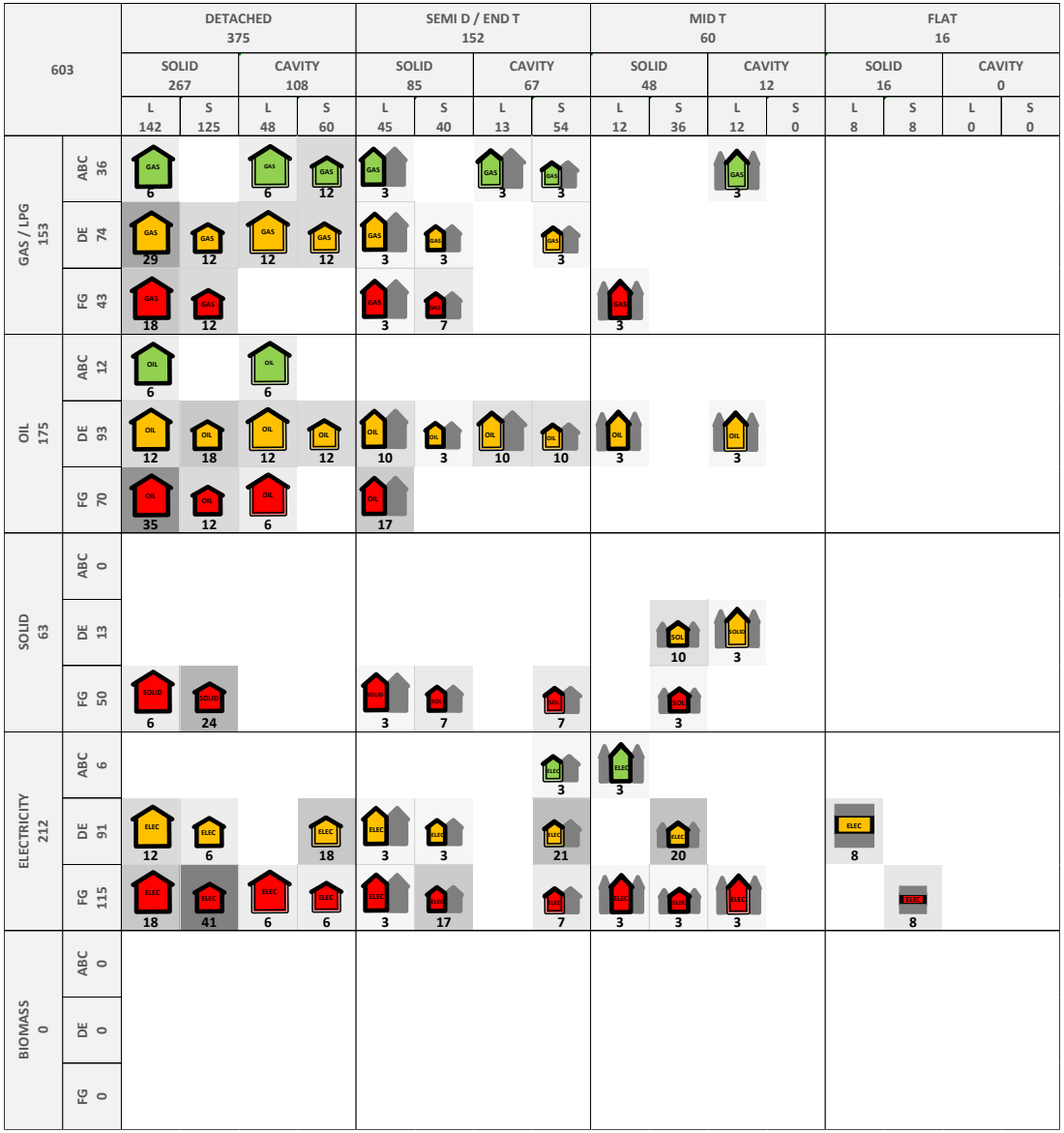
Dolbenmaen (010A)

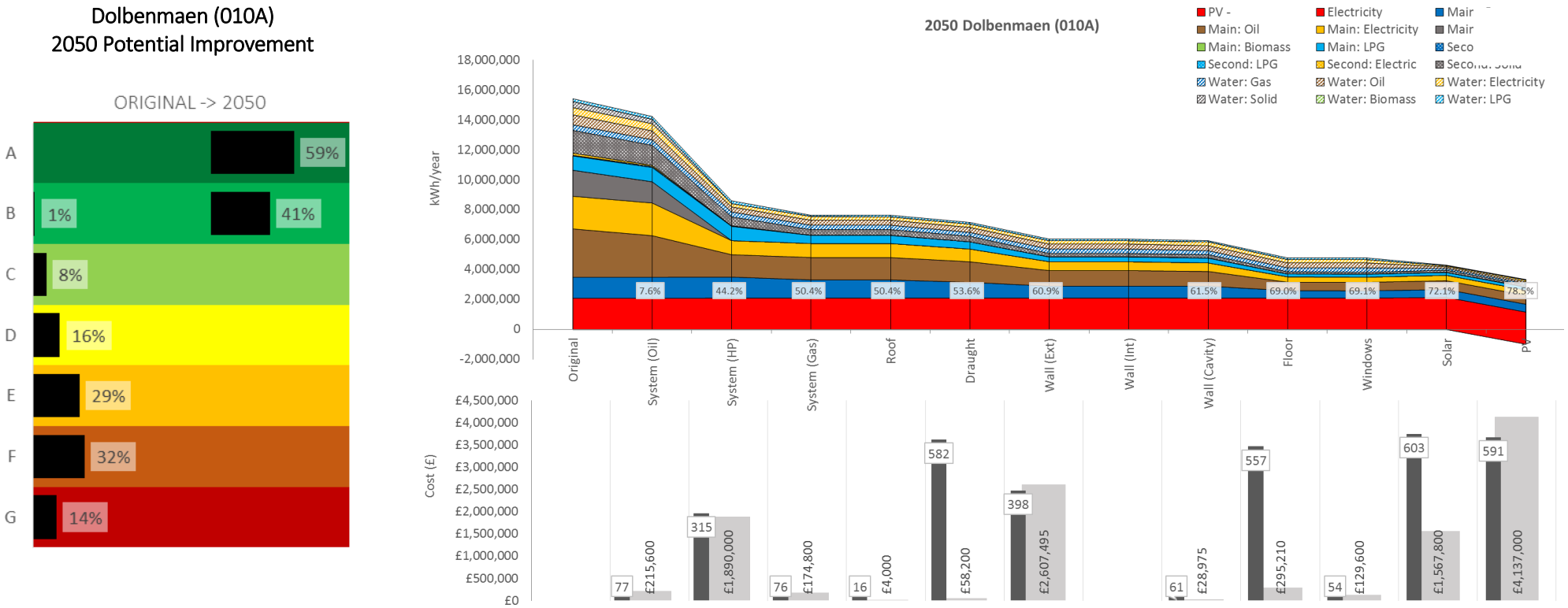
Ranked 958 in WIMD 2011
1,240 people: Countryside communities
Village, Hamlet & Isolated Dwellings – Sparse (Wales)



This area has the 3rd greatest 2050 potential for consumption reduction per property

- 603 properties
- 490 (81%) of properties are off mains gas:
  40 (7%) LPG, 175 (29%) Oil, 63 (10%) Solid, 212 (35%) Electricity
- 416 (69%) of properties are solid walled
-
- 375 (62%) are detached
- 54 (9%) are ABC rated, 271 (45%) DE rated and 278 (46%) FG rated





- **Energy consumption** could be reduced from **15.4GWh/year** to **3.3GWh/year**
- **Average reduction** per suitable property could be **20,033KWh/year** (a 78.5% reduction) and would **cost** approximately **£18,422** per property
- The % of efficient properties **in SAP rating bands A or B** could be increased from **1%** to **100%**
- **Total cost** of measures would be approximately **£11,108,680**

<u>Improvements and Costs</u>

Systems: 20.5% of the cost (£2,280,400) would be to install efficient systems (468 Systems: 77 Oil, 315 Heat pumps, 76 Gas/LPG). Upgrading systems could reduce consumption by 7.8GWh/year

Fabric: Insulating the roof of 16 properties would cost £4,000 (0.04% of the cost). Draught proofing 582 properties would cost £58,200 (0.5% of the cost). Externally insulating 398 properties would cost £2,607,495 (23.5% of the cost). Insulating 61 cavity walled properties would cost £28,975 (0.3% of cost). Insulating the floor of 557 properties would cost £295,210 (2.7% of the cost). Installing efficient multiple glazing in 54 properties would cost £129,600 (1% of the cost). Fabric measures could reduce consumption in this area further by 2.9GWh/ year

Renewables: Installing 603 solar hot water systems could cost £1,567,800 (14.1% of cost). Installing 591 solar hot water systems could cost £4,137,000 (37.2% of cost). Installing renewables would reduce consumption further by 1.4GWh year

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