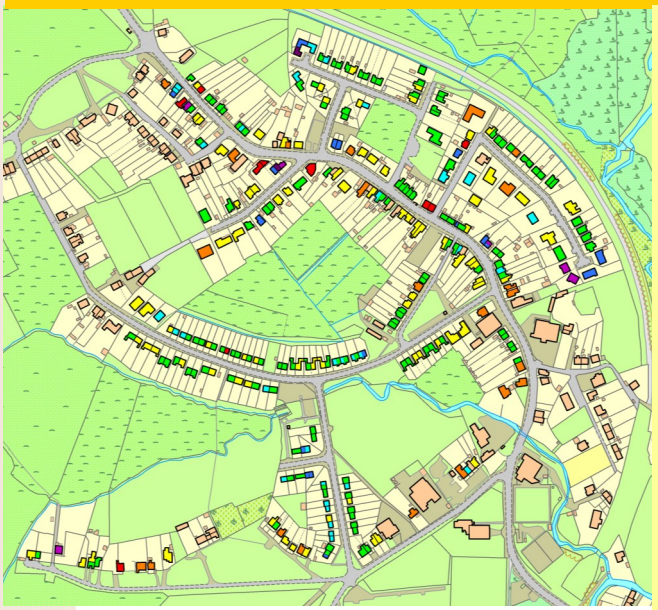
CARBON MAPPING SUMMARY:
CWMLLYNFELL (AWEL AMAN TAWE)

EVALOC
EVALUATING LOW CARBON COMMUNITIES

COMMUNITY SUMMARY CI-CM OCTOBER 2014



KEY FINDINGS:

CHANGES IN ENERGY AND CARBON EMISSIONS:

PRE-LCCC COMMUNITY (2008)
Average household energy use: **25,530 kWh/yr (8,239 kgCO_2/yr)**

POST-LCCC COMMUNITY (2012)
Average household energy use: **22,891 kWh/yr (7,342 kgCO_2/yr)**

*This represents a **10.3%** community energy use reduction following LCCC action.*

FUTURE SAVINGS POTENTIAL:

Depending on need, **WALL INSULATION** or new **HIGH EFFICIENCY HEATING SYSTEM** provided the greatest singular measure reductions in the mapped households.

Packaged retrofits could provide a CO_2 reduction of **UP TO 73%** in some homes.

1. Introduction

The UK is committed to reducing greenhouse gas emissions by 80% from 1990 levels. In order to meet these commitments, reducing energy use in the domestic sector is critical as it accounts for 29% of the UK's total energy consumption. Recent Government funding and initiatives have aimed to reduce household energy use through behaviour change and increased energy efficiency of the UK's existing building stock. One such programme was the Low Carbon Communities Challenge (LCCC), which funded 22 low carbon community organisations to undertake energy reduction activities in their local community. Its focus was on reducing carbon emissions in these communities as well as stimulating pro-energy behaviours and further energy improvements in individual households through capital funding of physical interventions to homes and buildings, behaviour change campaigns and low carbon living activities. The theoretical carbon savings from the 8,206 installed measures and technologies for the entire LCCC programme was 3,062 tonnes of CO_2/year. The information contained within this summary document uses a geographical informational modelling and mapping, or carbon mapping, tool to assess the impact of the LCCC physical measures as well as provide recommendations for future potential action in the case study low carbon community that benefitted from LCCC funding.

Creating a common language for achieving community-led local carbon emission reductions.

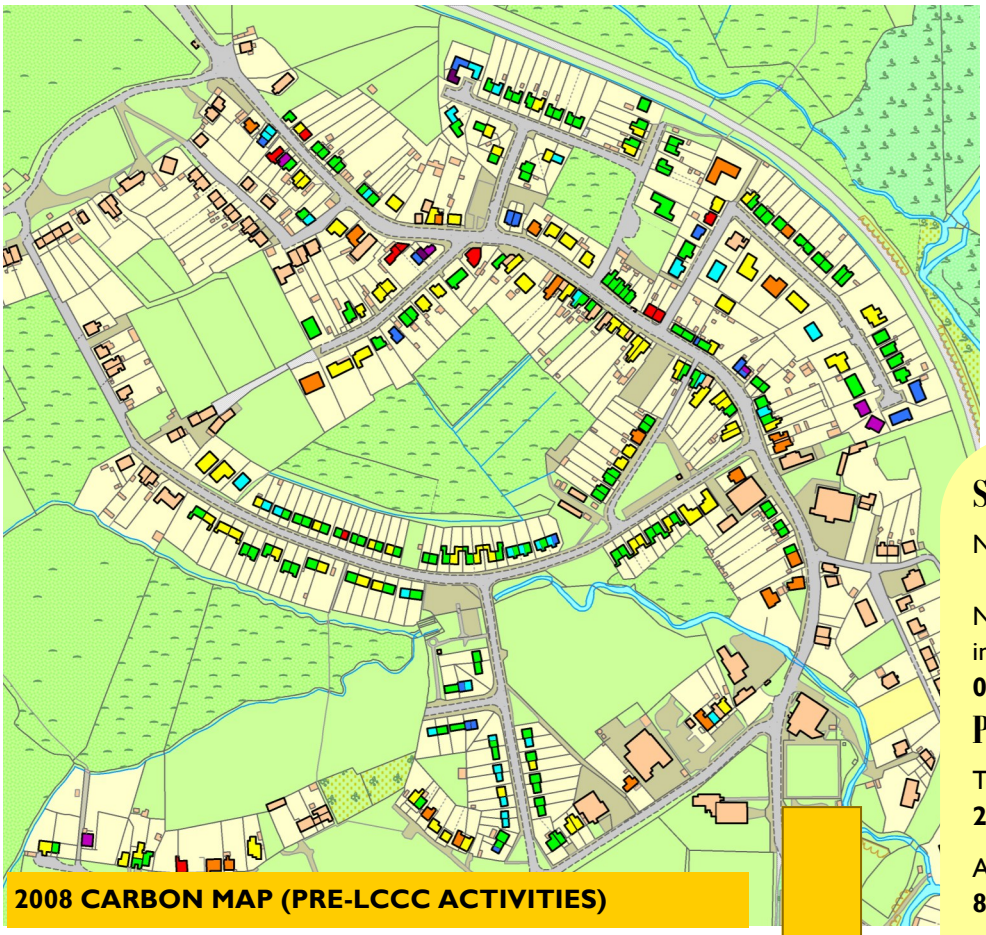
1.1 What is carbon mapping?

Carbon mapping is measuring, modelling and mapping the estimated local energy use and resultant carbon dioxide emissions in order to inspire reduction of household energy use locally. Carbon mapping is performed using DECoRuM. DECoRuM is an award-winning mapping based tool with the capability to estimate the energy performance and carbon emissions on a house-by-house level, and the potential energy savings from home energy improvements. The results can be aggregated to a street, district, suburb or city level. DECoRuM gathers data from a wide array of sources including ordnance survey, English Housing Condition Surveys, Energy Performance Certificates (EPCs), as well as questionnaires filled in by local residents.

Carbon mapping allows users to:

- Evaluate the costs for domestic CO_2 emission reductions by deploying a range of best practice energy efficiency measures, low carbon and renewable energy technologies on a community scale.
- Use a locally-relevant approach and well-established methodologies to ensure credibility for carbon emission reduction planning in built areas.
- Make assessments without access to properties.
- Spatially locate and target pollution hotspots for improvement.
- Makes energy visible to households in a useful way, further influencing and encouraging energy literacy and take-up of pro-energy behaviours and technologies.

2. MEASURING THE EFFECTIVENESS OF COMMUNITY ACTION: CHANGES IN CO_2



2008 CARBON MAP (PRE-LCCC ACTIVITIES)

Annual CO2 emissions (kgCO2/yr)
2008

16,000+	(12)
12,000 to 16,000	(22)
8,000 to 12,000	(81)
6,000 to 8,000	(134)
5,000 to 6,000	(32)
4,000 to 5,000	(17)
3,000 to 4,000	(6)
<3,000	(2)

Summary:

Number of households mapped: **311**

Number of households directly involved in LCCC activities within mapped area: **0**

Pre-LCCC activities:

Total carbon emissions: **2,562,267 $kgCO_2$/yr**

Average household carbon emissions: **8,239 $kgCO_2$/yr**

Post-LCCC activities:

Total carbon emissions: **2,283,296 $kgCO_2$/yr**

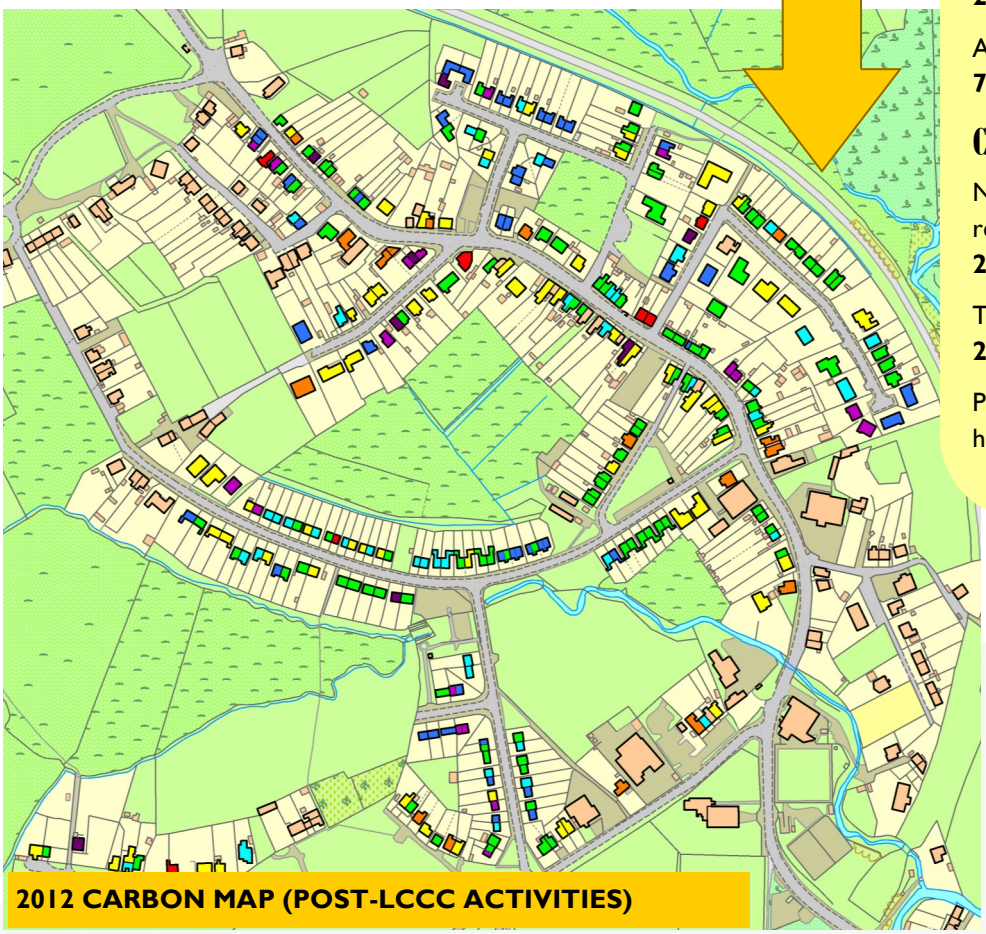
Average household carbon emissions: **7,342 $kgCO_2$/yr**

Change in carbon emissions:

Number of households that have reduced their carbon emissions: **293 (94%)**

Total carbon emission reductions: **278,971 $kgCO_2$**

Percentage reduction in average household carbon emissions: **10.3%**



2012 CARBON MAP (POST-LCCC ACTIVITIES)

Annual CO2 emissions (kgCO2/yr)
2012

16,000+	(7)
12,000 to 16,000	(19)
8,000 to 12,000	(64)
6,000 to 8,000	(103)
5,000 to 6,000	(41)
4,000 to 5,000	(45)
3,000 to 4,000	(19)
<3,000	(8)

3. RECOMMENDATIONS FOR FUTURE ACTION

3.1 Individual measures

DECoRuM was used to test the impact of individual measures where they are still needed, on further carbon reductions for the community. It was found that:

- Cavity wall insulation resulted in a mean 22% reduction.
- Solid wall insulation resulted in a mean 32% reduction.
- A new condensing boiler, cylinder and pipe insulation resulted in a mean 21% reduction.
- Reducing the thermostat setting from 21-19°C resulted in a mean 7% reduction.

3.2 Packages of measures

In order to understand the savings if more than one measure is undertaken at one time (as the savings from individual measures are not cumulative), packages of measures were also modelled:

1. FABRIC PACKAGE:

- Wall insulation (cavity or solid as required)
- Loft insulation
- Floor insulation
- Double glazing
- Draught-proofing

SAVINGS (reductions from current baseline): 34% for cavity wall homes, 47% for solid wall homes, 14% for cavity wall insulated homes

2. FABRIC & HEATING UPGRADE PACKAGE:

Fabric package +

- New condensing boiler or heat pump
- Hot water tank insulation
- Pipework insulation
- Heating controls

SAVINGS (reductions from current baseline): 53% for cavity wall homes, 62% for solid wall homes, 32% for cavity wall insulated homes

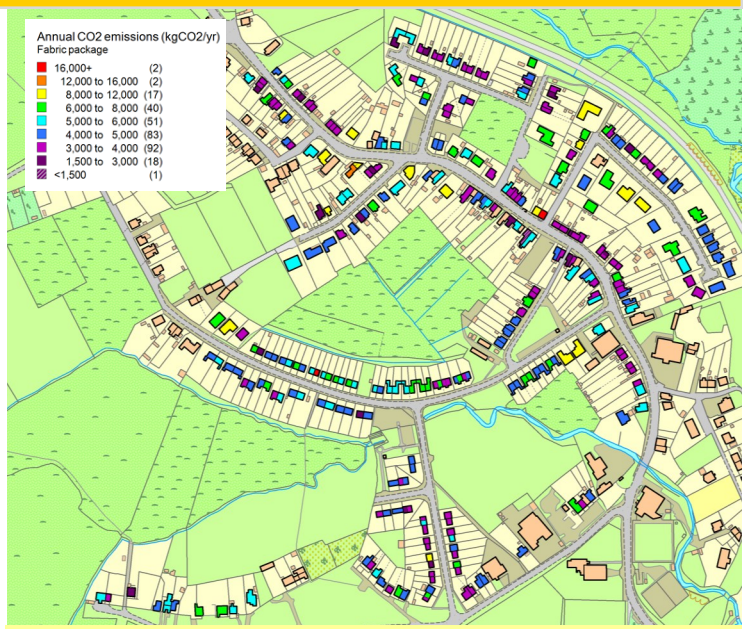
3. FABRIC, HEATING & ELECTRICITYPACKAGE:

Fabric & heating upgrade package +

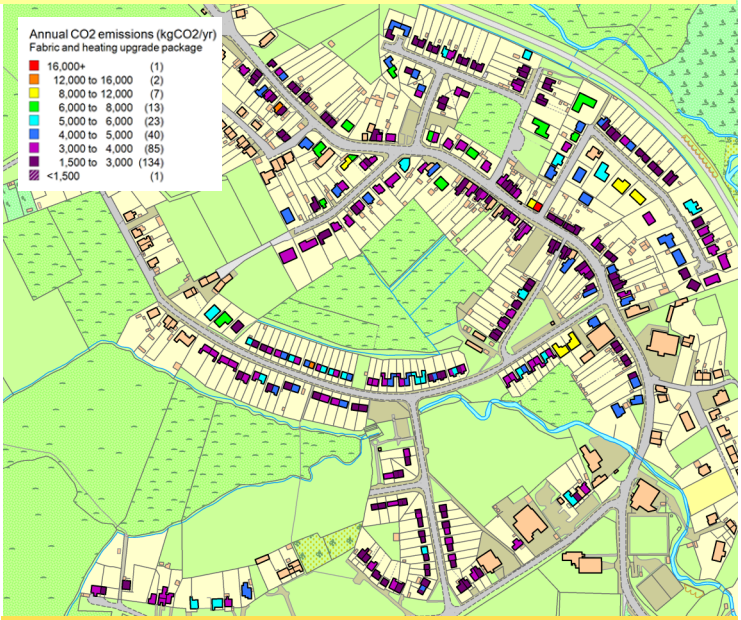
- Energy efficient lighting and appliances
- Photovoltaic solar system
- Solar hot water system

SAVINGS (reductions from current baseline): 63% for cavity wall homes, 72% for solid wall homes, 43% for cavity wall insulated homes

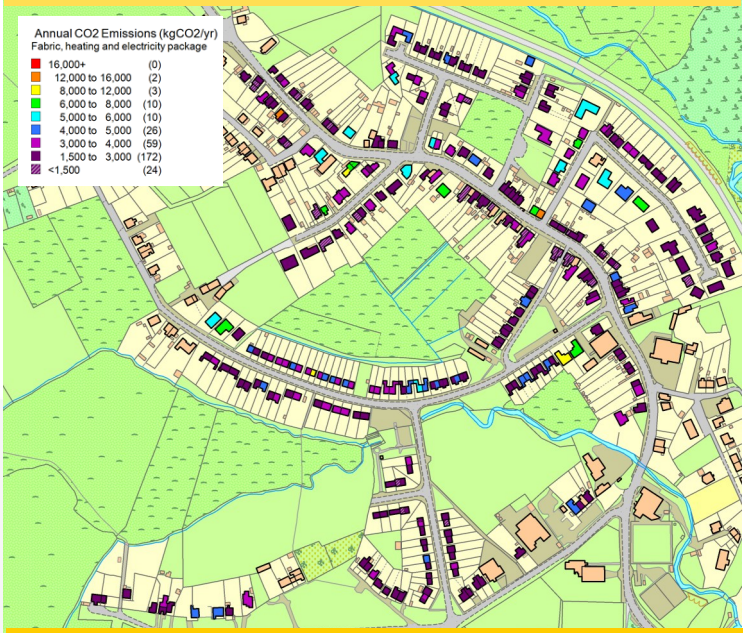
Community-scale package retrofitting (rather than individual scale improvements) has the potential to reduce capital cost due to economies of scale. Large-scale retrofitting can also increase the awareness and magnitude of increase in home values in the community.



FABRIC PACKAGE



FABRIC & HEATING UPGRADE PACKAGE



FABRIC, HEATING & ELECTRICITY PACKAGE

3.3 Potential package reductions by dwelling type:

1930-49 Semi-detached (41% of the carbon mapped area)

Reduction from current baseline:

- **32%** from the fabric package
- **52%** from the fabric & heating upgrade package
- **61%** from the fabric, heating upgrade & electricity package

Pre-1930 Semi-detached (14% of the carbon mapped area)

Reduction from current baseline:

- **47%** from the fabric package
- **62%** from the fabric & heating upgrade package
- **73%** from the fabric, heating upgrade & electricity package

1950-65 Semi-detached (24% of the carbon mapped area)

Reduction from current baseline:

- **17%** from the fabric package
- **40%** from the fabric & heating upgrade package
- **50%** from the fabric, heating upgrade & electricity package

Pre-1930 Terraced (13% of the carbon mapped area)

Reduction from current baseline:

- **46%** from the fabric package
- **63%** from the fabric & heating upgrade package
- **73%** from the fabric, heating upgrade & electricity package

3.4 Annual energy cost reduction ranges between dwelling type:

Fabric package: **£220-770**
Fabric & heating upgrade package: **£580-980**
Fabric, heating upgrade & electricity package: **£1,170-1,860**
(includes Feed-in Tariffs and Renewable Heat Incentive payments)

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The EVALOC project seeks to assess, explain and communicate the changes in energy use due to community activities within six selected case study projects under the Department of Energy and Climate Change's (DECC) Low Carbon Communities Challenge (LCCC) initiative, a government-supported initiative to transform the way communities use and produce energy, and build new ways of supporting more sustainable living.

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