Talysarn and Nantlle Community Energy Survey

Summary and Key Findings

1. Project Objectives

i) By means of a representative survey of the properties and householders in Talysarn and Nantlle, make a determination of the levels of fuel poverty in the villages, the opportunities for energy improvements to properties and the installation of renewable technologies.
ii) Make recommendations for a strategy to carry out the energy improvements, maximising the opportunities for local employment. Make proposals to secure the implementation of the strategy as a long tem energy project, including identifying the resources needed.
iii) To carry out the necessary work on a local community building (the Canolfan) leading to recommendations for energy improvements and appropriate renewable technologies and funding to take these forward.

2. Method

To discover the potential improvements that are appropriate and estimate the benefits, both the financial savings people may make and reduced environmental impact from energy use, a comprehensive survey has been conducted. External surveys of 551 of the properties have been carried to determine age, wall construction, glazing types and, where possible, heating type. Detailed surveys of 52 households has provided more filled in details not visible from outside the properties and information collected on heating use, costs and incomes.

3. Outcomes

Although it was not possible to recruit a truly randomised sample for detailed surveys, the support from volunteers has resulted in a reliable representative model for the properties found in Talysarn and Nantlle, though the under representation of working families in the samples means that costs and incomes data can only be regarded as indicative. As a result of this a number of opportunities for energy improvements and renewable energy generation have been identified. The current cost of providing adequate heating and the financial and carbon savings that result from improvements have been worked out.

From the age and appearance of most of the properties it was anticipated that the majority would be a solid stone walled construction. It was expected that most lofts and cavity walls, where they existed would be fully insulated, that full double glazing would be nearly universal and that, where available, most homes would have mains gas fired central heating. Heating costs were expected to be much higher than the national average, mostly due to high heat losses through the walls.

From the detailed surveys:

- 15% of households were found to be spending more than 10% of income on heating and hot water. In almost all of these cases the

heating was on for all of the day, either through choice for comfort or because of reduced mobility.
- 40% of households were spending significantly less than required for adequate heating and hot water.
- 30% of households would have needed to spend more than 10% of income to achieve adequate heating and hot water.
- If all the measures proposed in this report were adopted no households would need to spend more than 10% of their income to achieve adequate heating and hot water.

For the whole area covered by the surveys (excluding some of the outlying Properties):
- 71% have solid walls
- 16% an uninsulated room in the roof space
- 37% have insufficiently insulated loft spaces
- 21% have at least some cavity walls which require insulation.
- Many of the solid walled properties have some degree of dampness due to cold walls, especially around windows,
- Some solid wall properties suffer occurrences of penetrating damp where there are faults in the external render.
- 70% of properties are fully double glazed and a further 10% partially so.
- Single glazed properties, especially those in Nantlle which cannot be double glazed for planning reasons, are difficult to heat and comfort is reduced because of draughts.
- Mains gas is available to 79% of the houses but only 82% of these have mains gas heating (58% of the total).
- In houses that do not use a mains gas connection roughly equal numbers use open coal fires, oil central heating, peak electric heating, wood/coal stoves or electric storage heaters. A very small number use tank or bottled propane.

4. Canolfan Talysarn

The heating cost is much higher than should be experienced for a building of this construction. The heating in the main hall is particularly ineffective because of the position of the radiators high up on the wall and without the air circulation fans that were part of the original design. Lack of controls, heating of all areas when only part is needed, the inefficient boiler in the older part and thermal inefficiency of the older part all contribute to costs.
The main areas to be addressed are:
- solid wall insulation of the older parts and replacement of the boiler there
- zoning of the heating to restrict the heat to areas in use
- lowering the radiators in the main hall and ensuring good circulation of the air, probably with a heat recovery ventilation system.

5. Opportunities

The analysis of the survey indicates that there many opportunities for improving the energy efficiency of houses and for the installation of renewable energy.

a. Loft insulation & Heating Systems

- Around 200 properties still require improved loft insulation and about 100 have some cavity walls that should be insulated, mostly in extensions.
- 43% of the homes are suitable for heating upgrades, mostly either by taking up a gas connection with central heating or replacing very old gas boilers or back boilers behind gas fires.
- Significant reductions in heating costs and carbon emissions would result from these simple improvements, some of which supported by grants or other subsidies.

b. Solid Walls & Un-insulated Rooms

- Almost 80% of the properties have solid walls, including the outlying properties, and a further 16% have an un-insulated room in the loft. While bringing these up to the standard expected of a modern home involves more serious work and is more costly the benefits in terms of financial savings and increased comfort are similarly greater. These measures will also reduce dampness caused by condensation.
- Currently such improvements are not supported by general grant schemes, but certain programmes may help and the cost of remedial measures may be reduced by training and using local contractors.

c. Installation of Renewable Energy

- The orientation of most of the roofs in the village make them suitable for roof mounted solar panels, for producing both hot water and electricity. These are expensive, though prices should fall as a result of anticipated increased demand.
- Although there is little in the way of grants towards the cost on installation, the recently introduced *Feed in Tariffs* (FIT's) for producing electricity and future *Renewable Heat Incentives* (RHI)'s for producing heat will pay a substantial income to homes with these installed. The challenge is to find ways to finance the upfront costs so that everyone can benefit. Local contractors would be able to install these after suitable training and accreditation.

d. Other Energy Related Problems

A number of simple, mostly very low cost, options are available that would deal with some of the problems experienced in homes.

- Sempatap, a thin latex foamed product that is put up like a wall paper, would reduce condensation around window openings.
- Plastic film attached to window frames would act as temporary double glazing where other solutions are unsuitable.
- Excessive moisture can be reduced without making properties colder by using extractors with heat recovery *systems*.
- All of these measures could be organised locally.
- In most of the homes visited additional advice was provided for a

range of issues and this would be valuable part of any future project.

e. Savings to Households
The summary of the benefits these measures bring to households is provided in table 2 (Page 6). The average household savings are shown in table 4 (Page 7). With the incomes provided by solar panels, the average costs of providing adequate heating and electricity can be reduced from £1,442 to under £100 per year.

f. Indicative Cost of Improvements
Currently the cost for the major measures identified are approximately £4k for external solid wall insulation, £3k for solar thermal panels and £7.5k for solar PV. Cavity wall and loft insulation upgrades will be in the range of £200 to £500, but grants are available for much of this. Boiler upgrades will cost around £1.5k, but could be reduced through the boiler scrappage scheme. It is expected that the cost of all major items could be reduced by around a third by the adoption of the follow on project and alternative ways to subsidise the upfront costs should be pursued.

6. Carbon footprint

Reduction in carbon dioxide emissions due to energy use are one of the main incentives for support for energy saving and is a way that individuals can contribute to combating man made climate change. Table 3 (page 6) summarises the potential that the suggested measures can make towards reducing emissions. The current average household emissions amount to 7.4 tonnes of carbon dioxide each year and taking up all the measures will reduce this to 3.7 tonnes.

7. Other Factors

Adoption of the proposals made below will result in lower heating costs and households will be better placed as energy costs rise. It will be more affordable for currently under heated households to be become warmer. Further benefits include;

- **Reduction in use of primary health care needs through people living in properly heated, ventilated and damp free homes**
- **Creation of employment and training opportunities for local people in building, heating and renewable energy businesses.**

8. Next Steps for Talysarn & Nantlle Energy Project

The survey findings have demonstrated the opportunities and the benefits of adopting a programme of substantial improvements in energy efficiency and renewable energy in a rural Welsh village with large numbers of older properties.

If the recommendations are to be implemented a development officer will be needed with responsibility for:

- helping householders access the existing measures and grants that address improving insulation
- helping householders access existing measures and grants for renewable energy

- encouraging local businesses to provide relevant goods and services
- the development of financial mechanisms to ensure that private & social tenants and those with limited financial resources can benefit from the grants and payments available
- working in conjunction with other agencies to ensure that maximum advantage is taken of all opportunities for improving energy efficiency and renewable energy in the locality.

8. Project Evaluation

This project has demonstrated that a detailed appraisal of the energy performance, opportunities for improvements and benefits for a small community can be carried out with a high level of confidence in the outcomes. It has been established that the method can be used more generally.

The sampling problems are encountered in all surveys, questionnaires and activities related to energy consumption. Here, as is usually experienced, the majority of respondents are more mature, leaving young families under represented. As a result the information collected regarding incomes and amount spent on heating does not have the same level of confidence as the property data. The main conclusions concerning Fuel Poverty are broadly correct if not numerically robust.

The timescale for carrying out this project was short, leaving no time to prepare the community before starting data collection. During the course of the data collection it was clear that as local people became more familiar with the project, so did their interest and confidence. To be most effective community support should be garnered in advance.

The amount of usable, representative data collected offered the opportunity for very detailed analysis but this was time consuming and lead to further delays in producing the outcomes.

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Table 1. Income and cost of heating, before and after improvements

Currently spend more than 10% of income	Spending significantly less than needed to heat home	Spending significantly more than needed to heat home	Would currently need to spend more than 10% of income to sufficiently heat home	Would need to spend more than 10% of income on heating after improvements
15%	40%	12%	30%	0%

Table 2. Improvements that can be made and savings that result

	Insulate Solid Wall	Insulate room in roof	Insulate cavity walls	Improve loft insulation	Heating upgrades	*Temp double glazing	**Solar Thermal panels	**Solar PV panels
Number needing measures	393	88	118	206	236	59	551	551
Average household saving	£319	£186	£138	£182	£229	£30	£295	£817

* In Nantlle only, saving calculated from draught-proofing provided

** Includes the income from producing heat and electricity from renewable sources (FIT and RHI)

Table 3. Carbon emissions savings that result from improvement

	Current values	With Energy Efficiency Improvements	With Energy Efficiency Improvements and Heating Upgrades	With Energy Efficiency Improvements, Heating Upgrades and Solar Thermal	With Energy Efficiency Improvements, Heating Upgrades, Solar Thermal and Solar PV
Total CO_2 emission tonnes/year	4082.7	2920.2	2589.0	2396.2	2037.9
% Saving Carbon emissions		28%	37%	42%	50%

Table 4. Total savings made by improvements to homes

	Average Annual Household Heating and Hot Water Costs	Average Annual Household Heating, Hot Water and Electricity Costs	Average Household Annual Energy Costs (inc income from Solar Thermal and PV)	% Average Saving in energy costs (inc income from Solar Thermal and PV)
Current values	£856	£1442	£1442	0%
With Energy Efficiency Improvements	£454	£1039	£1039	28%
With Energy Efficiency Improvements and Heating Upgrades	£406	£992	£992	31%
With Energy Efficiency Improvements, Heating Upgrades and Solar Thermal	£331	£916	£696	52%
With Energy Efficiency Improvements, Heating Upgrades, Solar Thermal and Solar PV	£331	£840	£99	93%