



SCOTTISH EXECUTIVE

Assessing the Impact of the Central Heating Programme on Tackling Fuel Poverty:

Report on the First Year
2001-2002

Development Department



**ASSESSING THE IMPACT OF
THE CENTRAL HEATING
PROGRAMME ON TACKLING
FUEL POVERTY:**

**REPORT ON THE FIRST YEAR
2001 – 2002**

**Bill Sheldrick and David Hepburn
Alembic Research**

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EXECUTIVE SUMMARY

Introduction

1. In 2001, the Scottish Executive launched the Central Heating Programme (CHP) to install central heating systems, along with a package of insulation and other measures in an estimated 70,000 Scottish dwellings without central heating. To monitor the impact of this programme on tackling fuel poverty, the Scottish Executive commissioned an annual survey of households included in each of the first three years of the programme. This report presents the results for those households receiving central heating during 2001-2002, the first year of the Programme.

The Survey

2. During 2001-2002, 8,508 households received a new heating system, amongst other improvements, under the CHP. From this total, 470 randomly selected households drawn from across all tenures were surveyed between October 2002 and March 2003 to assess the impact of the CHP on tackling fuel poverty.

3. Three of the most significant factors in determining whether or not a household is in fuel poverty are the energy efficiency of the home, household fuel costs, and household income. The survey collected information of all three through

- an energy survey of the dwelling to collect information on its insulation and heating characteristics for both before and after the CHP improvements; and,
- a household questionnaire to collect information on the use and heating of individual rooms, the incidence and extent of condensation in the home, fuel expenditure, methods of payment, self-disconnection, fuel debt, household characteristics, health concerns, and income.

4. Importantly, information collected through the survey and the questionnaire distinguished between the situation prior to the CHP improvements, and afterwards. This information was analysed using the National Home Energy Rating (NHER) Surveyor 3 energy audit computer software. The results in the main report are presented both for the programme overall, and broken down where appropriate by tenure, urban and rural households, and age pensioner and non-pensioner households.

Energy Efficiency of the Dwelling

5. The energy efficiency of a dwelling was assessed through the use of the dwelling's NHER. This score provides a succinct measurement of the overall energy efficiency of a dwelling on a scale of 0 – 10. A NHER score of '0' indicates a poorly insulated dwelling that is reliant on an expensive form of heating; a score of '10' indicates a dwelling that is extremely efficient in its overall use of energy.

6. Prior to the CHP improvements, 66.4% of the dwellings surveyed scored less than 4 on the NHER scale, with a mean NHER score of 3.31. No dwelling scored higher than 7. By comparison, a calculated average NHER score for the 2002 Scottish House Condition Survey is 5.42, with only 17% of Scottish dwellings scoring less than 4 on the NHER scale¹. As a result of the CHP improvements, the mean NHER score increased to 6.87, with only 5.5% of the sample scoring less than 4 on the NHER scale.

Household Fuel Costs

7. Household-reported fuel expenditure prior to the CHP improvements ranged from £3.50 to over £35 per week, 11.5% of households spending more than £20 per week. The mean expenditure was £13.00 per week. After the CHP improvements, household-reported fuel expenditure ranged between £3 and £31 per week, with less than 4% spending more than £20 per week. The mean household-reported expenditure fell to £11.41 per week, a reduction of 12.2% on average.

8. Before the new heating was installed, households were found to be heating their homes to considerably lower standards than assumed in the satisfactory heating regime, with 76.8% of households heating no more than the lounge and two other rooms². When the use of heating in each room was aggregated and averaged across the whole house, the result was a mean use of heating of 4.5 hours per room per day. Householders rated their homes between cool and comfortable in terms of overall comfort. Afterwards, 96.5% of households heated the lounge and at least three other rooms, with a mean of 9.7 hours of heating used per room per house. The increased use of heating brought an overall increase in the reported level of comfort in the individual rooms, and across the home.

9. To achieve the satisfactory heating regime prior to the CHP improvements would have required a mean expenditure of £1085 per year, a 60.5% increase on household-reported fuel expenditure. Following the CHP improvements, the cost of achieving this temperature standard fell to £549 per year, a reduction of 49.4%.

Household Income

10. Defining household income is a critical factor in the assessment of fuel poverty. To take account of various concerns, household income was calculated in four ways in the report:

- **household-reported income** with no adjustments for subsidies or housing costs.
- **total household income** including Housing Benefit, Income Support for Mortgage Interest (ISMI), but net of Council Tax.
- **household income excluding Housing Benefit and ISMI** and net of Council Tax.
- **household income net of all housing costs**, including Housing Benefit, ISMI and Council Tax Relief, minus full rent, mortgage and Council Tax.

¹ This mean score was calculated from the revised NHER figures for the 2002 Scottish House Condition Survey published in March 2004 at www.shcs.gov.uk

² The Scottish Fuel Poverty Statement defines the satisfactory heating regime for elderly and infirm households to be 23°C in the living room and 18°C in other rooms, to be achieved for 16 hours in every 24. For other households, it is 21°C in the living room and 18°C in other rooms for 9 hours in every 24 (or 16 in 24 over the weekend), with two hours being in the morning and seven hours in the evening.

11. Household income ranged on average from £8,498 (when all housing costs were excluded) to £9,930 (under total household income when Housing Benefit, Income Support for Mortgage Interest and Council Tax Relief are included) - a difference of 14.6%.

Impact on Fuel Poverty

12. The Scottish Fuel Poverty Statement states that a “household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use.”³ Taking this definition, the CHP improvements resulted in a considerable reduction in the incidence and severity of fuel poverty⁴.

13. Prior to the CHP improvements, the average fuel expenditure required to meet the satisfactory heating regime accounted for 10.9% of total household income, with 61.6% of households needing to spend more than 10%. A subset of this group, representing 9.3% of all households, needed to spend more than 20% of their income on fuel. Afterwards, average expenditure fell to 5.5% of total household income, with only 7.8% of households needing to spend more than 10% of their income and no household having to spend more than 16% of their total household income. Through the CHP improvements, 87.2% of the fuel poor households in the survey were removed from fuel poverty.

14. The tangible difference between the various definitions of income is the number of fuel poor households both before and after the CHP improvements - the higher the income, the fewer households that were in fuel poverty prior to the CHP improvements, and subsequently. Conversely, the lower the income, the more households that were in fuel poverty both before and after the improvements. Regardless of the method for calculating income, the CHP is successfully removing households from fuel poverty. However, the numbers removed varied between different groups within society and the method of calculating household income.

15. The results from the survey indicate that physical measures alone may be insufficient to wholly eradicate fuel poverty. Those that remained in fuel poverty after the CHP improvements were characterised by low and very low incomes, all having a total household income of less than £9,000 per year, with over half having an income of less than £5,000 per year.

Condensation, Dampness and Mould

16. The large majority of the individual rooms were recorded as being dampness, condensation, and mould-free for the periods before and after the CHP improvements. Subsequent to the CHP improvements, in those dwellings where condensation, dampness or mould was reported or found, there was a reduction in the number of rooms effected by these problems, as well as a reduction in their overall severity.

³ Scottish Executive (2002) *The Scottish Fuel Poverty Statement*, Edinburgh: The Stationery Office, para 3.4

⁴ The research found this was due to the CHP improvements and not down to other factors affecting income and fuel costs.

Ancillary Issues

17. For the small number of households that reported a fuel debt with either an electricity or gas supplier before the new heating was installed, all but one of the households were either paying the debt off (through arrangements agreed with the supplier), or had paid it off completely since. No household reported that their debt had got worse.

18. Less than a quarter of households had a prepayment meter. Self-disconnection does not seem to have been much of a problem, either before the CHP improvements or since.

19. A small number of households reported that they had changed a fuel supplier, some more than once, since the new heating was installed. The main reason cited was the search of lower fuel bills.

20. Amongst those households where a direct comparison can be made (that is, excluding those taking a new supply such as with gas and oil), subsequent to CHP improvements there was a shift away from paying the bill when it arrives towards a more managed payment method, across all fuels. The main reasons cited were seeking lower fuel bills and for the sake of convenience.

21. All households were asked about whether their use of individual rooms had remained unchanged, had increased, or had decreased subsequent to the CHP improvements. What emerges is a small, net increase in the use of all rooms in the home, subsequent to the CHP improvements.

22. All occupants were asked about their health before and after the CHP improvements. Despite all of the qualifications that must be applied here, the results are positive. While two-thirds (65.8%) of householders reported no health problems prior to the CHP improvements, amongst those that did, two-fifths (39.9%) reported that their condition or problem had eased or improved after the new heating was installed⁵.

Household Experience with the New Central Heating

23. The overwhelming majority of households surveyed (83.4%) reported that the new system heated the home either well or extremely well. Four-fifths (78.9%) of householders found the new systems easy or extremely easy to use and satisfaction levels were high, with 78.5% of households stating that they were satisfied or extremely satisfied overall with the new system.

Conclusion

24. The CHP has succeeded in reducing the cost of heating the home to a reasonable temperature standard and, as a result, has removed significant numbers of households from fuel poverty (see Summary of Impact below). Installing the new heating systems appears to have achieved very noticeable and tangible benefits for the households surveyed. Conditions within the home have improved. Homes are being heated more; rooms are being used more; and, households consider their homes to be warmer and more comfortable to live in.

⁵ The Scottish Executive has commissioned a separate study to assess the impact of the CHP on health. Consisting of a survey of an intervention and control group of households at three separate points in time the study is due to report in September 2006.

Summary of Impact of CHP

	Before CHP improvements	After CHP improvements
mean NHER score	3.31	6.87
% of dwellings with NHER <4	66.4%	5.5%
mean reported-fuel expenditure	£13.00	£11.40
% households reported-fuel expenditure >£20 per week	11.5%	3.8%
mean use of heating per room per day	4.5 hours	9.7 hours
fuel expenditure required to achieve satisfactory heating regime	£1085 p.a.	£549 p.a.
average total household income	£9,930	£10,002
% of required fuel expenditure of total household income	10.9%	5.5%
% households needing to spend >10% of total household income on fuel	61.6%	7.8%
% households needing to spend >20% of total household income on fuel	9.3%	0

CHAPTER ONE INTRODUCTION

1.1 In 2001, the Scottish Executive launched the Central Heating Programme (CHP). Over its initial 5-year life span, this initiative is specifically targeted at installing central heating systems and various insulation and home safety measures, as well as providing energy advice, in an estimated 70,000 dwellings without central heating in Scotland. For the Scottish Executive, the CHP initiative represents an integral component in its strategy to reduce the number of households in fuel poverty by 30% by 2006.

DEFINING FUEL POVERTY

1.2 In Scotland, Section 95 of the Housing Scotland Act 2001 defines 'fuel poverty' as being a household living in a home which cannot be kept warm at a reasonable cost. The Scottish Fuel Poverty Statement (SFPS), in noting that a more precise definition is necessary to track progress in tackling fuel poverty, adopts the definition that:

“A household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use.”⁶

1.3 The SFPS goes on to set out explicitly that a 'satisfactory heating regime', based on the World Health Organisation recommendations, is

“For elderly and infirm households, this is 23°C in the living room and 18°C in other rooms, to be achieved for 16 hours in every 24. For other households, this is 21°C in the living room and 18°C in other rooms for 9 hours in every 24 (or 16 in 24 over the weekend); with two hours being in the morning and seven hours in the evening.”⁷

1.4 The SFPS went on to clarify what it considered to be encompassed by the term 'household income' defining it “as income before housing costs”.⁸ Thus, importantly, such benefits as Housing Benefit and Income Support for Mortgage Interest were to be included in the assessment of household income. The full definition of household income as set out in the SFPS is provided in Appendix 1.

⁶ Scottish Executive (2002) *The Scottish Fuel Poverty Statement*, Edinburgh: The Stationery Office, , para 3.4

⁷ Op. cit. 1, para. 3.6

⁸ Op. cit. 1, para. 3.6

CENTRAL HEATING PROGRAMME

1.5 The Central Heating Programme offers a number of improvements including:

- the installation of a new central heating system⁹ (either a gas, electric, solid fuel or oil system subject to the householder's choice and the availability of a fuel supply);
- the fitting of insulation measures (that is, loft insulation, cavity wall insulation, hot water tank jacket, and draughtproofing as necessary and appropriate);
- the provision of energy advice;
- the completion of a welfare benefits check; and,
- the supply of various alarm devices.

1.6 In the private housing sector (that is, both owner-occupied and privately rented dwellings), anyone aged 60 or over, regardless of household income, living in a property without any form of central heating or where the system is wholly non-functioning and beyond repair is eligible for the Central Heating Programme¹⁰. Eaga Partnership won the contract to manage the delivery of the CHP in the private sector. The first systems were installed in October 2001.

1.7 In the social housing sector (that is, both local authority and housing association dwellings), different rules govern the eligibility for the CHP. In this sector, any household, regardless of the age of its occupants or their income, is eligible for inclusion in the CHP as long as they are living in a property without any form of central heating. No provision was included within this sector for replacing systems that were considered irreparable or obsolete. The local authority and housing association CHP scheme nominally started in April 2001, and is managed directly by the Scottish Executive. The housing association scheme is managed by Communities Scotland (formerly Scottish Homes).

MONITORING PROGRAMME

1.8 To enable progress to be tracked, the Scottish Executive built an extensive monitoring programme into the CHP. As part of this monitoring programme, Alembic Research won an open tender to design and carry out a 3-year study to assess the impact of the CHP on tackling fuel poverty.

1.9 The primary aims of this research study are threefold:

- first, to determine the extent to which the beneficiaries were in fuel poverty prior to the CHP improvements
- second, for those who were in fuel poverty, to determine whether they have been removed from fuel poverty, or have had their degree of fuel poverty reduced
- third, for those not in fuel poverty, to determine whether they have benefited from lower fuel bills or other improvements.

⁹ Central heating system is used here to include electric storage heating-based, whole house heating systems, as well as gas, oil and solid fuel systems.

¹⁰ There are a number of other minor conditions governing eligibility.

1.10 This research study also seeks to assess a number of secondary effects including the extent to which the CHP has, if at all,

- changed levels of fuel debt
- effected the choice of fuel tariffs or method of payment;
- changed the incidence of self-disconnection;
- changed the incidence and extent of condensation dampness and mould; and,
- changed the use of the whole house.

1.11 The research programme will comprise ultimately three statistically significant sample surveys drawn respectively from those households that received CHP improvements in each of the first three years of the CHP scheme. The first and second year reports are to present statistically reliable national data on the impact of the CHP. At the end of the three years, statistically reliable data is to be presented at both a national level, and by tenure, age of household (for households with occupants over and under 60 years of age), and locality (for urban and rural locations).

REPORT ON YEAR 1 OF THE CENTRAL HEATING PROGRAMME

1.12 This report presents the results of the assessment of the impact of the CHP on tackling fuel poverty in the properties included in the first year of the CHP's operation, that is, between April 2001 and end of March 2002.

1.13 The research methodology is outlined in Chapter 2. In total, 470 households (from across all tenures and across Scotland) were surveyed and interviewed. Selected characteristics of the surveyed households are summarised in Chapter 3.

1.14 Three major factors in determining whether or not a household is in fuel poverty are:

- the energy efficiency of the home;
- household fuel costs; and,
- household income.

The impact of the CHP on each of these factors is examined in turn in Chapters 4, 5 and 6, before its overall impact on fuel poverty is assessed in Chapter 7. The report then goes on in Chapters 8 and 9 to examine the impact of the CHP on a range of other issues and, in Chapter 10, to examine the overall satisfaction with the scheme by its beneficiaries.

1.15 This report is based on a sample of households drawn from those that received a new heating system during the first year of the CHP, and was drawn to produce statistically reliable information on the impact of the CHP in Scotland at the national level (see Chapter 2). The results in this report are also broken down by pensioner and non-pensioner households¹¹; by urban and rural locality; and by tenure, but because of the numbers available in this first year's sample, not all of the results at these sub-national levels are statistically significant. The results are, however, illustrative of the differential impact of the CHP on various sub-groups benefiting from the programme.

¹¹ The term 'pensioner households' is used throughout this report to refer to a household where either the main householder or their spouse or partner was 60 years of age or over, regardless of whether or not they were actually in receipt of a pension. The term 'non-pensioner households' is used throughout this report to refer to a household where neither the main householder nor their spouse or partner was 60 years of age or over.

CHAPTER TWO METHODOLOGY

2.1 From the initial information provided by the Scottish Executive, it was estimated that approximately 14,000 dwellings would be included in the first year of the CHP, comprised of 3,500 private sector, 7,000 local authority and 3,500 housing association dwellings¹². The actual outturn the first year of the CHP was considerably less, primarily as a result of an overestimate in the number of installations that would be completed in the local authority and housing association sectors during 2001/2002. Ultimately, about 8,500 heating systems were installed under the CHP: approximately 3,550 private sector dwellings, 4,100 local authority dwellings, and 850 housing association dwellings.

2.2 The first year sample was drawn to produce statistically reliable information on the impact of the CHP in Scotland at the national level. However, the sample was also designed with a view towards the research project's longer-term requirement to provide statistically reliable data on the changes in fuel poverty:

- for each tenure of the stock,
- for those households with occupants aged under 60 and those 60 or older, and,
- for rural and urban areas.

Results are presented for these various sub-groups within in this report. They are included as indicative of the differential impact of the CHP on those benefiting from the programme. However, because of the small size of some of the data sub-sets involved, the results for these sub-groups levels are not statistically reliable, and therefore should be treated with caution. The sample and the survey are discussed in more detail in Appendix 2.

2.3 The survey sample was selected by a separate random sample of addresses drawn from each tenure group. In total,

- 300 addresses were selected from the private sector (with no distinction between owner-occupiers and private rented) (representing about 1 in 12 of the total number of private sector addresses);
- 300 addresses from the local authority sector (representing about 1 in 14 of the total number of local authority sector addresses) and;
- 200 addresses from the housing association sector (representing almost 1 in 4 of the total number of housing association sector addresses)

2.4 Given the number of heating systems installed during the first year of the CHP, the minimum sample size to produce statistically reliable data at the national level was calculated to be 447 dwellings (see Appendix 2). In the end, 470 households were actually surveyed.

¹² Based on a programme to install 70,000 central heating systems over 5 years.

2.5 The response rates for the households contacted to participate in the survey, including reasons for not completing surveys, are set out in Table 2.1. A small percentage of the households contacted in each of the three groups refused to participate in the survey. Most of these households did not give a reason for their refusal. The most common reason for not completing a survey was ‘no access – no contact’, that is, no one was home at the time of any of the visits to the dwelling, and no one responded to the contact card that was left behind by the surveyor. In all three groups, a percentage of dwellings were empty when visited. A few dwellings were never found because of difficulties with their addresses. The poorest response was amongst the Housing Association sector; the best was amongst the private sector households.

Table 2.1: Survey participation response rates

Response rates	Local Authority	Private Sector	Housing Association
number of households contact attempted	300	300	200
completed survey	172* (57.3%)	240 (80%)	58 (29%)
no access – no contact	81 (27.0%)	31 (10.3%)	113 (56.5%)
refused to participate	20 (6.7%)	19 (6.3%)	18 (9%)
householder ill at time of survey	4 (1.3%)	8 (2.7%)	0
void property	18 (6.0%)	2 (0.7%)	8 (4%)
address incomplete – could not find dwelling	3 (1%)	0	2 (1%)
New tenant – did not survey	2 (0.7%)	0	1 (0.5%)
* includes 2 households that were local authority tenants but have since purchased their property under the right to buy arrangements			

2.6 Where the household agreed to participate in the research study, the survey involved two separate activities:

- first, an energy survey was completed on the dwelling, with full dimensional data and occupancy data being collected. Importantly, information collected during the survey distinguished between the dwelling’s insulation and heating characteristics prior to the CHP improvements, and subsequently. This information was used to complete a Level 3 NHER Surveyor 3 energy audit assessment¹³ of every

¹³ The energy survey is the collection of data about the energy-related characteristics of the dwelling. The NHER energy audit assessment is the processing of the data with the computer-based software. The NHER Surveyor 3 programme is the particular energy audit computer-based software used in this project.

dwelling surveyed, covering both before and after situations, and several different use of heating scenarios.

- second, a household questionnaire was used to collect information on the use and heating of individual rooms, the incidence and extent of condensation in the home, fuel expenditure, methods of payment, self-disconnection, fuel debt, household characteristics, health concerns, and income. All of these issues were differentiated between the period prior to the CHP improvements, and the period after the new heating was installed. This questionnaire interview was completed with an adult in the home. No specific distinction was made over matters such as 'head of household' or 'person responsible for the fuel bill'.

2.7 The intention was that the dwellings should have had the new heating installed in them for at least 6 months before being surveyed, giving the householder a chance to use the new system. With this in mind, the pilot survey took place at the end of September 2002 and the main data collection phase from October 2002 to February 2003.

2.8 Importantly, given the purpose of the survey, the words or the term 'fuel poverty' were not used by the survey team at anytime in contacting householders or during the interviews. All contact letters and telephone conversations made reference to the term 'affordable warmth' or the 'affordability of the new heating system'. All surveyors were briefed similarly to use the terms 'affordable warmth' or 'affordability of the heating' during the site visit.

2.9 In total, 470 households were surveyed. Energy audits were completed on all 470 dwellings. The household questionnaire was completed in 469 dwellings. In one dwelling the householder refused to answer any questions after the energy audit survey had been completed.

2.10 The next chapter of this report provides some general information on the households surveyed, prior to the analysis of the information arising from the energy audit and questionnaire survey, which takes up the rest of the report.

2.11 More information on the background to the construction of the sample survey is set out in Appendix 2.

CHAPTER THREE SURVEY SAMPLE POPULATION

3.1 This chapter presents information about the general nature and type of households that were surveyed as part of the first year's research into the impact of the CHP on fuel poverty. Given the longer-term requirement of this research programme to provide statistically reliable data by tenure, pensioner and non-pensioner households, and urban and rural households, as well as at a national level, information is presented below on each of these items (see Appendix 2 on the construction of the survey sample). Where possible, the survey population is compared to overall statistics available for the CHP for 2001/2002¹⁴.

TENURE

3.2 During 2001/2002, the CHP was effectively comprised of three separate schemes operating independently of one another, in the private, local authority, and the housing association sectors respectively. Households were asked about their tenure through the questionnaire. The breakdown of the sample population by owner-occupied, local authority, housing association and private rented tenures¹⁵ is set out in Table 3.1.

Table 3.1: Breakdown of sample population by tenure

Tenure	Number of households surveyed (%) (n=470)	Overall CHP 2001/2002 (n= 8,508)
owner occupied	209 (44.5%)	3305 (38.8%)
local authority	170 (36.2%)	4000 (47.0%)
housing association	58 (12.3%)	948 (11.1%)
private rented	30 (6.4%)	255 (3.0%)
other (tied cottage)	1 (0.2%)	no information
local authority at time of CHP but since purchased under right to buy	2 (0.4%)	no information

3.3 Compared to the overall number of 8508 heating systems installed in 2001/2002 of the CHP:

- the private sector (owner occupied plus private rented plus tied cottage) was over represented in the sample population (50.9% of the households surveyed compared to only 41.8% of the heating systems installed);

¹⁴ This data is taken from Scottish Executive (2003) *The Scottish Executive's Central Heating Programme and the Warm Deal Annual Report 2001/02: Benefits from Home Energy Efficiency Schemes in Scotland 2001/2002: A Report by The Scottish Executive*, Edinburgh: Scottish Executive

¹⁵ Historically, the private-rented sector, although the smallest of the main tenure groups, has been found to contain some of the poorest properties in terms of their house condition (for example, see the Scottish House Condition Survey Reports for 1991 and 1996). Private-rented households were identified through the questionnaire, so private sector figures have been disaggregated into owner-occupied and private rented households throughout the whole of this report.

- the local authority sector (local authority plus right to buy households) is under-represented in the sample (36.6% of the households surveyed compared to 47.0% of the heating systems installed); and,
- the housing association sector, despite the poor success rate with completed surveys (see Chapter 2) is slightly over-represented in the sample population (12.3% of the households compared to 11.1% of the heating systems installed).

LOCALITY

3.4 Households were classified as being either urban or rural, based on the postcode of their dwelling.

3.5 During the first year of the CHP, the numbers were dominated heavily by heating systems installed in urban local authority areas (over 80% of all the systems installed in local authority dwellings were installed in 3 urban authorities). Almost all of the heating systems installed in housing association properties were in urban areas. In the private sector, the majority of systems also appear to have been installed within the central belt of Scotland. This predominance of urban areas is reflected in the overall CHP statistics and in the households surveyed. The breakdown of the sample population into urban or rural properties is set out in Table 3.2.

Table 3.2: Breakdown of sample population by urban or rural locality

Locality	Number of households surveyed (n=470)	Overall CHP 2001/2002 (n= 8,023) ¹⁶
urban	391 (83.2%)	7151 (89.1%)
rural	79 (16.8%)	872 (10.9%)

HOUSEHOLD COMPOSITION

3.6 During the questionnaire, information was collected on the age of all the members of the household. Household composition is presented below in two ways:

- by age of adult householders (see Table 3.3); and,
- by the number of adults and children living at each address (see Table 3.4)

¹⁶ This data is taken from Table 2 on p.22 of the Scottish Executive (2003) *The Scottish Executive's Central Heating Programme and the Warm Deal Annual Report 2001/02: Benefits from Home Energy Efficiency Schemes in Scotland 2001/2002: A Report by The Scottish Executive*, Edinburgh: Scottish Executive. The authors of that report may not have had sufficient post code data to identify the urban or rural locality of all 8,508 dwellings in the first year of the CHP.

3.7 What emerges from the breakdown is the predominance of pensioner households within both the overall CHP statistics and the sample population (see Table 3.3). Households with at least one adult over the age of 60 accounted for 61.6% of the beneficiaries of the CHP in 2001/2002, and 77.6% of those surveyed. Over a third of all households surveyed (37.3%) contained at least one person aged 75 or older.

3.8 It is not unexpected that the households with at least one person over the age of 60 dominate both the CHP generally, and the sample population. In the private sector, the CHP is only open to households with at least one person over 60 years of age. In the local authority and housing association sectors, where the scheme is not limited by age of the householders, over half of all the households surveyed (54%) included at least one person over the age of 60, compared to at least 34% within the CHP overall¹⁷.

Table 3.3: Breakdown of sample population by age of adult householders

Age of adult householders	Number of households surveyed (n=469 ¹⁸)
no adult over 60 years of age	105 (22.4%)
single adult over 75 years of age	124 (26.4%)
couple (both over 60), with at least one over 75 years of age	49 (10.4%)
single adult between 60 and 74 years of age	75 (16.0%)
couple between 60 and 74 years of age	68 (14.5%)
other households: all occupants over 60, and at least one over 75 years of age	2 (0.4%)
mixed households: adults over 60 years of age and adults under 60 years of age	46 (9.8%)

3.9 In terms of household composition, adult-only households (that is, households with no one under 16 years of age) dominated the sample. Households without any children comprised 89.1% of all the households surveyed (see Table 3.4). Amongst the households

¹⁷ A direct comparison is not possible here with the overall CHP statistics, because of differences in reporting age bands. On page 14 of the 2001/2002 Annual Report (op. cit. 14), it states that 34% of local authority and housing association households included “a pensioner”, but the text of the report then distinguishes between a pensioner, that is, a person receiving a pension, and those over the age of 60 but not in receipt of a pension for whatever reason.

¹⁸ While energy audit surveys were completed on 470 dwellings, only 469 household questionnaires were completed.

with children, four would be classified as pensioner households in Table 3.3 as they contained someone 60 years or older living within them¹⁹.

Table 3.4: Breakdown of sample population by household composition

Household composition (adults / children)	Number of households surveyed (n=469)
adult only households	418 (89.1%)
households with 1 child	27 (5.8%)
households with 2 children	18 (3.8%)
households with 3 children	6 (1.3%)

HOUSEHOLD SOCIO-ECONOMIC STATUS

3.10 All households were asked about the socio-economic status of the adults living in the dwelling. This information²⁰ is presented here in two ways:

- the socio-economic status of the main respondent, their partner or spouse, and other adults is set out in Table 3.5, and ,
- the main sources of income are broken down for the main respondent, their partner or spouse, and other economically active adults in the household in Table 3.6

3.11 Given the large number of pensioner households within the sample, it is not surprising that ‘permanently retired from work’ accounted for the largest socio-economic status group amongst all of the adult householders (see Table 3.5). ‘Other’ adults²¹ living in the home (that is, not the main respondent or their spouse or partner), had a more varied socio-economic profile, but these adults represented only a small percentage (6.7%) of all of the adult householders within the surveyed households.

¹⁹ Again, a direct comparison with the overall CHP statistics is not possible because the 2001/2002 Annual Report (op. cit 14) includes no information about children in the private sector or housing association households.

²⁰ The overall CHP Annual Report for 2001/2002 (op. cit. 14) contained no comparable information.

²¹ Usually, adult-aged children that were living with one or both of their parents. These adults were not classified as ‘spouse or partner’.

Table 3.5: Breakdown of sample population by socio-economic status of adults

Socio-economic Status	main respondent (n = 469)	partner or spouse (n= 201)	other adults (n=48)	all adult occupants (n=718)
self-employed	3 (0.6%)	1 (0.5%)	4 (8.3%)	8 (1.1%)
employed over 30 hours per week	23 (4.9%)	18 (9.0%)	12 (25.0%)	53 (7.4%)
employed less than 30 hours per week	22 (4.7%)	18 (9.0%)	6 (12.5%)	46 (6.4%)
looking after family	18 (3.8%)	21 (10.4%)	1 (2.1%)	40 (5.6%)
permanently retired from work	350 (74.6%)	122 (60.7%)	4 (8.3%)	476 (66.3%)
unemployed and seeking work	22 (4.7%)	8 (4.0%)	9 (18.7%)	39 (5.4%)
in further / higher ed., college / school	3 (0.6%)	1 (0.5%)	7 (14.6%)	11 (1.5%)
permanently sick or disabled	24 (5.1)	11 (5.5%)	5 (10.4%)	40 (5.6%)
unable to work due to short term illness/injury	4 (0.9%)	1 (0.5%)	0	5 (0.7%)

3.12 Again, given the large number of pensioner households within the sample, it is not unexpected that pensions in various forms account for a significant percentage (61.5%) of all sources of income identified for the households surveyed (see Table 3.6). When aggregated with other benefits, only 10% of all the sources of identified household income are either not pension related or not state benefit related. The preponderance of pensioner households, and pensioner households that are retired from work (as opposed to those that may still be working) and the reliance on pensions as sources of income, as well as other state benefits, may have implications for total household income. Exactly how much income households have is examined in more detail in Chapter 6 of this report, on how this impacts on fuel poverty is examined in detail in Chapter 7.

Table 3.6: Breakdown of Sample Population: By Sources of Income

Socio-economic Status	main respondent (n = 469)	partner or spouse (n= 201)	other adults (n=48)	all adults (n=718)
state retirement pension	254 (54.2%)	111 (55.2%)	4 (8.3%)	369 (51.4%)
Income support + state retirement pension or supplementary pension	80 (17.1%)	7 (3.5%)	0	87 (12.1%)
private employer's or occupational pension	174 (37.1%)	15 (7.5%)	0	189 (26.3%)
Incapacity benefit	38 (8.1%)	10 (5.0%)	4 (8.3%)	52 (7.2%)
Widows payments or pensions	6 (1.3%)	0	0	6 (0.8%)
Income support (not pension related)	56 (11.9%)	17 (8.5%)	4 (8.3%)	77 (10.7%)
Working Family tax credit	14 (3.0%)	2 (1.0%)	0	16 (2.2%)
Job seekers allowance	6 (1.3%)	3 (1.5%)	4 (8.3%)	13 (1.2%)
Disability Living Allowance – care component	34 (7.2%)	6 (3.0%)	2 (4.2%)	42 (5.8%)
Disability Living Allowance –mobility component	20 (4.3%)	7 (3.5%)	1 (2.1%)	28 (3.9%)
Attendance allowance	58 (12.4%)	6 (3.0%)	0	64 (8.9%)
No benefit, allowance or pension	32 (6.8%)	43 (21.4%)	30 (62.5%)	105 (14.6%)

COUNCIL TAX BANDS

3.13 Council Tax Bands are not a fuel poverty indicator in their own right. However, in the assessment of total household income as set out in the SFPS, the amount of Council Tax paid is removed from the calculation. Thus, two households with the same income may be categorised differently in terms of their total household income depending on their council tax band, their eligibility for a rebate, and variations in Council Tax across council areas.

3.14 The breakdown of the sample population by Council Tax Band, and by tenure, as identified by the householder, is set out in Table 3.7. It can be seen that overall, over two-thirds of all households fall within Bands A and B, that is, the two lowest bands. About 80% of all housing association and local authority tenants fall within Bands A and B, compared to just over half of owner-occupied households, and only 40% of private rented tenants. About 20% of owner-occupiers and private-rented tenants fall within the two highest bands encountered during the survey – that is, Bands D and E. Owner-occupiers account for over 80% of all the households falling into Bands D and E, although these two groups only account for just over 10% of all the dwellings surveyed.

Table 3.7: Breakdown of sample population: by Council Tax band and tenure

Council Tax Band	Overall sample (n=469)	Owner occupied (n=209)	Local authority (n=169)	Housing association (n=58)	Private rented (n=30)
a	116 (24.7%)	36 (17.2%)	65 (38.5%)	11 (19.0%)	4 (13.3%)
b	213 (45.4%)	79 (37.8%)	88 (52.1%)	35 (60.3%)	8 (26.7%)
c	84 (17.9%)	49 (23.4%)	14 (8.3%)	9 (15.5%)	12 (40.0%)
d	45 (9.6%)	36 (17.2%)	2 (1.2%)	2 (3.4%)	5 (16.7%)
e	11 (2.3%)	9 (4.3%)	0	1 (1.7%)	1 (3.3%)

OVERALL COMMENT ON CHAPTER THREE

3.15 Households reliant upon pensions or on state benefits are not considered to be among the more affluent groups in society generally. Pensioner households accounted for the largest group of households surveyed, and various pensions and state benefits accounted for the most frequently cited sources of household income. This has potential implications for the assessment of the number of households in fuel poverty, both before and after the CHP improvements, for two reasons:

- first, pensioner households are assessed against a higher heating standard, which results in higher fuel costs being assessed than would be if a non-pensioner household lived in the same dwelling; and,
- the lower the income, the greater the risk of fuel poverty, regardless of how the fuel costs are calculated.

The impact of the CHP on fuel poverty is examined in detail in Chapter 7.

CHAPTER FOUR ENERGY EFFICIENCY IN THE HOME

4.1 The National Home Energy Rating (NHER) score²² provides a succinct measurement of the overall energy efficiency of a dwelling, through an assessment of its heating and hot water system or appliances and their controls and efficiency, as well as ventilation factors and the insulation characteristics of the home. A NHER score of '0' indicates a poorly insulated dwelling that is reliant on an expensive form of heating, while a score of '10' indicates a dwelling that is extremely efficient in its overall use of energy. A dwelling built to the Part J heating and insulation standards of the 2002 Scottish Building Regulations typically scores between 8 and 10 on the NHER scale. The average NHER for Scotland (as calculated from the 2002 Scottish House Condition Survey Fuel Poverty report) was 5.4²³.

NHER PROFILE OF DWELLINGS IN CENTRAL HEATING PROGRAMME

4.2 The detailed energy audit survey of every dwelling in this survey allowed a Level 3 NHER assessment to be completed on each dwelling using the NHER Surveyor 3 program. The overall NHER profile for the surveyed dwellings, comparing their NHER scores before and after the CHP improvements, is displayed in Figure 4.1. What is evident is the considerable increase in the NHER scores after the CHP improvements.

4.3 Prior to the CHP improvements, almost two-thirds of all the dwellings surveyed (66.4%) scored less than 4 on the NHER scale and, as a result, were likely to have incurred above average fuel costs in achieving the SFPS satisfactory heating regime. The average NHER score of these was 3.31. By comparison, the 2002 Scottish House Condition Survey found an average NHER of 5.4, with only 17% of Scottish dwellings with a NHER of less than 4²⁴.

4.4 This lower average is not surprising, as eligibility for inclusion within the CHP (see Section 1.2) requires generally that dwellings do not have a central heating system. Heating is the biggest single determinant of a dwelling's NHER score. Central heating systems are significantly more efficient²⁵ to operate than room heater appliances (the minimum acceptable boiler efficiency installed under the CHP was 78%, with some of those installed being rated at over 90%, compared to efficiencies of between 32 and 60% for most room heaters)²⁶.

²² The NHER is an energy-cost performance indicator derived from an assessment of the total fuel costs per square metre of total floor area of a dwelling and reported on a scale of '0' to '10'. In calculating the energy costs, the NHER is concerned with the cost of all household fuel consumption (i.e. for cooking, lights and appliances as well as space and water heating, and standing charges).

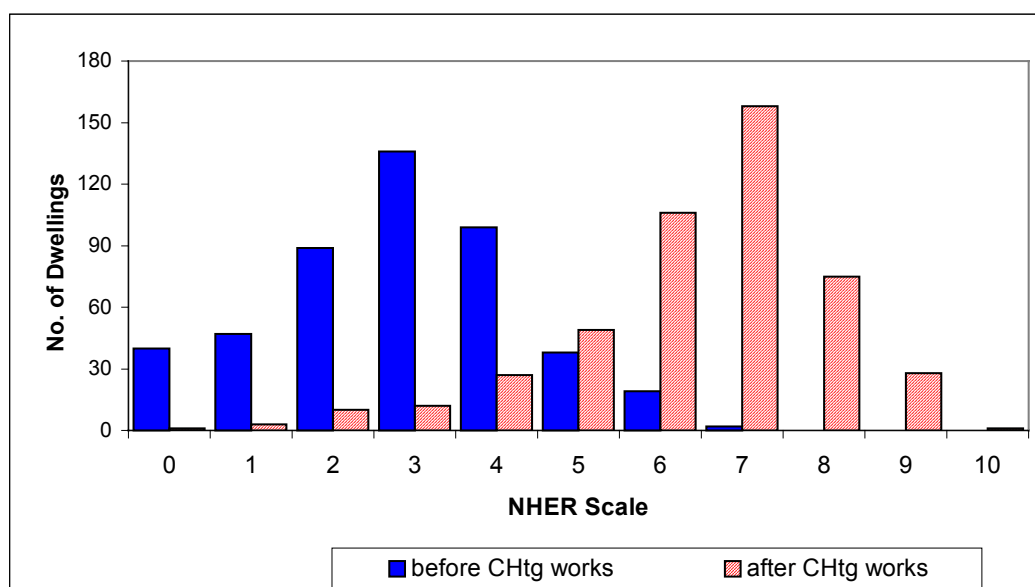
²³ Cormack, D, Friel, K, Grainger, S, Millen, D and Robinson A (2004) *Fuel Poverty in Scotland: Further Analysis of the Scottish House Condition Survey*, Edinburgh: Communities Scotland and Scottish Executive

²⁴ Op. cit. 8

²⁵ Efficiency here is calculated on the basis of cost per useful heat.

²⁶ Building Research Establishment (2001) *The Government's Standard Assessment Procedure for Energy Rating of Dwellings*, 2001 Edition, Garston: Building Research Establishment - see Table 4b.

Fig. 4.1: Overall NHER Profile: Before and After CHP Improvements

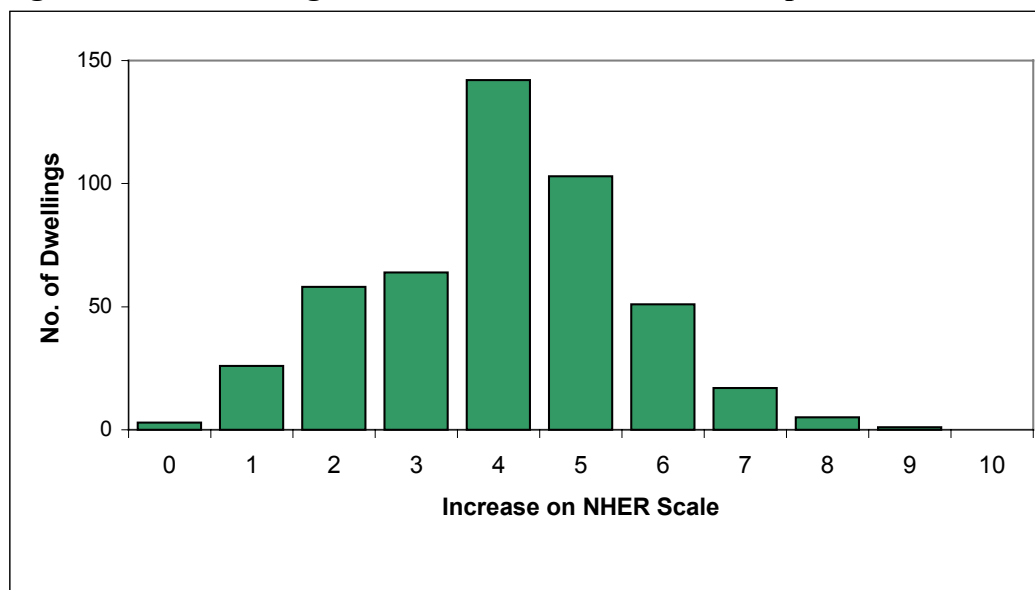


4.5 As a result of the CHP improvements, the average NHER score more than doubled, increasing from 3.31 to 6.87 (considerably above the Scottish average), with only 5.5% of the sample scoring less than 4 on the NHER scale. A possible explanation for this 5.5% still achieving less than 4 is investigated below in section 4.18 to 4.24.

4.6 Figure 4.2 sets out the impact of the CHP improvements on the individual dwelling NHER scores. Although the average increase in the rating was 3.56 on the NHER scale, the degree of impact varied considerably across the dwellings included in the survey. Ultimately, the resultant average NHER is likely to be slightly higher. On the day of the survey, some households were still awaiting CHP works to be completed²⁷. When these works are completed, the NHER scores in these dwellings will increase.

²⁷ For example, some households were awaiting insulation works to be installed. Consequently, these works were not included in the NHER assessment here. Additionally, two households were still awaiting the installation of new supply meters before their new heating system was operational – these dwellings were assessed on the basis of their prevailing heating system (as required under NHER conventions).

Fig. 4.2: Overall Change in NHER as a Result of CHP Improvements



NHER Profile by Tenure

4.7 The overall survey was disaggregated by household tenure – owner-occupiers, local authority, housing association and private rented - to examine the impact of the CHP improvements on the NHER profiles for these tenure groups within the sample population.

4.8 The average NHER scores for all four tenure groups, for both before and after the CHP works were undertaken, are set out in Table 4.3. Comparisons of the NHER scores for the different tenures before and after the CHP improvements are displayed in Figures 4.3 to 4.6 respectively. Considerable increases in NHER scores as a result of the improvements are quite evident across all four tenures.

4.9 Before the CHP improvements, the average NHER scores for all tenures were less than their respective Scottish median score²⁸, reflecting the large number of low ratings in each tenure. Almost two-thirds of the dwellings surveyed in the owner-occupier and local authority sectors (65.6% and 65.3% respectively) scored less than 4 on the NHER scale, while amongst the housing association and private rented groups the percentages were higher – 70.7 and 70.0% respectively.

4.10 While there are slight differences between the tenures with regard to their respective average NHER scores, they are bunched reasonably close together, with less than a 5% spread between the highest (the owner-occupiers) and the lowest score (housing association), before the CHP improvements and a 4% spread afterwards. The average NHER scores by tenure are certainly much closer together than found in the SHCS 2002 results, where the highest and lowest median NHER scores differed by more than 30%. Unlike the SHCS, all of the dwellings in this survey generally shared two common factors – before the CHP, they all lacked a central heating system, and afterwards, they all had one installed.

²⁸ Op. cit. 18

Figure 4.3 NHER Profile: Owner Occupiers - Before and After CHP Improvements

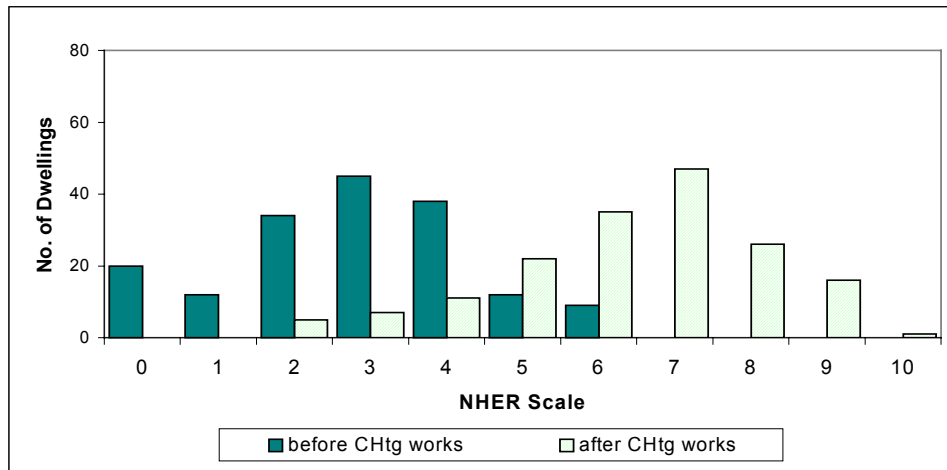


Figure 4.4: NHER Profile: Local Authority Tenants - Before and After CHP Improvements

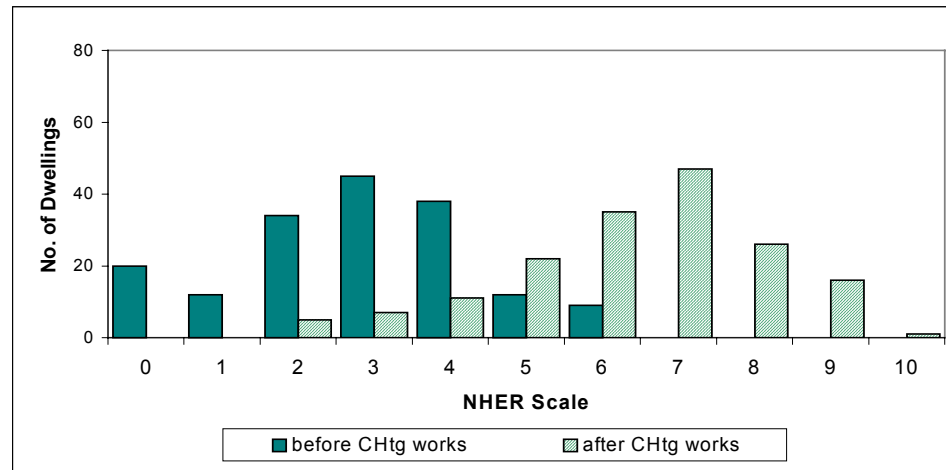


Figure 4.5: NHER Profile: Housing Association Tenants – Before and After CHP Improvements

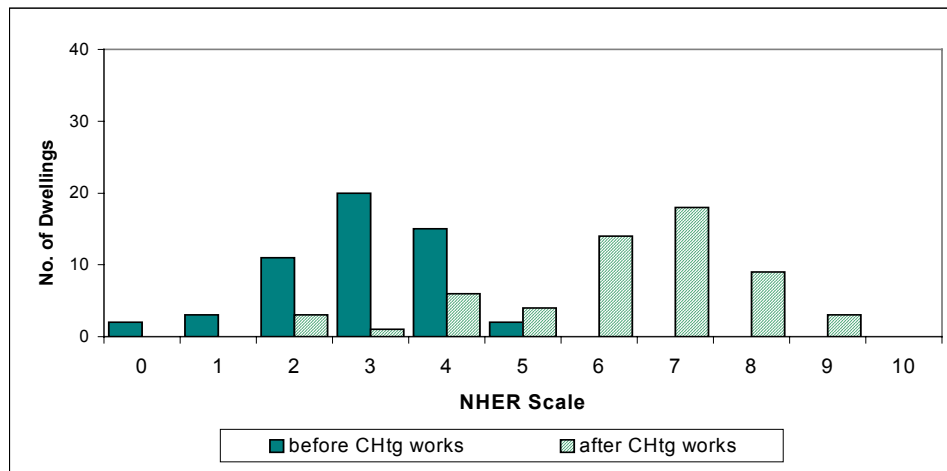
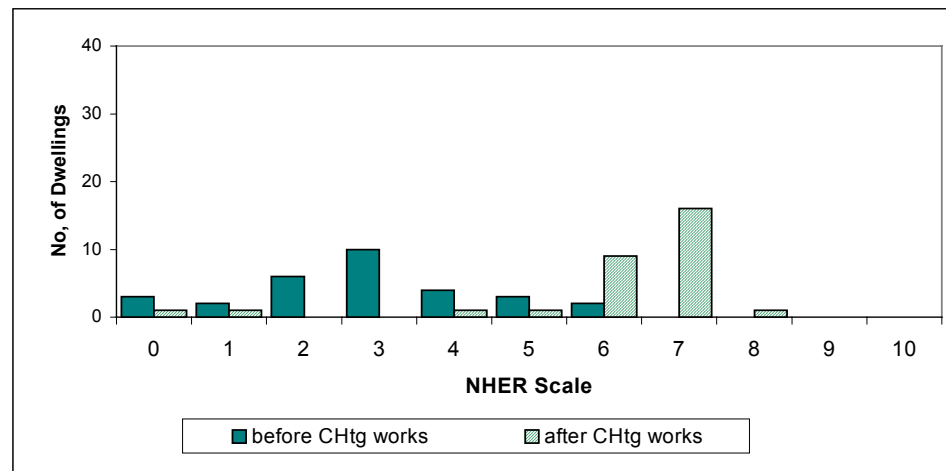


Figure 4.6: NHER Profile: Private Rented – Before and After CHP Improvements



4.11 Subsequent to the CHP works, the number of dwellings scoring less than 4 on the NHER scale was reduced significantly across all tenures: 3.8% amongst owner occupiers; 7.1% amongst local authority tenants; 6.9% amongst housing association tenants; and 6.6% amongst private rented tenants. All tenures achieved considerably higher NHER scores on average than found in Scotland generally.

Table 4.3: Average NHER Before and After CHP works: By Tenure

Tenure Group	Scottish average NHER – 2002 SHCS	Average NHER of sample: Before CHP improvements	Average NHER of sample: After CHP improvements	Average change in NHER as a result of CHP improvements
Owner occupiers (n=209)	4.4	3.35	6.95	3.6
Local authority (n=170)	4.9	3.28	6.84	3.56
Housing Association (n=58)	5.2	3.18	6.70	3.52
Private rented (n=30)	3.65	3.35	6.72	3.37

NHER Profile of Pensioner and Non-Pensioner Households

4.12 The overall survey was disaggregated by pensioner and non-pensioner households to examine the impact of the CHP improvements on their respective NHER scores. NHER profiles, comparing both before and after the CHP improvements, for both groups are displayed in Figures 4.7 and 4.8 respectively. A considerable increase in NHER scores as a result of installing the new heating systems is quite obvious.

4.13 Prior to the CHP improvements, more than two-thirds of the dwellings occupied by pensioner households (68.7%), and 58.5% of those occupied by non-pensioner households, scored less than 4 on the NHER scale. The average NHER score for the pensioner households was 3.27, and that for the non-pensioner households, slightly higher at 3.43.

4.14 Subsequent to the CHP improvements, only 3.8% of the dwellings occupied by non-pensioner households and only 6% of those occupied by pensioner households scored less than 4 on the NHER scale. The average NHER scores more than doubled: for pensioner households, the average NHER increased to 6.87; while for non-pensioner households, it increased to 6.90.

4.15 All of the non-pensioner households were either council or housing association tenants, and the majority of these were living in flatted accommodation of some sort. Flats tend to score higher on NHER scale than houses because of the reduced number of heat loss surfaces. Therefore, it is not unexpected that the non-pensioner households display a higher average NHER score than do the pensioner households. However, the difference between the two is not large before the CHP improvements and almost disappears subsequent to the CHP improvements.

Figure 4.7: NHER Profile: Pensioner Households – Before and After CHP Improvements

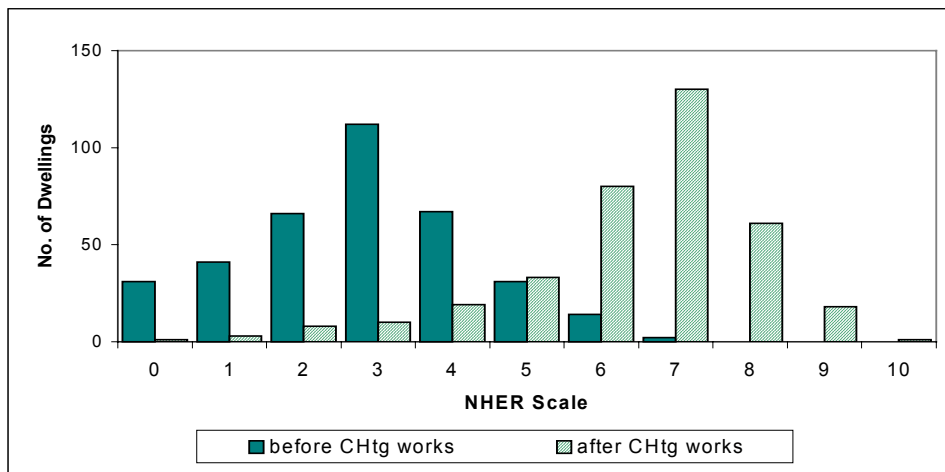


Figure 4.8: NHER Profile: Non-Pensioner Households – Before and After CHP Improvements

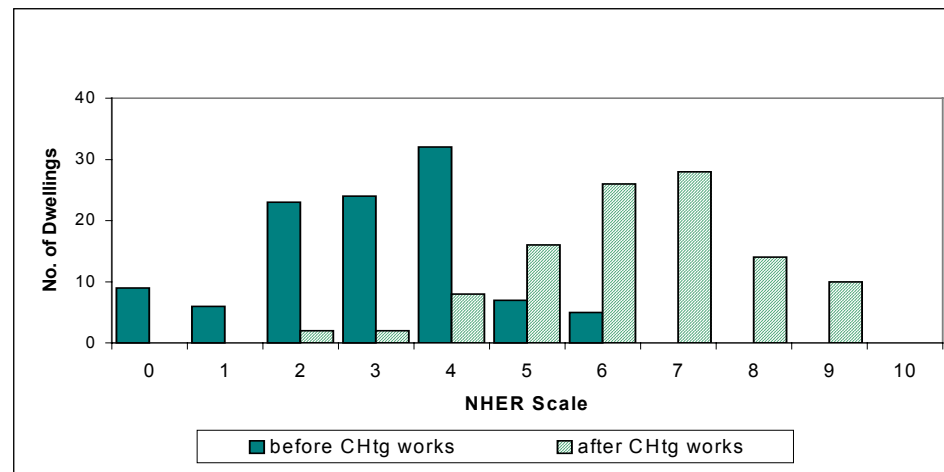


Figure 4.9: NHER Profile: Urban Households Before and After CHP Improvements

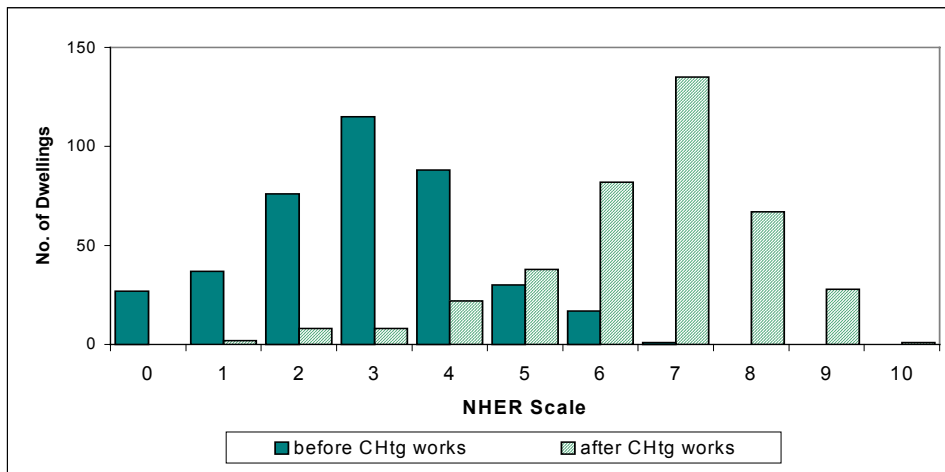
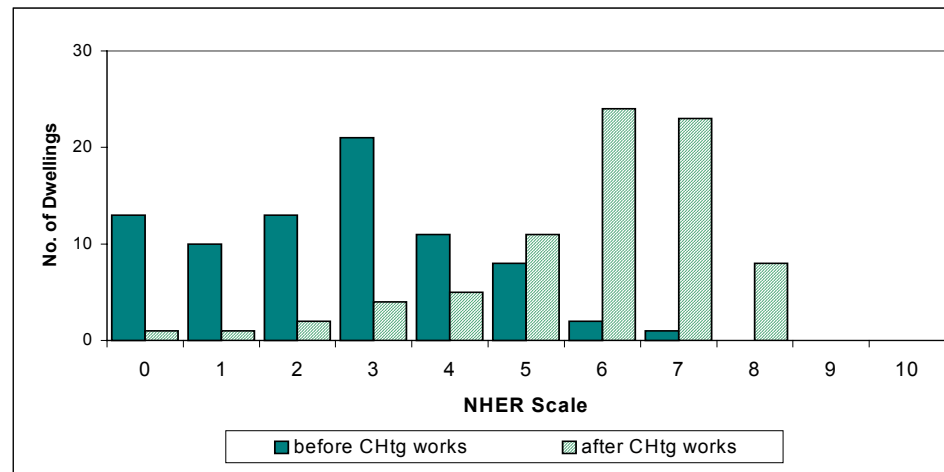


Figure 4.10: NHER Profile: Rural Households – Before and After CHP Improvements



NHER Profile of Urban and Rural Households

4.16 The overall survey was disaggregated by urban and rural households to examine the impact of the CHP improvements on the respective NHER profiles for these two groups. Their NHER profiles, comparing both before and after the CHP improvements, are displayed in Figures 4.9 and 4.10 for each of these groups. Again, both groups show a considerable shift increase in their NHER scores as a result of the CHP improvements.

4.17 Prior to the CHP improvements, almost two-thirds of the urban-based households (65.2%) and 72.2% of rural households scored less than 4. The average NHER score for urban households was 3.37 compared to 2.97 for rural households. As a result of the CHP improvements, the number of households scoring less than 4 was significantly reduced to 10.1% of rural households and 4.6% of urban households. The average NHER scores more than doubled to 6.99 for urban households and 6.28 for rural households.

THE EFFECT OF ELECTRIC HEATING

4.18 It was noted above that social sector tenants and non-pensioner households in the sample were scoring lower on the NHER scale than might have been expected both before and after the CHP improvements were installed. A contributory factor here appears to be electric heating, or at least electric heating coupled with other factors.

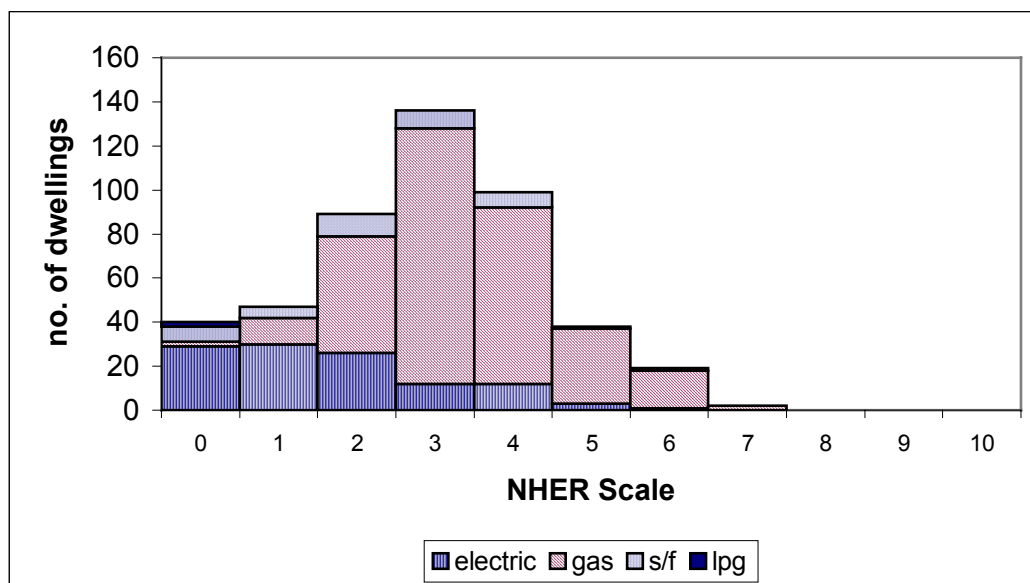
4.19 The mean NHER ratings of the dwellings, broken down by primary heating fuel are set out in Table 4.4. Dwellings with electric heating scored the second lowest NHER score on average before and the lowest NHER score on average after the CHP improvements.

Table 4.4: NHER scores by primary heating fuel: Before and after CHP improvements

primary heating fuel	Before CHP improvements		After CHP improvements	
	No. of dwellings	mean NHER	No. of dwellings	mean NHER
solid fuel	39	2.72	3	7.00
electricity	113	2.08	49	4.01
gas (mains)	316	3.83	409	7.23
LPG	2	0.2	0	-
oil	0	-	9	6.33

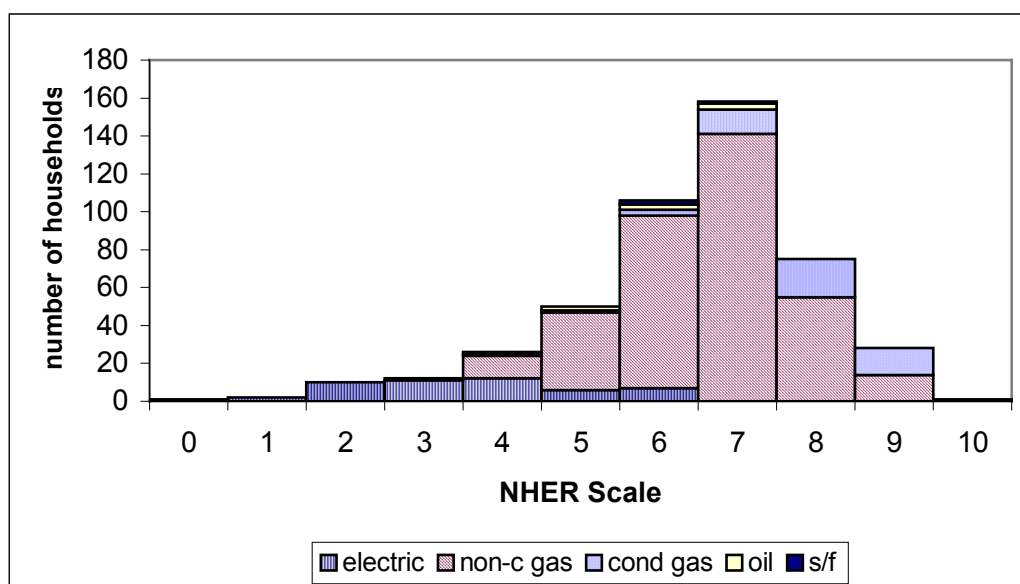
4.20 Electric heating, while accounting for less than a quarter (24%) of the primary heating systems before the CHP works, accounted for almost a third of the dwellings with the lowest NHER ratings (i.e. those with a NHER of less than 4) overall (see Fig. 4.11). Poor ratings for dwellings relying on direct acting electric heating appliances is understandable given the high cost of electricity charged on the standard tariff.

Figure 4.11: NHER Profile by Heating Fuel: BEFORE CHP Improvements



4.21 Subsequent to the CHP improvements electric storage heating systems accounted for just over 10% of all heating systems within the dwellings surveyed. However, even with the installation a new electric storage heating system about half of these dwellings still achieved a score of less than 4 on the NHER scale. Subsequent to the CHP improvements, electric storage heating accounts for almost all of the lowest ratings. Of the 26 dwellings (5.5% of the sample) that still scored less than 4 on the NHER scale after the CHP works, all but one of these dwellings (96.2%) received an electric storage heating system under the CHP (see Fig. 4.12).

Figure 4.12: NHER Profile by Heating Fuel: AFTER CHP Improvements



4.21 Electric heating accounts for a larger percentage of the primary heating in dwellings in both social sector tenure groups than it does in the two private sector groups, both before and after the CHP improvements (see Table 4.5).

Table 4.5: Electric Heating by Tenure

Tenure	electric heating as primary system before CHP improvements	electric heating as primary system in dwellings with NHER <4 before CHP improvements	% electric storage heating as primary system installed under CHP in dwellings surveyed	electric heating as primary system in dwellings with NHER <4 after CHP improvements
Owner occupiers (n = 209)	30 (14.4%)	29 of 137 (21.2%)	11 (5.3%)	8 of 8 (100%)
Local authority (n = 170)	64 (37.6%)	51 of 111 (45.9%)	25 (14.7%)	11 of 12 (91.7%)
Housing association (n = 58)	16 (27.6%)	14 of 41 (34.1%)	11 (19.0%)	4 of 4 (100%)
Private rented (n = 30)	3 (10.0%)	3 of 21 (14.3%)	2 (6.7%)	2 of 2 (100%)

4.23 While electric storage heating uses electricity charged on an off-peak tariff, which is cheaper than the standard rate tariff, it is still more expensive for a useful unit of heat than gas. This price differential is exacerbated if electric storage heating is installed in dwellings with poor insulation characteristics, or other factors that will contribute to higher total heating costs, which will be reflected in lower NHER scores. Of the 25 dwellings with electrical storage heating that scored less than 4 on the NHER scale at the time of the survey,

- 18 (72%) of them have a wall construction that does not lend itself to an inexpensive insulation solution (e.g. sandstone, solid concrete, and non-traditional constructions) or are flats that cannot be insulated cheaply unless other, non-eligible households are as well;
- 3 (12.0%) were awaiting cavity wall insulation;
- 4 (16.0%) were in particularly exposed, northern locations

4.24 As seen in Figure 4.12, higher NHER ratings can be achieved with electric storage heating. However, in certain circumstances and dwellings, electric heating may not be the most appropriate heating system to specify, although in some areas the choice of heating system may be limited by the lack of a mains gas supply.

OVERALL COMMENT ON CHAPTER FOUR

4.25 The overall impact of the CHP improvements is to considerably increase the energy efficiency of dwellings as reflected by the dwelling's NHER score. The consequence of this improvement is the likely reduction in the level of fuel expenditure required of those in these dwellings to achieve the satisfactory heating regime. The overall increase in NHER scores is mirrored in disaggregated data.

4.26 However, in assessing the impact of the CHP programme on tackling fuel poverty, the issue is not how much is spent on fuel or whether it is above or below the average household expenditure. What is important is expenditure relative to household income. That assessment will be undertaken later in this report in Chapter 7.

CHAPTER FIVE HOUSEHOLD FUEL COSTS AND WARMTH

5.1 Household fuel costs were derived in three ways through the household questionnaire and the energy audits.

5.2 First, all households were questioned about their total fuel expenditure for the periods before and after the CHP improvements. Calculating total household fuel expenditure for the year before and after the improvements, however, was not always possible because:

- other members of the family sometimes took responsibility for the householder's fuel bills so that they were not able to supply the required information;
- some households had yet to receive a fuel bill after the new heating system had been installed, even a year later in a small number of instances;
- given the date of the installation of the new heating and date of survey, many households had yet to actually use the new system during the winter, and therefore did not know what it would truly cost them;
- households paying by direct debit arrangements did not necessarily know the true costs of using the new system²⁹.

5.3 The second approach was to use the NHER Surveyor 3 program³⁰ to estimate the household's annual fuel costs. This assessment was customised to reflect the household's use of heating throughout the house as established through the questionnaire. This customised assessment tended to involve very different assumptions about the use of the heating appliances within a dwelling than those used in calculation of the NHER score for the dwelling³¹.

5.4 A third set of fuel costs, based on achieving the Scottish Fuel Poverty Statement's (SFPS) 'satisfactory heating regimes', were calculated using the NHER Surveyor 3 program. As will be seen below, many households were not heating the whole of their home before the new heating was installed, and certainly not to the temperature standards set out within the 'satisfactory heating regime'. To calculate fuel costs to achieve these standards tended to involve assumptions about the use of additional heating (and in particular, the use of portable heating).

5.5 The following sections outline household fuel expenditure derived respectively from each of these three approaches for before and after the CHP improvements.

²⁹ Direct debit arrangements for fuel bills are usually re-negotiated only once a year. However, if a household builds up a large credit or deficit on their account during the year (e.g. because of a change of heating system, or change of use in heating the home), the utility would be likely to reduce or increase their next payment arrangement to reimburse the householder or clawback the deficit as necessary. Thus, it may not be until the second year after the new system was installed that the direct debit payment arrangement would reflect actual fuel use.

³⁰ One of the outputs from the NHER Surveyor 3 program is an estimate of annual household fuel costs, both in total, and broken down by end use consumption. The basis of the fuel cost calculations can be a standardised heating pattern, such as the SFPS satisfactory heating regime. However, fuel costs can be tailored to the specific household circumstances concerning the use of heating and appliances, and the actual number of occupants.

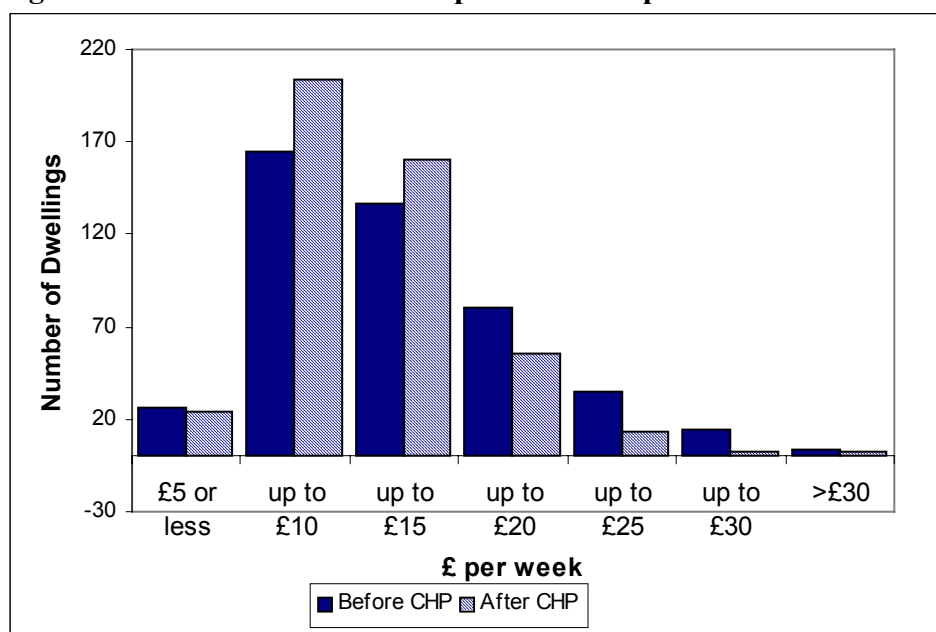
³¹ Under the NHER conventions, an assessment of a dwelling to determine its NHER rating would ignore the use of portable heating in the home, as only fixed heating appliances are included within the NHER assessment. However, many of the households surveyed in this study were using various forms of portable heating, with implications for their total fuel costs. For this calculation the NHER Surveyor 3 program was tailored to accommodate the use of portable heating in calculating the annual household fuel costs.

HOUSEHOLD-REPORTED FUEL EXPENDITURE

5.6 For the year prior to the CHP improvements, the household-reported fuel expenditure ranged from £3.50 per week to over £35 per week, with 54 households (11.5%) reporting that they were spending more than £20 per week (see Figure 5.1). The mean expenditure was £13.00 per week, representing an average household-reported fuel bill of £676 per year.

5.7 After the CHP improvements, household-reported fuel expenditure ranged between £3 and £31 per week, with less than 4% of households reporting that they were spending more than £20 per week on fuel (see Figure 5.1). The mean household-reported expenditure fell from £13 to £11.41 per week (from £676 to £594 per year), a reduction of 12.2%.

Figure 5.1: Overall Household-reported fuel expenditure: Before CHP



5.8 Despite these overall reductions, household-reported fuel expenditure was not always lower. Amongst the 462 households where a comparison could be made, 245 households (53.0%) reported reductions in their fuel expenditure,

- 128 households (27.7%) reported increased fuel costs, and
- 89 households (19.3%) reported 'no change' in their fuel costs at the time of survey

The important issue here is not how much households were spending on fuel *per se*, but whether these households were purchasing sufficient warmth with this expenditure, and ultimately in the context of fuel poverty, whether this warmth is affordable.

5.9 Households were asked several questions concerning the use of heating in each room within their home – including whether they heated the room daily, the number of hours they heated the room, and their assessment of how warm the room was overall. What emerged from these questions was a considerable change in the use of heating in the home after the new heating was installed (see Table 5.1). Before the central heating was installed, 361 households (76.8%) were heating no more than the lounge and two other rooms. Afterwards, 352 households (96.5%) were heating the lounge and at least three other rooms.

Table 5.1: Comparison of rooms heated before and after CHP

	Before CHP (% of households) n =470	After CHP (% of households) n = 470
lounge only	63 (13.4%)	1 (0.2%)
lounge plus 1 other room	165 (35.1%)	7 (1.5%)
lounge plus 2 other rooms	133 (28.3%)	10 (2.1%)
lounge plus 3 other rooms	68 (14.5%)	182 (38.8%)
lounge plus 4 other rooms	41 (8.7%)	270 (57.5%)

5.10 The CHP improvement specification for the private sector did not, in the first year of the scheme, include a radiator being installed in the kitchen. However, in many of these dwellings, the new boiler was sited in the kitchen, providing a source of heat into the room. If the kitchen is excluded from consideration of which rooms were heated after the CHP improvements, 398 households (84.8%) stated that they were heating the lounge, main bedroom, hall and bathroom on some basis compared with just 66 (14.1%) prior to the improvements.

5.11 Prior to the CHP improvements, the heat input into many rooms in the dwellings surveyed was only enough to take the chill off the air (e.g. heating the bedroom for an hour or two in the evening). Households reported that on average the lounge was heated for 13.9 hours per day. The next best-heated room was the hall, which was only heated for 4.9 hours on average. For all of the other rooms in the home, the average was between 1 and 4 hours of heating per day (see Table 5.2). When the total number of hours of heating in each room were aggregated and averaged across the whole of each house, the result was a mean of 4.5 hours of heating per room per day prior to the CHP works being installed. This average was considerably less than the number of hours set out for in the satisfactory heating regime.

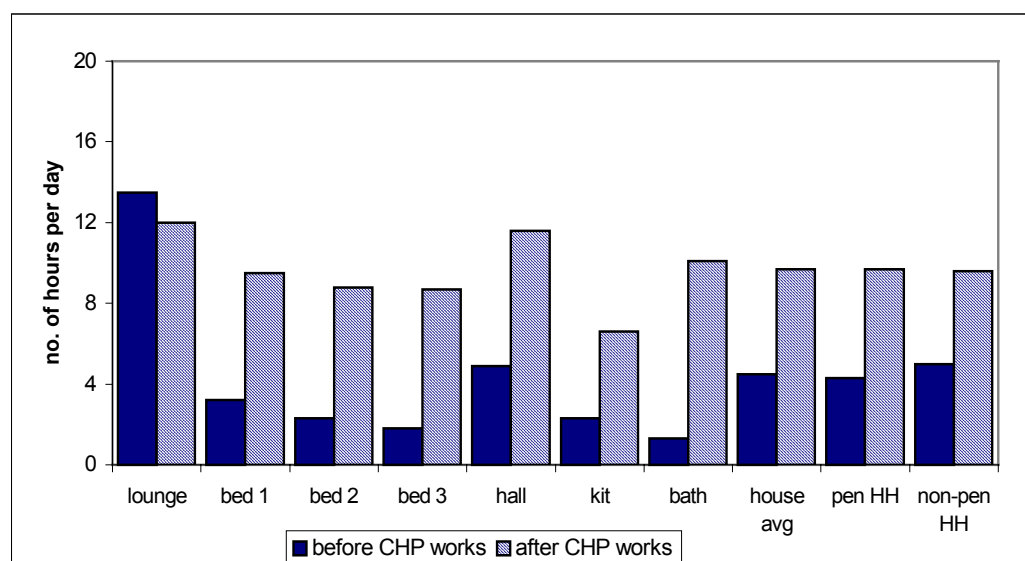
5.12 When broken down by pensioner and non-pensioner totals, the average was only 4.32 hours of heating per room per day for pensioner households and 5.01 hours for non-pensioner households – so, the group with the greater need for warmth, i.e. the pensioner households, were heating their homes less than others.

5.13 After the new heating was installed, households were not only heating more of their house; they were also generally heating the rooms for longer (see Table 5.2 and Figure 5.2). While there was a small reduction in the average number of hours the lounge was heated compared to previously, all of the other rooms in the house were heated for longer. Overall, the result was a mean increase of 5.4 hours heating per room per house. On average, pensioner households were heating each room for 9.7 hours per day compared to 9.6 hours per day for non-pensioners households. Amongst pensioner households, this represents an increase of over 5 hours of heating per room per day, and increase of 4.6 hours per room for non-pensioner households.

Table 5.2: Hours of heating and comfort ratings: By room-before and after CHP

	Hours of heating		Comfort rating	
	Before CHP	After CHP	Before CHP	After CHP
lounge	13.5	12.0	3.4	3.8
bedroom 1	3.2	9.5	2.1	3.6
bedroom 2	2.3	8.8	1.9	3.5
bedroom 3	1.8	8.7	1.7	3.4
hall	4.9	11.6	2.1	3.76
kitchen	2.3	6.6	1.9	3.5
bathroom	1.3	10.1	1.6	3.7
overall house	4.3	9.7	2.1	3.6
pensioner households	4.3	9.7	2.22	3.64
non-pensioner households	5	9.6	1.97	3.56

Figure 5.2: Average Hours Rooms Heated: Before and After CHP



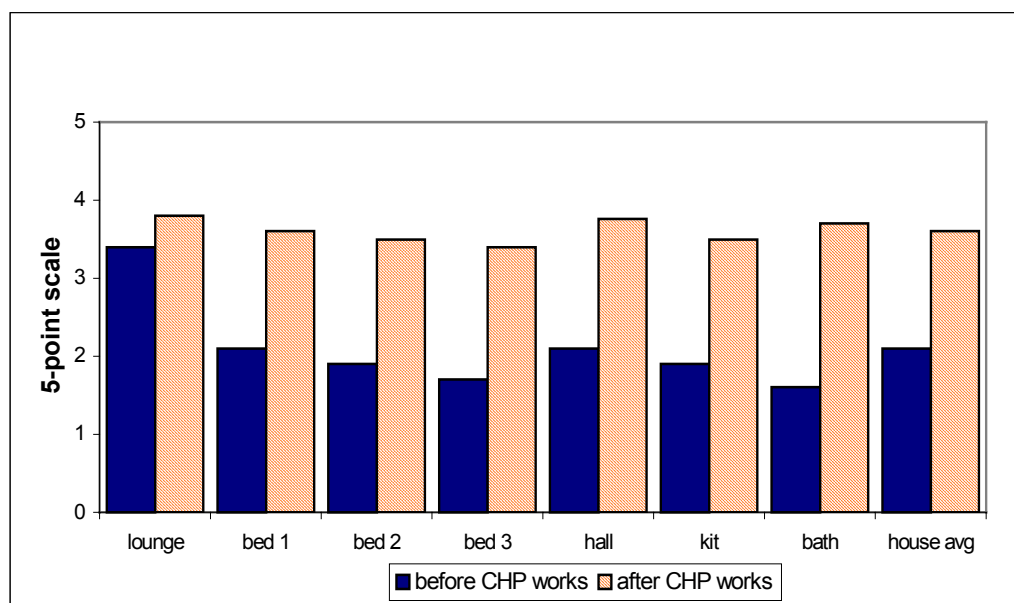
5.14 All households were asked to rate each room in terms of the achieved level of comfort on a 5-point scale:

1. cold
2. cool
3. comfortable
4. warm
5. hot

5.15 Before the CHP improvements, only the lounge scored on average above 3 (that is, between comfortable and warm) in terms of its achieved level of comfort (see Table 5.2 and Figure 5.3). The hall and main bedroom scored between cool and comfortable overall (2.1 and 2.06 respectively). All of the other rooms scored between cold and cool (between 1 and 2) in terms of achieved level of comfort. When the room scores were averaged out across the whole house, the dwellings scored between cool and comfortable (2.2) in terms of the overall comfort level. Given the limited extent of heating used in the house (both in terms of number of rooms heated and the number of hours) prior to the CHP improvements, it is not surprising that many households considered their home to be less than comfortable overall. When the average number of hours a room was heated and its reported achieved comfort score are compared, what emerges is a direct correlation between the two: the more hours a room was heated, the higher it scored on the comfort scale.

5.16 Following the installation of the new heating, its increased use brought an increase in the level of comfort. Overall, all rooms in the home, as well as the dwelling overall, increased their comfort rating score (including the lounge, despite the reduction in hours heated overall), scoring between 3 and 4 (between comfortable and warm) on average (see Table 5.2 and Figure 5.3).

Figure 5.3: Reported Levels of Comfort: Before and After CHP Improvements



5.17 It was noted above that 217 households (47.0%) reported either increased fuel costs or 'no change' in their fuel costs at the time of survey. The greater use of heating in the home may account for some of these increased fuel costs, or may have balanced out potential

reductions amongst some of those that reported ‘no change’. Despite households generally heating more of their house than before, heating rooms for longer than before, and reporting a noticeable increase in their comfort, what is significant here is that more than half of the households surveyed still reported savings on their fuel bills.

5.18 Additionally, increased fuel expenditure after CHP improvements may have come about for other reasons. Situations reported by households included:

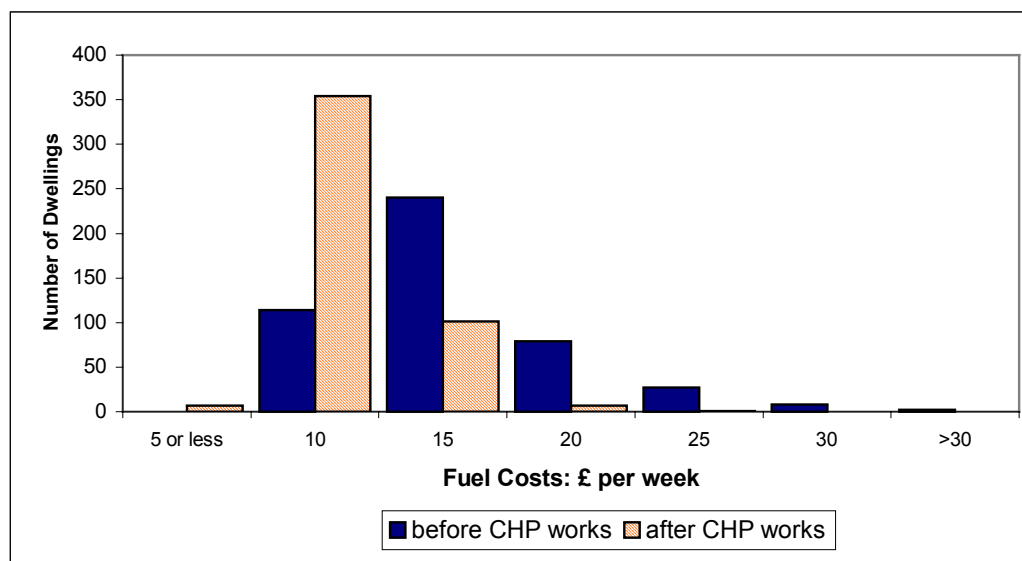
- that with the installation of the new heating, they had changed fuel supplier and entered into new payment arrangements without any corresponding reductions in payments to their previous supplier (e.g. due to disputes between suppliers, or problems with the transfer of supplier, the household was paying two suppliers for the same fuel supply);
- the installation of the new system may have required a new fuel supply (e.g. a gas supply being installed for the first time), and the household agreeing a new payment arrangement without any corresponding decrease in their existing payments (e.g. paying for the gas without a reduction (at the time of the survey) in the amount paid to their electricity supplier);
- that because of past deficits in their fuel accounts, current direct debits or payment arrangements had been increased to clawback these deficits, and the householder did not regard these as a fuel debt;
- that the householder had changed their fuel supplier, for whatever reason, to one that was actually more expensive than the supplier they were with previously.

Other reasons, although not actually reported by any householder, could be that they were not controlling the system effectively, or not making the best use of it. Post-installation visits by qualified energy advisers are built into the CHP to assist householders in making effective use of the new systems to minimise these risks.

CALCULATED FUEL COSTS

5.19 In addition to the household-reported fuel costs, the NHER Surveyor 3 program was used to calculate the annual total fuel costs for each household, customised to their individual circumstances, to assist in filling in gaps in the collected fuel bill data. The information used to tailor the heating and other fuel use behaviour was derived from the household questionnaire. While individual results do vary, the resultant average annual total fuel cost across the whole of the survey was £681; that is, very similar to the average of £676 derived from the household-reported fuel expenditure. The profile of annual fuel costs calculated by the NHER program, prior to the CHP improvements, is shown in Figure 5.4.

Figure 5.4: Calculated Fuel Costs: Actual Circumstances Before and After CHP



5.20 The NHER Surveyor 3 program also enabled annual fuel costs to be estimated for the period after to the CHP improvements³² (also shown in Figure 5.4). These calculated fuel costs also found that some households increased their fuel expenditure, but that the general trend in fuel expenditure was downwards. The average calculated-total annual household fuel cost, subsequent to the CHP improvements, was £472, a reduction of 30.7% on the average calculated cost before the improvements. This calculated average fuel expenditure is less than the post-CHP average of £594 derived from the household-reported data. The difference between the two amounts may reflect delays in realising some of the benefits of the CHP improvements, some reasons for which are discussed above. This reduction in the calculated-total annual fuel costs subsequent to the CHP improvements suggests that the overall fall in fuel costs may be greater than the 12% reduction calculated solely from the household-reported data.

FUEL EXPENDITURE TO ACHIEVE A SATISFACTORY HEATING REGIME

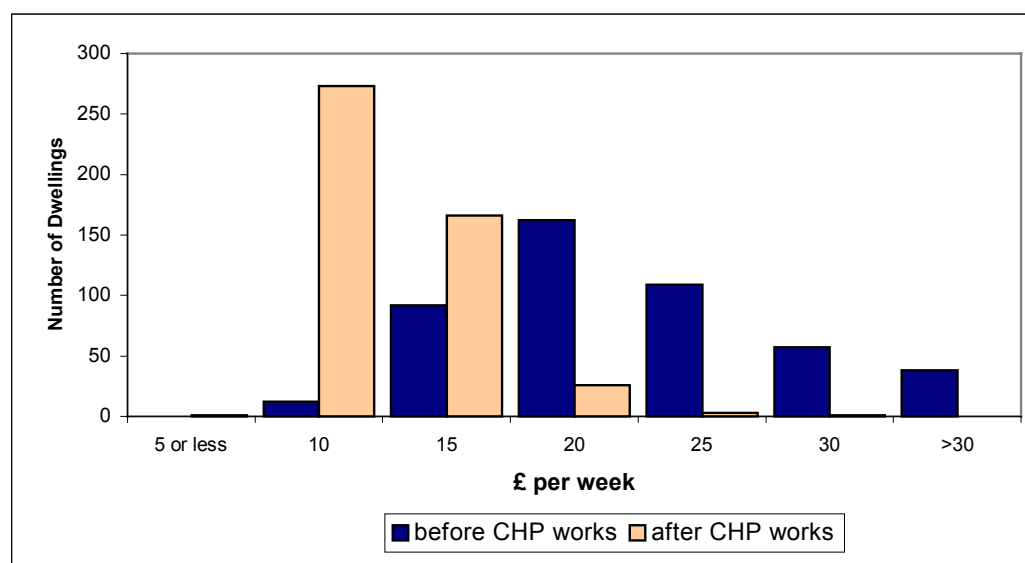
5.21 The Scottish Fuel Poverty Statement (SFPS) was not concerned with actual household fuel expenditure, whether household-reported or computer-calculated, if the end product was still a cold home. From the information presented in Section 5.1 on the extent of heating used in the home, the hours of heating and the reported level of comfort achieved, those surveyed would need to spend considerably more on fuel to achieve the temperature standards assumed by the satisfactory heating regime. The NHER Surveyor 3 program was used to calculate just how much more households would need to spend to achieve the respective satisfactory heating regimes given the heating and insulation characteristics of the dwellings both before and after the CHP improvements.

³² This included instances where information was not available from the householders themselves. For example, no before or after fuel expenditure information was available in 2% of the households surveyed. Also, 20.6% of households reported 'no change' in their fuel expenditure subsequent to the CHP improvements for a wide variety of reasons, of which almost half of this group (46%) were either paying for fuel by direct debit or by a weekly arrangement that was only negotiated once a year.

5.22 To achieve the respective satisfactory heating regime in these dwellings before the CHP improvements required an additional heat input into every dwelling in the sample. In some instances, this additional heat input could have been met by simply using the existing heating appliances more; in others, the use of supplementary heating appliances was required.

5.23 Where supplementary heaters were required, they were assumed for the purposes of the calculations to be direct acting, portable electric heaters³³. Supplying this additional heat input in this way adds considerably to the overall households fuel costs. The ranges of fuel costs associated with meeting the respective satisfactory heating regimes, both before and after the CHP improvements, are set out in Figure 5.5.

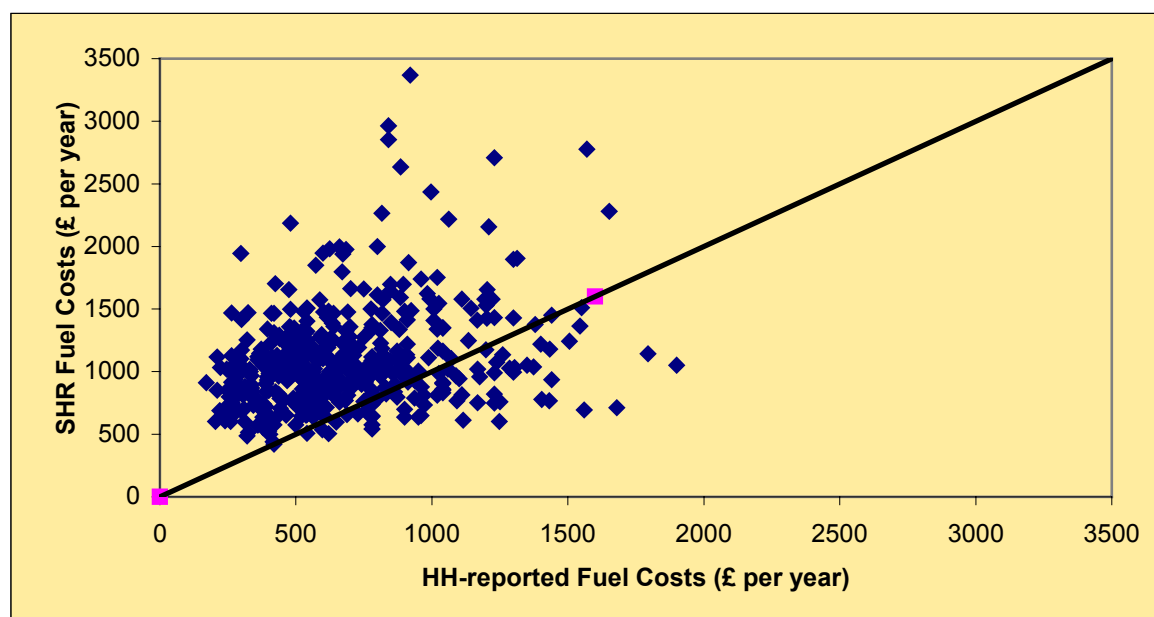
Figure 5.5: Fuel Costs Required to Meet Satisfactory Heating Regime: Before and After CHP improvements



5.24 In Figure 5.6, the heating costs to achieve the satisfactory heating regime are compared directly with the household-reported expenditure for the period before the central heating was installed. The points above the line indicate where the calculated heating costs are greater than the household-reported ones; the further the points are away from the line the greater the difference between the two. Most of the points are concentrated above the line. To achieve the satisfactory heating regime required an average expenditure of £1085 per year before the CHP improvements, a 60.5% increase on the average household-reported fuel expenditure of £676 per year. To bring the two together would require either a significant reduction in temperature standards and the amount of the house heated, or a significant increase in actual fuel expenditure.

³³ Portable electric heaters were assumed on the basis that they could be readily plugged into existing electrical sockets within rooms where there was no heating before, and therefore would need no additional supply to be installed to the house. Using ‘bottled gas’ portable heaters would have been just as expensive, if not more so.

Figure 5.6: Comparison of Household-reported Fuel Costs with Fuel Costs Required to Meet Satisfactory Heating Regime: Before CHP improvements



5.25 The impact of the improvements is seen in a considerable reduction in total fuel costs needed to achieve the satisfactory heating regime. The overall average fuel cost to attain the temperature standards fell from £1085 to £549 per year following the CHP improvements. The average required fuel expenditure following the improvements represents:

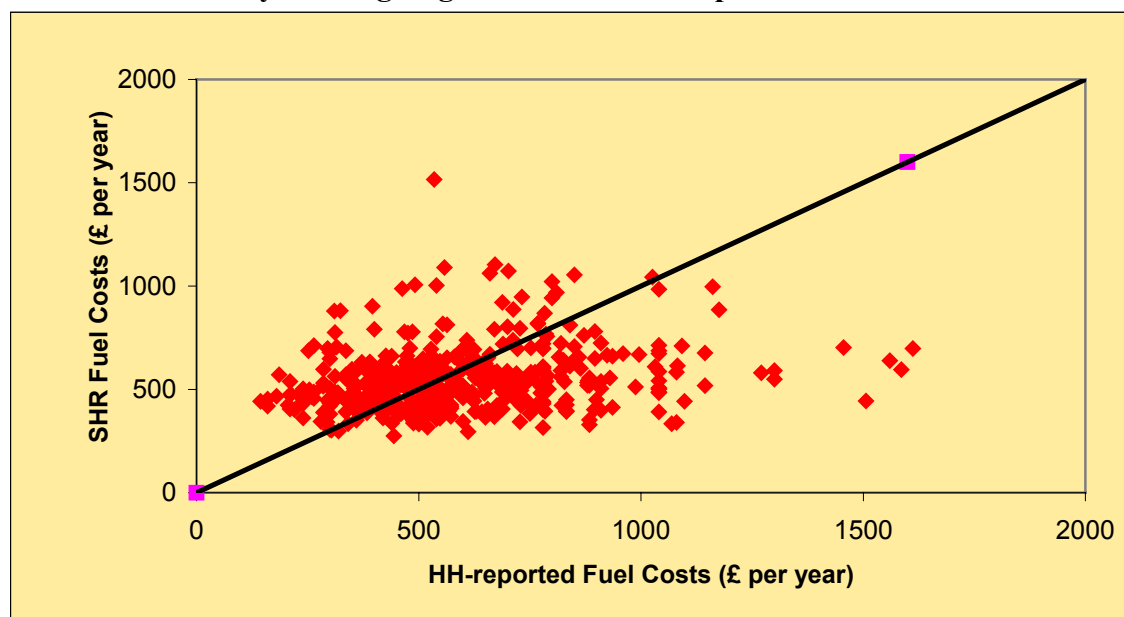
- a 49.4% reduction on the fuel costs required to meet the satisfactory heating regime prior to the CHP improvements; and,
- an 8.2% reduction on the household-reported fuel costs subsequent to the CHP improvements.

The range of fuel costs associated with meeting the satisfactory heating regime, subsequent to the CHP works, is set out in Figure 5.5.

5.26 When these fuel costs are plotted against household-reported fuel costs for the same period (see Figure 5.7), the concentration of the points are much closer to the line than in Figure 5.6, that is, what households are spending on fuel is much closer to what they need to spend. After the CHP improvements, achieving the SFPS satisfactory heating regime would require only a slight increase on reported use of the heating system for most dwellings³⁴. Even then, the reported expenditure of some households is higher than calculated. Reasons why reported-fuel expenditure may be higher are discussed above in Section 5.2.

³⁴ For some larger dwellings, it also required the use of some supplementary heating.

Figure 5.7: Comparison of Household-reported Fuel Costs with Fuel Costs Required to Meet Satisfactory Heating Regime: After CHP improvements



5.27 Given the different age-related satisfactory heating regimes outlined in the SFPS, it is useful to disaggregate these figures by pensioner and non-pensioner households. The average fuel costs associated with achieving the satisfactory heating regime were £1131 per year for pensioner households, and £935 for non-pensioner households, prior to the CHP improvements. These amounts represent a 78.4% increase for pensioner households, and a 12.8% increase for non-pensioner households, on their respective household-reported fuel costs prior to the CHP improvements.

5.28 After the CHP improvements, the average calculated total fuel costs for pensioner and non-pensioner households to achieve their satisfactory heating regimes were £558 and £519 respectively. For pensioner households, the average cost of £558 is very similar to the average household-reported fuel costs of £555 subsequent to the CHP improvements. For non-pensioner households, the average cost of £519 is less than their household reported fuel expenditure of £731 subsequent to the CHP improvements.

OVERALL COMMENT ON CHAPTER FIVE

5.30 Three different approaches were examined here for deriving total household fuel costs for the periods before and after CHP improvements were installed (see summary of all three approaches in Table 5.3). Regardless of the approach, all three indicate that following the CHP improvements, average fuel costs fell.

Table 5.3: Summary Fuel Costs: Before and After Central Heating Programme

	Household-reported Annual Fuel Costs (£/year)	NHER calculated Annual Fuel Costs (£/year)	Annual Fuel Costs required to achieve 'Satisfactory Heating Regime' (£/year)
Before CHP improvements	£676	£681	£1,085
After CHP improvements	£594	£472	£549
% Change	-12.1%	-30.7%	-49.4%

5.31 Prior to the CHP improvements, the households surveyed were spending slightly above the Scottish average expenditure on fuel. More significantly, given the levels of household-reported fuel expenditure and their use of heating, the majority of households in the survey were not spending the amounts needed to achieve the SFPS 'satisfactory heating regime' within their home. Despite the levels of expenditure of fuel, many felt their homes fell far short of being considered warm or comfortable throughout. Other than in the lounge, the use of heating was limited both with regard to the extent of the house heated, and the number of hours the heating was used. Given the heating and insulation characteristics of these dwellings before the CHP improvements, most households needed to considerably increase the use of heating, with a consequential impact on costs, to achieve the SFPS 'satisfactory heating regime'.

5.32 What emerges is just how expensive it was to heat the unimproved dwellings to the SFPS temperature standard using portable heating, and how much cheaper it is with a central heating system:

- only 38 households (8.1%) spent £12.40 per week or less (the average Scottish household expenditure on fuel for 2001) before compared with 378 households (80.6%) after the CHP improvements
- 202 households (43%) needed to spend more than £20 per week, with 38 (8.1%) needing to spend more than £40 per week, before the CHP improvements compared with only 4 households (0.9%) needing to spend more than £20 afterwards.

5.33 The CHP improvements have resulted in householders heating more of their home, heating it for longer, being more comfortable, and spending less on fuel overall. Given the arrangements by which they pay for fuel, it may be a year or two after the new heating is installed before householders experience the full impact in their fuel bill.

CHAPTER SIX HOUSEHOLD INCOME

INTRODUCTION

6.1 Defining household income is a critical factor in the assessment of fuel poverty: the lower the household income for any given set of fuel costs, the greater the likelihood of a household being in fuel poverty.

6.2 There has been considerable debate across the UK about exactly what should be included within the calculation of a household's income, in particular, whether such things as Housing Benefit (HB), Income Support for Mortgage Interest (ISMI) or Council Tax Relief (CTR) should be included. When these items are included in the calculation, they may increase a household's income without any more money actually passing through the hands of the household – that is, these benefits defray household costs without increasing a household's disposable income. Yet, to exclude these benefits results in other anomalies. The assessment of the incomes of those households eligible for benefits will have their housing costs ignored compared to those that do not receive these benefits (and, therefore have to pay rent or a mortgage as well as their fuel costs from their income). Simply removing these subsidies from the calculation can give rise to other inconsistencies as rents and Council Tax can vary considerably across the country. To avoid regional disparities and other anomalies, some local authorities maintain that the most appropriate way to define household income is to exclude all housing costs paid by the households themselves³⁵. However, even here there will be disparities between sections of the population with little or no housing costs (e.g. those that have paid off their mortgage) and those that are paying a mortgage or a rent.

6.3 Both the UK Fuel Poverty Strategy³⁶ and the Scottish Fuel Poverty Statement (SFPS)³⁷ acknowledged this debate. The Scottish Executive decided that the calculation of total household income would include Housing Benefit (HB), Income Support for Mortgage Interest (ISMI) and Council Tax Relief (CTR), but be net of Council Tax. However, the Scottish Executive noted that data should also be collected detailing the relevant amounts so that these subsidies could be excluded, if so desired. The questionnaire is designed to collect household data in such a manner.

³⁵ Beacon Councils (2003) *Tackling Fuel Poverty: A Beacon Council Toolkit for Local Authorities*, Newcastle upon Tyne: Beacon Councils and NEA,

³⁶ Dept of Trade and Industry, Dept for Environment, Food and Rural Affairs, Dept of Social Development, The Scottish Executive and National Assembly for Wales (2001) *The UK Fuel Poverty Strategy*, London: DTI

³⁷ Scottish Executive, Op. cit. 1

DEFINING HOUSEHOLD INCOME

6.4 An extensive part of the household questionnaire was concerned with the assessment of household income. Prior to the start of the survey, it was considered that this would be the most sensitive and difficult part of the questionnaire to complete. However, in the event, the overwhelming majority of householders were willing to discuss their income in greater or lesser detail. In total, of the 470 households surveyed:

- 442 households (94.0%) provided information on their income, many of these reinforcing the discussion with supporting documentation (e.g. pension books, bank statements, council tax assessments);
- another 7 households (1.5%) provided information on their income, but could not provide information on the income of an economically active son or daughter living at home;
- 14 households (3.0%) provided information on the benefits that they were in receipt of without discussing actual amounts;
- 6 households (1.3%) refused to answer any questions on income or even to indicate if they were in receipt of any benefits.

6.5 This information allowed household income to be calculated in four ways:

1. the **household-reported income** for the main respondent and spouse or partner and any economically active children living at home, that is, reported income without any adjustments for benefits, subsidies or housing costs;
2. the **total household income** (i.e. the SFPS definition of income) for the main respondent and spouse or partner and any economically active children living at home, including HB, ISMI, CTR minus Council Tax;
3. the household income **excluding HB and ISMI** for the main respondent and spouse or partner and any economically active children living at home, but including CTR, minus Council Tax;
4. the household income **net of all housing costs** for the main respondent and spouse or partner and any economically active children living at home, (that is, including HB, ISMI and CTR minus full rent, mortgage and Council Tax)

6.6 For 26 households (5.5%), the income calculations required a further adjustment because of changes in circumstances subsequent to the CHP improvements. The income of 17 households (3.6%) increased in the period after the CHP works were completed, while income fell for 9 households (1.9%). Reasons for the changes include the Welfare Benefit Check included within the CHP (increased), retirement (income both increased and decreased), change of employment (income both increased and decreased), and bereavements.

6.7 In Table 6.1, the average annual income is set out for each of the four permutations in the definition of household income described above.

Table 6.1: Overall Average Household Income

definition of income	Before CHP improvements (£ per year)	After CHP improvements (£ per year)
Household-reported income (unadjusted)	£9,606	£9,677
Total household income (including HB, ISMI and CTR)	£9,930	£10,002
Household income excluding HB and ISMI	£9,072	£9,144
Household income excluding all housing costs	£8,498	£8,570

6.8 As can be seen in Table 6.1, how household income is defined has a considerable effect on the average household income:

- including HB and ISMI within the income calculation increases the average total household income by about 4% on the unadjusted household-reported income. Amongst the households surveyed, this increase is almost wholly attributable to HB as only 4 of the owner-occupiers surveyed were in receipt of ISMI. Most owner-occupiers in the sample had completely paid off their mortgage.
- excluding HB and ISMI from the assessment of total household income reduces the average income by about 8.6% compared to when these subsidies are included in the calculation, and reduces average income by 5.6% on the unadjusted household-reported income.
- excluding all housing costs reduces average income by 11.7% on the unadjusted household-reported income;
- excluding all housing costs results in an average income of 14.6% less than the average total household income.

6.9 Table 6.1 also distinguishes average household income for the periods before and after the CHP improvements were completed. The change in average household income between the two periods represented an increase of about £70 per household per year, that is, an increase of less than 1% regardless of the income definition.

6.10 Simply focusing on average income hides the range of household incomes. In Figure 6.1 the distribution of household income is illustrated for the definition of total household income (i.e. the SFPS definition of income). The skewed distribution in household income is evident. While 291 households (62.7%) have a total income within £3000 of the average, the highest income is over 7 times greater than the lowest income amongst the households surveyed, and 2.75 times greater than the average income.

6.11 A skewed distribution is present for all of the income definitions set out above. The only difference is the degree of disparity between the lowest and highest incomes:

- for household-reported income, the highest income is over 11 times greater than the lowest income, and almost 3 times greater than the average income;
- when HB and ISMI are excluded from the assessment of household income, the highest income is over 17 times greater than the lowest income, and 3 times greater than the average income;

6.12 Overall, the households are not affluent: 444 households (94.5% of the sample) have a total income that is less than the average disposable income for Scottish households of 17,836³⁸; 361 households (76.8%) have an income of less than the average disposable income for all UK retired households of £12,116³⁹.

HOUSEHOLD INCOME BY SUB-GROUPS

6.13 When average household income is disaggregated by various sub-groups (that is, by pensioner and non-pensioner households, by urban and rural households, and by tenure), considerable variation exists (see Table 6.2):

- with household-reported income, pensioner households, rural households, and owner-occupier and private-rented households are more affluent on average than the sample overall; non-pensioner households, urban households and local authority and housing association tenants have a lower income. However, the differences in average income between pensioner and non-pensioner households, and between rural and urban households are small (1.6% and less than 1% respectively). Much larger variations are present within the tenure groups, with an almost 10% difference between the average owner-occupier household income (the highest) and that of a housing association tenant (the lowest).
- with total household income (i.e. including HB and ISMI and CTR), non-pensioner households and local authority and housing association tenants all show an increase of more than 10% on average when their total household income is compared to their average household-reported income. By contrast, the average income of owner-occupier and rural households falls as the reduction associated with removing Council Tax from the calculation is greater than any increases associated with including HB, ISMI or Council Tax Relief. The result is that the ordering between groups almost completely inverts. Pensioner households, rural households, and owner-occupier household average incomes are now below the overall sample average, while non-pensioner households, urban households and local authority and housing association tenants are above average. Private-rented households have an above-average income under both calculations. The differential between groups also increases, with about 8% difference between non-pensioner and pensioner groups, about 4% between rural and urban households, and almost 14% between the lowest (owner-occupiers) and highest (local authority) tenure groups.
- when HB and ISMI are excluded from the calculation of household income, all sub-groups show a reduction in average income when compared with both their respective total household income and the household-reported income averages. For owner-occupied households, this reduction is negligible when compared to the average total household income. By contrast, amongst the other three tenures the

³⁸ Office of National Statistics (2002) *Family Spending: A Report on the 2000-2001 Family Expenditure Survey*, London: The Stationery Office found the average Scottish disposable household income to be £343 per week, that is, the equivalent of £17,836 per year.

³⁹ The average disposable household income (ibid. 38) for a retired household was found to be £233 per week, that is, the equivalent of £12,116 per year.

reduction in average income is between 12 and 16%. However, despite a 12.2% reduction in income, private-rented households are still slightly above overall sample average income under this definition. By contrast, both local authority and housing association tenants fall below average. Rural households, and owner-occupiers are above average, while non-pensioner and pensioner households, and urban households are all very close to the average income.

- excluding all housing costs reduces income and changes the ordering again, with pensioner households, rural households and owner occupier households all having above average incomes, and the rest of the sub-groups all below average. Compared with total household income, all three tenants groups and non-pensioner households show a reduction in average income of more than 20%. By contrast, owner-occupier household average income fell by only 3.3%.

Table 6.2: Average Income By Sub-group: Before and After CHP

Sub-group	Before CHP				After CHP			
	Actual income (not adjusted) (£/year)	Total income (inc. HB, ISMI and CTR) (£/year)	H/Hold income (ex. HB and ISMI) (£/year)	Income (ex. ALL housing costs) (£/year)	Actual income (not adjusted) (£/year)	Total income (inc. HB, ISMI and CTR) (£/year)	H/Hold income (ex. HB and ISMI) (£/year)	Income (ex. ALL housing costs) (£/year)
HOUSEHOLDER								
Non-pensioner households (n=104)	£9,485	£10,562	£9,079	£8,221	£9,528	£10,605	£9,123	£8,264
Pensioner households (n=365)	£9,640	£9,750	£9,070	£8,578	£9,719	£9,828	£9,149	£8,657
URBAN-RURAL								
Rural households (n=79)	£9,676	£9,629	£9,132	£8,546	£9,637	£9,601	£9,094	£8,508
Urban households (n=390)	£9,591	£9,989	£9,060	£8,489	£9,685	£10,082	£9,152	£8,582
TENURE								
Owner-occupiers (n=209)	£9,956	£9,325	£9,309	£9,019	£10,057	£9,426	£9,409	£9,121
Local authority (n=169)	£9,334	£10,581	£8,922	£8,197	£9,390	£10,637	£8,979	£8,254
Housing Association (n=58)	£9,054	£10,012	£8,623	£7,844	£9,000	£9,959	£8,569	£7,791
Private rented tenants (n=30)	£9,791	£10,429	£9,161	£7,877	£9,986	£10,624	£9,356	£8,072

6.14 As can be seen, none of the individual sub-groups examined here was found to be consistently either above or below average across the four different income definitions. When households are further subdivided between all of these three sub-groups (that is, age of householder by locality by tenure), and ranked by average income, changes in the rank ordering occur as the definition of income changes. Two constants, however, emerged: the 6

privately rented pensioner households living in rural areas (representing 1.3% of the sample) were the richest group across all four definitions of income. By comparison, the 10 pensioner households living in local authority dwellings in rural areas (representing 2.1% of the sample) were the poorest group across all four definitions.

WINTER FUEL ALLOWANCE

6.15 As part of the questionnaire survey, households with anyone 60 years of age or older were asked about whether they claimed the winter fuel allowance that they were entitled to, and then asked to estimate how much they actually spent on fuel. Of the 364 households asked this question, all but 3 households (less than 1%) stated that either they were claiming or that 2002 was the first year that they were eligible to claim and that they would be claiming. Over half the households stated that they spent all of the £200 on fuel or that it was paid into their bank account which was used for paying their direct debits such as their fuel bills (see Table 6.3). Less than 10% stated that they did not spend any of it on fuel, and that it went towards other purchases.

Table 6.3: Winter Fuel Allowance: Claims and Expenditure

	% of households (n=363)
did not claim	0.8%
spent none on fuel	6.6%
spent some (less than 50%) on fuel	6.0%
spent half on fuel	17.3%
spent most (more than 50%) on fuel	7.7%
spent all on fuel	48.4%
paid into bank account for direct debits	11.5%
first claim in 2002	0.5%
no information available or refused	1.1%

OVERALL COMMENT ON CHAPTER SIX

6.16 How household income is defined is a critical factor in the assessment of fuel poverty, and as noted in the SFPS, one that exercised many debates in preparation of the government statement. Essentially, household income increases:

- as more economically active individuals within a household are taken into consideration (regardless of whether or not they contribute to household expenses); and,
- as more benefits are taken into account (regardless of whether or not the household actually receives them rather than being paid directly to a third party such as a landlord).

6.17 The greater the income, however it is calculated, the less likely it is that a household will be deemed fuel poor. Assessing the extent of fuel poverty, both before and after the CHP improvements, is the focus of the next chapter of this report.

CHAPTER SEVEN ASSESSING IMPACT ON FUEL POVERTY

INTRODUCTION

7.1 As seen in the previous two chapters of this report, both household fuel costs and household income may be derived in different ways. The methods used to derive household fuel costs and household income therefore have a direct effect on the number of households that fall into fuel poverty. If fuel poverty is to be truly eradicated, then it is important that households are truly removed from fuel poverty and the associated hardships, and not just defined out of it.

7.2 This chapter assesses the impact of the CHP improvements on reducing fuel poverty using four different approaches to deriving household fuel costs and household income:

- the first compares the household-reported fuel expenditure with the **household-reported income** without any adjustments for any benefits or costs;
- the second assesses the fuel costs associated with heating the dwelling to the satisfactory heating regime with the SFPS definition of **total household income** (that is, including HB and ISMI, and net of Council Tax);
- the third examines the fuel costs associated with heating the dwelling to the satisfactory heating regime with household income **excluding Housing Benefit or ISMI**, that is, using the alternative SFPS definition of household income; and,
- finally, the fuel costs associated with heating the dwelling to the satisfactory heating regime are assessed against household income **excluding all housing costs**.

7.3 The number of households spending more than 10% of their income on fuel, and therefore in fuel poverty, both prior and subsequent to the CHP improvements varied between the different approaches to assessing fuel poverty. As will be seen, regardless of the approach adopted, the CHP had a considerable impact on

- reducing the percentage of expenditure on fuel,
- reducing the percentage of households needing to spend more than 10% of their income on fuel (that is, those in fuel poverty), and
- reducing the severity of fuel poverty.

7.4 When the overall sample is broken down into householder, locality and tenure sub-groups, similar trends emerged, although the actual impact varies by sub-group and definition of income.

7.5 Despite the considerable improvement achieved, not all households were removed from fuel poverty by the CHP. Physical improvements alone may not be sufficient to remove all households from fuel poverty.

HOUSEHOLD-REPORTED FUEL EXPENDITURE AND INCOME

7.6 Prior to the CHP improvements, household-reported fuel expenditure accounted, on average, for 8.2% of household-reported income. For 24.9% of those surveyed, household-reported fuel expenditure accounted for more than 10% of household-reported income (see Table 7.1). Subsequent to the CHP improvements, the average household-reported expenditure on fuel fell to 7.2% of reported household income. As well as this reduction in average household expenditure on fuel, subsequent to the CHP improvements:

- the percentage of households spending more than 10% of their reported income on fuel fell to 19.1%; and,
- the percentage of households in each band spending over 10% of reported income on fuel fell in each banding by between 0.4 and 3.5%.

Table 7.1: Household-reported income and fuel expenditure

(n = 461 ⁴⁰)	Number of Households (%) spending on fuel					
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%
Before CHP improvements	346 (75.1%)	76 (16.5%)	24 (5.2%)	7 (1.5%)	5 (1.1%)	3 (0.7%)
After CHP improvements	373 (80.9%)	60 (13.0%)	21 (4.6%)	3 (0.7%)	3 (0.7%)	1 (0.2%)
net change after CHP works	+27 (+5.8%)	-16 (-3.5%)	-3 (-0.6%)	-4 (-0.8%)	-2 (-0.4%)	-2 (-0.5%)

7.7 Amongst the 88 households (19.1%) still spending more than 10% of their actual income on their reported fuel expenditure after the CHP improvements:

- 32 households (6.9% of all households) previously spent a larger percentage of their actual income on fuel than after CHP works (i.e. their reported-fuel expenditure had fallen but not to the point where it constituted less than 10% of their reported income);
- 19 households (4.1% of all households) previously spent more than 10% of their reported income on fuel, and the percentage had not changed;
- 15 households (3.3% of all households) previously spent more than 10% of their reported income on fuel and that percentage had increased⁴¹;
- 22 households (4.8% of all households) previously spending less than 10% of their reported income on fuel, spent more than 10% after CHP improvements⁴². For 2 households in this group, the percentage spent on fuel increased because their income actually dropped subsequent to the CHP improvements.

⁴⁰ Nine households were not included here because of the lack of information on their actual fuel bills

⁴¹ Reasons for increased household-reported fuel expenditure are discussed in section 5.2.

⁴² 17 of these 22 households heated more rooms in their home, heating them for longer, and considered them warmer. The other 5 were, in various combinations, either heated more of their home, heated them for longer, or considered it warmer subsequent to the CHP improvements.

7.8 It is possible that in some of these households where the percentage of reported household income spent on fuel increased after the new heating was installed, or remained unchanged, the percentage may fall as issues such as direct debits or the lack of fuel bills resolve themselves.

THE OFFICIAL SCOTTISH DEFINITION OF FUEL POVERTY

7.9 As discussed in Chapter 5, what households are spending on fuel is likely to underestimate what they need to spend to achieve satisfactory temperatures across their homes. The DETR noted,

“it is important to distinguish between the amount actually spent on heating and that needed to be spent. Given the competing pressures on low-income households, many do not spend the amount needed to stay warm.”⁴³

The intention of the Scottish Fuel Poverty Statement (SFPS), by including a temperature standard within the definition of fuel poverty, was to ensure that fuel poverty targets were not reached simply through deprivation, that is, by households spending less on fuel by living in cold homes. As seen in Section 5.1, the only room that was generally considered comfortable prior to the CHP works was the lounge; the rest of the rooms scored no better than cool on average. The costs associated with attaining the satisfactory heating regime are set out in Section 5.3. Again, as seen, these fuel costs were generally considerably higher than the household-reported fuel expenditure.

7.10 When the calculated fuel costs associated with meeting the satisfactory heating regimes are compared here against the SFPS’s definition of total household income⁴⁴, the CHP is seen to reduce considerably:

- the percentage of household income spent on fuel,
- the percentage of households in fuel poverty, and
- the severity of fuel poverty

7.11 Prior to the CHP improvements, the average fuel expenditure required to meet the satisfactory heating regime was 10.9% of total household income, with 289 households (61.6%) needing to spend more than 10% of their total household income to attain the SFPS’s temperature standards. Subsequent to the CHP improvements, average expenditure on fuel required to meet these standards fell to 5.5% of total household income.

7.12 The CHP improvements removed 252 (87.2%) of the fuel poor households from fuel poverty. Only 37 (7.8%) of all of the households surveyed needed to spend more than 10% of their income on fuel subsequently (see Table 7.2). Amongst the households still needing to spend more than 10% of their total household income on fuel, the severity of fuel poverty was reduced, with:

- only 3 households (0.6%) needing to spend more than 15%, compared to 121 households (25.9%) before the CHP improvements;

⁴³ DETR (1999) *Fuel Poverty – The New HEES – A programme for warmer, healthier homes*, London: DETR

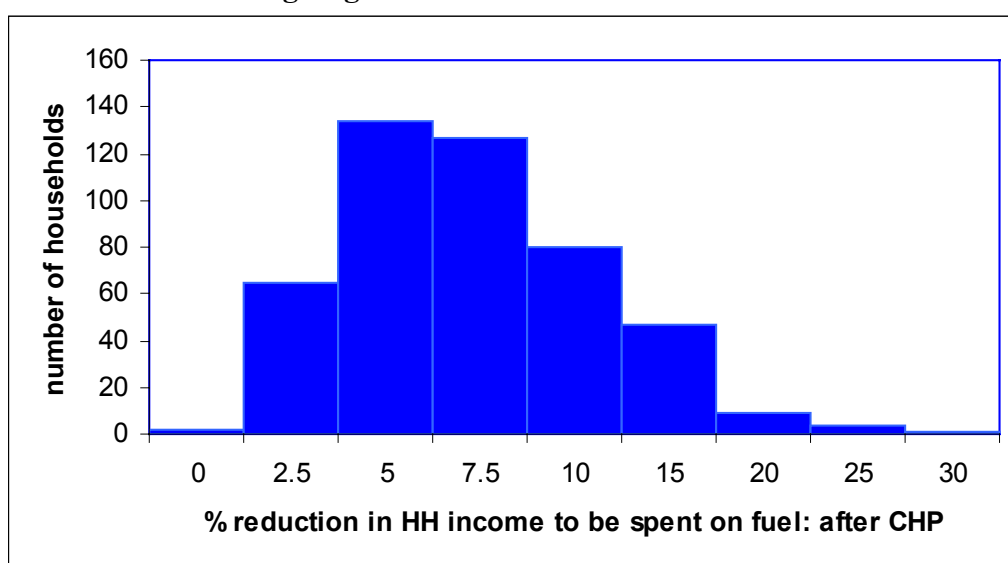
⁴⁴ This includes the income of all economically active adults living within the dwelling, as well as any Housing Benefit, Income Support for Mortgage Interest, and Council Tax Relief, minus their Council Tax.

- no household needing to spend more than 20% of their income on fuel, compared to 44 (9.3%) before;
- a reduction in the percentage of households across all of the bands spending over 10% of household income on fuel;
- 21 (56.8%) of these 37 households needing to spend between 10 and 12% of their income - that is, they are just over the fuel poverty threshold;
- 22 (59.5%) of these 37 households reducing the amount of total household income required to be spent on fuel to achieve the satisfactory heating regime by more than 10%. The fuel expenditure required to meet these standard fell by between 1% and 27.1% of total household income, with an average reduction of 12.1% (see Figure 7.1);
- a reduction of between 8.8% and 21.3% of the total household income for the 3 households that still needed to spend in excess of 15% of their total household income to maintain the satisfactory heating regime.

Table 7.2: Household income required to achieve Satisfactory Heating Regime

(n = 469)	Number of Households (%) needing to spend on fuel					
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%
Before CHP works	180 (38.4%)	167 (35.6%)	78 (16.6%)	26 (5.5%)	11 (2.3%)	7 (1.5%)
After CHP works	432 (92.1%)	34 (7.2%)	3 (0.6%)	0	0	0
net change After CHP works	+252 (+53.7%)	-133 (-28.8%)	-75 (-16.0%)	-26 (-5.5%)	-11 (-2.3%)	-7 (-1.5%)

Figure 7.1: Reduction in % of household income needed to achieve Satisfactory Heating Regime: AFTER CHP



Scottish definition of fuel poverty: By sub-groups

7.13 When the overall sample is disaggregated by the various householder, locality, and tenure sub-groups, the trends found within the overall survey are repeated across all sub-groups. As in the overall sample, the percentage of total household income spent on fuel, the percentage of those in fuel poverty, and the severity of fuel poverty were all reduced considerably across all of the sub-groups examined (see Table 7.3). However, differences between the various sub-groups emerged:

- prior to the CHP improvements, less than 50% of non-pensioner households needed to spend more than 10% of their total household income to achieve the satisfactory heating regime. Amongst all of the rest, more than 50% of households needed to spend more than 10%;
- after the CHP improvements, all sub-groups needed to spend much less than 10% on fuel on average, with only rural households needing to spend more than 6%. All the rest needed to spend less than 6%;
- prior to the CHP improvements, pensioner households needed to spend more than 10% of their total household income on fuel on average (so were fuel poor on average). Average expenditure on fuel was less than 10% for non-pensioner households. Owner-occupiers and private-rented households also needed to spend more than 10% of their total household income on fuel (so were also fuel poor on average). Average expenditure on fuel was less than 10% for social sector tenants.
- after the CHP works, despite reductions of almost 60% in the overall percentage of rural and owner-occupier households in fuel poverty, more than 10% of these two sub-groups were still in fuel poverty. These were the only two sub-groups with more than 10% of households still in fuel poverty.

7.14 Of the various sub-groups set out in Table 7.3, the pensioner, rural, owner-occupier and private-rented households demonstrate both a greater amount of total household income needing to be spent on fuel, and a higher incidence of fuel poverty before the improvements than do any of the other sub-groups examined. They were the only sub-groups that needed to spend more than 11% of total household income on fuel on average; and, where more than 60% of households in each needed to spend more than 10% of total household income on fuel to achieve the satisfactory heating regime.

7.15 After the CHP improvements, all sub-groups displayed a considerable reduction in both the percentage of total household income needed to be spent on fuel, and the percentage of households in fuel poverty. However, the pensioner, rural, and owner-occupier households still needed to spend slightly more of their total household income on fuel, and demonstrated a higher prevalence of fuel poverty, than did the other sub-groups. These sub-groups were particularly over-represented amongst the fuel poor households when compared to the overall survey results. All of the other sub-groups were under-represented.

7.16 There is a strong degree of overlap between these three sub-groups: all of the owner-occupied and private-rented households⁴⁵ were pensioner households; 86.1% of rural

⁴⁵ The two households that purchased their council house subsequent to the CHP improvements are excluded here.

households were pensioner households; and, 57% of the rural households surveyed were owner-occupiers. The higher percentage of total household income spent on fuel and the greater prevalence of fuel poverty amongst these three groups is attributable, at least in part, to:

- higher fuel costs: the higher temperature standard within the satisfactory heating regime for pensioners will mean they would incur a greater fuel cost than if the same number of non-pensioners were occupying a particular dwelling;
- lower income: on average these three sub-groups have the lowest total household income of all of the sub-groups examined here;
- poorer energy efficiency: pensioner and rural households lived in the dwellings with the lowest average NHER score overall.

Table 7.3: Total household income spent on fuel: By Sub-group

Sub-group HOUSEHOLDER	Households (%) in Sub-group needing to spend on fuel						average expenditure
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%	
Non-pensioners (n=104) Before CHP	56 (53.8%)	32 (30.8%)	13 (12.5%)	3 (2.9%)	0	0	8.9%
Non-pensioners After CHP	99 (95.2%)	4 (3.8%)	1 1.0%	0	0	0	4.9%
Net % change After CHP	+43 (+41.4%)	-28 (-27.0%)	-12 (-11.5%)	-3 (-2.9%)	0	0	-4.0%
Pensioners (n=365) Before CHP	124 (34.0%)	135 (37.0%)	65 (17.8%)	23 (6.3%)	11 (3.0%)	7 (1.9%)	11.6%
Pensioners After CHP	333 (91.2%)	30 (8.2%)	2 (0.5%)	0	0	0	5.7%
Net % change After CHP	+209 (+57.2%)	-105 (-28.8%)	-63 (-17.3%)	-23 (-6.3%)	-11 (-3.0%)	-7 (-1.9%)	-5.9%
URBAN / RURAL							
Rural (n = 79) Before CHP	21 (26.6%)	22 (27.8%)	21 (26.6%)	10 (12.7%)	1 (1.3%)	4 (5.1%)	13.5%
Rural households After CHP	68 (86.1%)	9 (11.4%)	2 (2.5%)	0	0	0	6.5%
Net % change After CHP	+47 (+59.5%)	-13 (-16.4%)	-19 (-24.1%)	-10 (-12.7%)	-1 (-1.3%)	-4 (-5.1%)	-7.0%
Urban (n = 390) Before CHP	159 (40.8%)	115 (37.2%)	57 (14.6%)	16 (4.1%)	10 (2.6%)	3 (0.8%)	10.4%
Urban households After CHP	364 (93.3%)	25 (6.4%)	1 (0.3%)	0	0	0	5.3%
Net % change After CHP	+205 (+52.5%)	-90 (-30.8%)	-56 (-14.3%)	-16 (-4.1%)	-10 (-2.6%)	-3 (-0.8)	-5.1%
TENURE							
Owner-occupiers (n=209) Before CHP	60 (28.7%)	69 (33.0%)	47 (22.5%)	16 (7.7%)	11 (5.3%)	6 (2.9%)	12.5%
Owner-occupiers After CHP	182 (87.0%)	26 (12.5%)	1 (0.5%)	0	0	0	6.0%
Net % change After CHP	+122 (+58.3%)	-43 (-20.5%)	-46 (-22.0%)	-16 (-7.7%)	-11 (-5.3%)	-6 (-2.9%)	-6.5%
Local authority (n=169) Before CHP	81 (47.9%)	56 (33.1%)	25 (14.8%)	7 (4.1%)	0	0	9.4%
Local authority After CHP	161 (95.3%)	7 (4.1%)	1 (0.6%)	0	0	0	5.0%
Net % change After CHP	+80 (+47.4%)	-49 (-29.0%)	-24 (-14.2%)	-7 (-4.1%)	0	0	-4.4%
Housing Assoc. (n = 58) Before CHP	27 (46.6%)	25 (43.1%)	5 (8.6%)	1 (1.7%)	0	0	9.8%
Housing Assoc. After CHP	57 (98.3%)	1 (1.7%)	0	0	0	0	5.3%
Net % change After CHP	+30 (+51.7%)	-24 (-41.4%)	-5 (-8.6%)	-1 (-1.7%)	0	0	-4.5%
Private rented (n = 30) Before CHP	11 (36.7%)	16 (53.3%)	1 (3.3%)	0	0	1 (3.3%)	11.8%
Private rented After CHP works	29 (96.7%)	0	1 (3.3%)	0	0	0	5.6%
Net % change After CHP works	+18 (+60.0%)	-16 (-53.3%)	0	0	0	-1 (-3.3%)	-6.2%

FUEL POVERTY AND HOUSEHOLD INCOME (EXCLUDING HOUSING BENEFIT AND ISMI)

7.17 Household incomes were re-calculated to reflect the ‘alternative’ definition of income set out within the SFPS, that is, household income excluding Housing Benefit (HB) and Income Support for Mortgage Interest (ISMI) from consideration⁴⁶. On average, the result is a household income of £858 per year less than total household income, and £534 lower than the unadjusted household-reported income (see Table 6.1)⁴⁷. The effect of reducing income without changing the fuel costs associated with heating a home to the satisfactory heating regime is to increase the percentage of household income spent on fuel, and therefore, the percentage of households in fuel poverty both before and after the CHP improvements. All of these effects are seen in Tables 7.4 and 7.5.

Table 7.4: Impact of changing definition of income on % of households in fuel poverty and average expenditure on fuel

Income Definition	% of households spending >10% of income before CHP	% of households spending >10% of income after CHP	% of all households coming out of fuel poverty after CHP	average expenditure on fuel before CHP	average expenditure on fuel after CHP
Total Household Income	61.6%	7.9%	53.7%	10.95%	5.5%
Household Income ex HB and ISMI	68.4%	15.0%	53.4%	12.0%	6.0%
Difference	+6.8%	+7.1%	-0.3%	+1.05%	+0.5%

7.15 When HB and ISMI are excluded from household income, not only is there a general increase in the number of households in fuel poverty both before and after the CHP improvements (see Table 7.4), but also in the severity of fuel poverty (see Table 7.5). The percentage of households needing to spend more than 10% of household income increases from 61.6% to 68.4% before the CHP improvements, and from 7.9% to 15.0% afterwards when HB and ISMI are excluded from the income calculation. Further, 37.4% of all households needed to spend more than 15% of their income before the CHP improvements and 1.7% after when Housing Benefit and ISMI are excluded compared to 25.9% and 0.6% of households respectively when they are included.

⁴⁶ This definition is net of council tax, so household income was calculated by reducing income by their Council Tax obligation and adding Council Tax Relief to those households that received any.

⁴⁷ Of the two, excluding Housing Benefit has the bigger impact on household income – 39.9% of all households surveyed were in receipt of Housing Benefit, compared with only 0.8% in receipt of ISMI. The implication is that the impact of changing the approach to calculating income here will be bigger on tenants than owner-occupiers.

Table 7.5: Household income (excluding HB and ISMI) needed for fuel to attain satisfactory heating regime

(n =469)	Number of Households (%) needing to spend on fuel <i>(comparable figures using Total Household Income, taken from Table 7.2)</i>					
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%
Before CHP	31.6 (38.4)	31.1 (35.6)	20.7 (16.6)	9.6 (5.5)	4.1 (2.3)	3.0 (1.5)
After CHP	85.0 (92.1)	13.3 (7.2)	1.7 (0.6)	0 (0)	0 (0)	0 (0)
% net change After CHP	+53.4 (+53.7)	-17.8 (-28.4)	-19.0 (-16.0)	-9.6 (-5.5)	-4.1 (2.3)	-3.0 (-1.5)

7.16 Subsequent to the CHP improvements, even when HB and ISMI are excluded from the income calculation, considerable reductions are seen in:

- the average expenditure on fuel (6% of household income on average compared to 12% before) (see Table 7.4);
- the percentage of fuel poor households (15% after compared to 62.6% before) (see Table 7.5);
- the severity of fuel poverty (1.7% of households needing to spend more than 15% of their income on fuel compared to 37.4% before) (see Table 7.5).

7.17 Just over 53% of all the households surveyed (see Table 7.5), representing 78.2% of the fuel poor households, are removed here from fuel poverty by the CHP improvements.

Fuel Poverty and Household Income (ex HB and ISMI) by Sub-group

7.18 The above results appear to confirm the Scottish Executive’s view in the SFPS that the “decreases or increases in the number of households in fuel poverty will be similar against each definition, that is, they will move in parallel.”⁴⁸ A different picture emerges, however, when the overall survey results are broken down into sub-groups.

7.19 As seen in Section 6.4, when HB and ISMI considerations are excluded, average household income falls across all sub-groups. The direct consequence is that the fuel expenditure required to reach the satisfactory heating regime accounts for a larger percentage of household income (see Table 7.6), and increases the incidence and severity of fuel poverty (see Table 7.7) across all sub-groups for both before and after the CHP improvements.

⁴⁸ Op. cit. 1, para 3.5

Table 7.6: Comparison of average fuel expenditure: by income and sub-group (Before and After CHP)

SUB GROUP	Fuel expenditure Before CHP		Fuel expenditure After CHP	
	% Total Household Income	% Household income (ex. HB and ISMI)	% Total household income	% Household income (ex. HB and ISMI)
HOUSEHOLDER				
Non-pensioner households	8.9	10.3	4.9	5.7
Pensioner households	11.5	12.5	5.7	6.1
URBAN-RURAL				
Rural households	13.5	14.2	6.5	6.9
Urban households	10.4	11.5	5.3	5.8
TENURE				
Owner-occupiers	12.5	12.5	6.0	6.0
Local authority tenants	9.4	11.2	5.0	5.9
Housing Association tenants	9.8	11.4	5.3	6.2
Private rented tenants	11.8	13.4	5.6	6.4

7.20 To achieve the satisfactory heating regime prior to the CHP improvements,

- all of the sub-groups assessed here needed to spend more than 10% of their total household income on average, that is, they were all fuel poor on average;
- more than half of the households in each sub-group needed to spend more than 10% of their household income on fuel; and,
- some households in each sub-group needed to spend more than 30% of their income to achieve these temperature standards

7.21 Within these general trends, differences emerge between the various sub-groups. For example, the pensioner, rural, owner-occupier and private rented households demonstrate both a greater amount of their total household income being spent on fuel, and a greater incidence of fuel poverty before the CHP improvements than the other sub-groups examined. They were the only sub-groups that needed to spend more than 12% of their household income on fuel on average; and, where more than 70% of the households needed to spend more than a 10% of their total household income on fuel. The increase in the incidence of fuel poverty found through using this calculation of household income is not spread equally across all sub-groups. The increase in the incidence of fuel poverty amongst local authority tenants accounted for 68.7% of the increase in the total number of fuel poor households as a result of the change in the calculation of income. By contrast the number of owner-occupiers in fuel poverty did not change at all with the removing of HB and ISMI from the income calculation.

7.22 Regardless of the change in calculating income, the impact of the CHP improvements is still considerable. The percentage of household income (excluding HB and ISMI) needed to be spent on fuel (see Table 7.6), as well as the incidence and severity of fuel poverty is reduced across all of the sub-groups (see Table 7.7). To achieve the satisfactory heating regime subsequent to the CHP improvements:

- no sub-group needed to spend more than 6.9% of their income on fuel on average (Table 7.6);
- the overall number of households needing to spend more than 10% of their income was reduced by between 33.3 and 63.4% of the total number of households in each sub-group (Table 7.7).
- no household within any of these sub-groups needed to spend more than 20% of their income (Table 7.7).

7.23 Within these general trends there are still differences between the sub-groups. Amongst the households that needed to spend more than 10% of their household income to achieve the satisfactory heating regime subsequent to the CHP improvements, non-pensioner and rural households and local authority tenants were over-represented. All of the other sub-groups within the age, locality and tenure sub groups are under-represented. Within the tenure sub-groups, local authority tenants accounted for 75.7% of the increase in the number of households in fuel poverty because of the change in the income definition. By contrast, the number of fuel poor owner-occupiers did not change at all with this change in the definition of income.

7.24 When Housing Benefit and ISMI are excluded from the income calculation, the sub-groups with the lowest average fuel expenditure are no longer necessarily those with the lowest prevalence of fuel poverty. Rural households demonstrate both the highest level of fuel expenditure, and the highest incidence of fuel poverty subsequent to the CHP improvements. By contrast, the next two sub-groups with the highest incidence of fuel poverty after the CHP improvements are local authority tenant and the non-pensioner households, but they also constitute two of the three groups with the lowest average fuel expenditure. This reflects the wide disparity in income between the more affluent households in these groups and the poorest.

7.25 The inclusion or exclusion of Housing Benefit and ISMI from consideration within the income calculation would appear to be more significant for some groups within society than others in determining the numbers of households that are considered fuel poor.

Table 7.7: Percentage of Household Sub-Group Income (excluding Housing Benefit and ISMI) to be spent on fuel

Sub-group HOUSEHOLDER	Number of Households (%) in Sub-group needing to spend on fuel					
	up to 10% of income on fuel	up to 15% of income on fuel	up to 20% of income on fuel	up to 25% of income on fuel	up to 30% of income on fuel	>30% of income on fuel
Non-pensioners (n=104) Before CHP	46 (44.2%)	22 (21.2%)	19 (18.3%)	9 (8.7%)	4 (3.8%)	4 (3.8%)
Non-pensioners After CHP	81 (77.9%)	17 (16.5%)	6 (5.8%)	0	0	0
Net % change After CHP	+35 (+33.7%)	-5 (-4.5%)	-13 (-12.4%)	-9 (-8.7%)	-4 (-3.8%)	-4 (-3.8%)
Pensioners (n=365) Before CHP	102 (27.9%)	124 (34.0%)	78 (21.4%)	36 (9.9%)	15 (4.1%)	10 (2.7%)
Pensioners After CHP	318 (87.1%)	45 (12.3%)	2 (0.6%)	0	0	0
Net % change After CHP	+216 (+59.2%)	-79 (-21.6%)	-76 (-20.9%)	-36 (-9.9%)	-15 (-4.1%)	-10 (-2.7%)
URBAN / RURAL						
Rural (n = 79) Before CHP	18 (22.8%)	20 (25.3%)	22 (27.8%)	12 (15.2%)	1 (1.3%)	6 (7.6%)
Rural households After CHP	61 (77.2%)	16 (20.3%)	2 (2.5%)	0	0	0
Net % change After CHP	+43 (+54.4%)	-4 (-5.0%)	-20 (-25.3%)	-12 (-15.2%)	-1 (-1.3%)	-6 (-7.6%)
Urban (n = 390) Before CHP	130 (33.3%)	126 (32.2%)	75 (19.2%)	33 (8.5%)	18 (4.6%)	8 (2.1%)
Urban households After CHP	338 (86.7%)	46 (11.8%)	6 (1.5%)	0	0	0
Net % change After CHP	+208 (+53.4%)	-80 (-20.4%)	-69 (-17.7%)	-33 (-8.5%)	-18 (-4.6%)	-8 (-2.1%)
TENURE						
Owner-occupiers (n = 209) Before CHP	60 (28.7%)	68 (32.5%)	48 (23.0%)	16 (7.7%)	10 (4.8%)	7 (3.3%)
Owner-occupiers After CHP	182 (87.1%)	26 (12.4%)	1 (0.5%)	0	0	0
Net % change After CHP	+122 (+58.4%)	-42 (-20.1%)	-47 (-22.5%)	-16 (-7.7%)	-10 (-4.8%)	-7 (-3.3%)
Local authority (n = 169) Before CHP	59 (34.9%)	48 (28.6%)	25 (14.8%)	24 (14.2%)	9 (5.3%)	4 (2.4%)
Local authority After CHP	136 (80.5%)	28 (16.6%)	5 (3.0%)	0	0	0
Net % change After CHP works	+77 (+45.3%)	-20 (-12.0%)	-20 (-11.8%)	-24 (-14.2%)	-9 (-5.3%)	-4 (-2.4%)
Housing Assoc. (n = 58) Before CHP	21 (36.2%)	15 (25.9%)	18 (31.0)	3 (5.2%)	0	1 (1.7%)
Housing Assoc. After CHP	52 (89.7%)	5 (8.6%)	1 (1.7%)	0	0	0
Net % change After CHP works	+31 (+53.5%)	-10 (-17.3%)	-17 (-30.3%)	-3 (-5.2%)	0	-1 (-1.7%)
Private rented (n = 30)Before CHP	7 (23.5%)	14 (46.7%)	6 (20.0)	1 (3.3%)	0	2 (6.7%)
Private rented After CHP	26 (86.7%)	3 (10.0)	1 (3.3%)	0	0	0
Net % change After CHP works	+19 (+63.4%)	-11 (-36.7%)	-5 (-16.7%)	-1 (-3.3%)	0	-2 (-6.7%)

7.26 It can be seen in Table 7.8 that the reduction in the percentage of households spending more than 10% of their income on fuel varies between sub-groups, and depends on the income calculation used:

- two sub-groups (urban households and owner-occupiers) show no change, or almost no change in the percentage of households being removed from fuel poverty, regardless of whether HB or ISMI are included in the income calculation or not. These two groups are the least effected by the changes in the definition of income;
- three sub-groups (pensioner households and housing association and private-rented tenants) had more households removed from fuel poverty when HB and ISMI were excluded in the income calculation;
- three sub-groups (non-pensioner households, rural households, and local authority tenants) had fewer households removed from fuel poverty when HB and ISMI were excluded from the income calculation.
- regardless of the number of households within each sub-group that come out of fuel poverty as a result of the CHP works, a smaller percentage of fuel poor are actually removed from fuel poverty under this definition of income across all sub-groups except owner -occupiers.

7.27 These differences are not simply related to the magnitude of the change in household income as a result of changing the income calculation. What cannot be said given the differential impact on reducing fuel poverty amongst the various sub-groups is that the numbers all move in parallel with the inclusion or exclusion of HB and ISMI in the income calculations (see Table 7.8).

Table 7.8: Comparison in the reduction of fuel poor households: by sub-group

sub-group	% of households spending >10% of income before CHP improvements	% of households spending >10% of income after CHP improvements	overall % of households coming out of fuel poverty after CHP improvements	% of fuel poor households coming out of fuel poverty after CHP improvements
HOUSEHOLDER				
Non-Pensioner (n=104) Total Household Income	48 (46.2%)	5 (4.8%)	43 (41.4%)	89.6%
Non pensioner (n=104) Income ex HB and ISMI	58 (55.8%)	23 (22.5%)	35 (33.3%)	60.3%
Pensioner (n=365) Total Household Income	240 (66.0%)	32 (8.8%)	208 (57.2%)	86.7%
Pensioner (n=365) Income ex HB and ISMI	263 (72.1%)	47 (12.9%)	216 (59.2%)	82.1%
URBAN / RURAL				
Rural (n=79) Total Household Income	58 (73.4%)	11 (13.9%)	47 (59.5%)	81.0%
Rural (n=79) Income ex HB and ISMI	61 (77.2%)	18 (23.8%)	43 (53.4%)	70.5%
Urban (n=390) Total Household Income	231 (59.2%)	26 (6.7%)	205 (52.5%)	88.7%
Urban (n=390) Income ex HB and ISMI	260 (66.7%)	52 (13.4%)	208 (53.3%)	80.0%
TENURE				
Owner-occupiers (n=209) Total Household Income	149 (71.3%)	27 (13.0%)	122 (58.4%)	81.9%
Owner-occupiers (n=209) Income ex HB and ISMI	149 (71.3%)	27 (13.0%)	122 (58.4%)	81.9%
Local authority tenants (n=169) Total Household Income	88 (52.1%)	8 (4.7%)	80 (47.4%)	90.9%
Local authority tenants (n=169) Income ex HB and ISMI	110 (65.1%)	33 (19.8%)	77 (45.3%)	70.0%
Housing association tenants (n=58) Total Household Income	31 (53.4%)	1 (1.7%)	30 (51.7%)	96.8%
Housing association tenants (n=58) Income ex HB and ISMI	37 (63.8%)	6 10.3%	31 (53.5%)	83.8%
Private rented tenants (n=30) Total Household Income	19 (63.3%)	1 (3.3%)	18 (60.4%)	94.7%
Private rented tenants (n=30) Income ex HB and ISMI	23 (76.7%)	4 (13.3%)	19 (63.4%)	82.6%

FUEL POVERTY AND HOUSEHOLD INCOME (EXCLUDING ALL HOUSING COSTS)

7.28 Removing all housing costs⁴⁹ from the household income calculations, as seen in Section 6.3, resulted in the lowest average income findings across the overall sample, and for the different householder, locality and tenure sub-groups. Overall, when all housing costs are excluded from the calculation of income, the average household income is £8,480, that is:

- £1432 per year less than total household income figure;
- £1108 per year less than the household-reported income, and,
- £574 per year less than household income figure that excludes HB and ISMI.

7.29 Unsurprisingly, the effect of using this calculation is to increase the percentage of household income spent on fuel, with a consequential increase in the incidence and severity of fuel poverty both before and after the CHP improvements compared against other income calculations used in this report (see Table 7.9).

Table 7.9: Comparison of households in fuel poverty and average expenditure on fuel: By household income

Household income	% of households spending >10% of income before CHP	% of households spending >10% of income after CHP	% of households spending >15% of income before CHP	% of households spending >15% of income after CHP	average expenditure on fuel before CHP	average expenditure on fuel after CHP
Total Household Income	61.6%	7.9%	25.9%	0.6%	10.9%	5.5%
Household Income ex HB and ISMI	68.4%	15.0%	37.4%	1.7%	12.0%	6.0%
Household Income ex all housing cost	72.1%	20.7%	42.4%	2.9%	12.8%	6.4%

7.30 Subsequent to the CHP improvements, even using this income calculation, considerable reductions are seen in:

- average expenditure on fuel (6.4% of household income on average compared to 12.8% before) (see Table 7.9);
- the percentage of fuel poor households (20.7% of all households compared to 72.1% before) (see Table 7.10);
- the severity of fuel poverty (2.9% of households needing to spend more than 15% of their income on fuel compared to 42.5% before) (see Table 7.10).

7.31 The net decrease in fuel poor households is similar to that found with the other income calculations, with over 51% of all the households surveyed being removed from fuel poverty by the CHP improvements (see Table 7.10), with 71.3% of previously fuel poor households being removed from fuel poverty.

⁴⁹ Total household income minus any amounts paid in mortgage, rent and Council Tax.

Table 7.10: Household income (excluding all housing costs) needed to be spent on fuel to attain satisfactory heating regime

(n = 469)	Number of Households (%) needing to spend on fuel <i>(comparable figures using total household income, taken from Table 7.2)</i>					
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%
Before CHP works	27.9 (38.4)	29.6 (35.6)	20.9 (16.6)	11.9 (5.5)	5.1 (2.3)	4.5 (1.5)
After CHP works	79.3 (92.1)	17.9 (7.2)	0.9 (0.6)	0.9 (0)	0.9 (0)	0.2 (0)
% net change after CHP works	+51.4 (+53.7)	-11.7 (-28.4)	-20.0 (-16.0)	-10.0 (-5.5)	-4.2 (2.3)	-4.3 (-1.5)

Fuel Poverty and Household Income (ex ALL Housing Costs) by Sub-group

7.32 As seen in Section 6.3, when all housing costs are removed from the calculation of household income, all the sub-groups examined here are left with a lower average income than with any other income calculation used in this report. The consequence, as the cost of heating these homes to the satisfactory heating regime remains unchanged, is that fuel expenditure accounts for an even larger percentage of household income on average, and that the incidence and severity of fuel poverty increases in each of the sub-groups, both before and after the CHP improvements (see Table 7.11). To achieve the satisfactory heating regime prior to the CHP improvements,

- all of the householder, locality and tenure sub-groups examined here needed to spend more than 10% of their total household income on average, that is, all of the sub-groups were fuel poor on average;
- more than 60% or more of all of the households in each sub-group needed to spend more than 10% of their household income on fuel;
- more than 39% of all of the households in each sub-group needed to spend more than 15% of their total household income.
- some of the households in each sub-group needed to spend more than 30% of their income on fuel.

7.33 However, as with the other methods of calculating income, the impact of the CHP improvements remains considerable. The percentage of income needed to be spent on fuel, as well as the extent and severity of fuel poverty is reduced across all of the sub-groups (see Table 7.11). To achieve the satisfactory heating regime after the CHP improvements,

- average expenditure on fuel fell to between 6.2 and 7.4% of income across the different sub-groups;
- all but two of the sub-groups show an overall decrease of between 50 and 60% in the total percentage of households spending more than to 10% of their income on fuel. Two groups (non-pensioner households and local authority tenants) demonstrate smaller reductions of 35.6% and 45.0% respectively in households suffering fuel poverty;

- all sub-groups show a considerable reduction in the percentage of households needing to spend more than 15% of their income on fuel (see Table 7.12).

7.34 The impact of the CHP improvements does vary between the different sub-groups:

- the rural and private rented households were the only sub-groups that needed to spend more than 15% of their income on fuel on average before the CHP improvements, and the only two groups that needed to spend more than 7% of their household income on fuel afterwards;
- local authority tenants and rural and non-pensioner households were the only groups where 6% or more of households needed to spend over 15% of their income to reach the temperature standards after the CHP improvements.
- non-pensioner households, on average, needed to spend less of their income on fuel than pensioner households, both before and after the CHP works, and demonstrated the smallest percentage of households needing to spend more than 15% of their income on fuel to attain the satisfactory regime before the improvements (39.2%). However, they show the largest percentage afterwards (7.7%). Non-pensioners demonstrated the smallest overall reduction households coming out of fuel poverty (only 35.6%).

7.35 Some groups experienced the impact of the CHP improvements more than others did. After the CHP improvements, less than 20% of pensioner, urban, owner-occupier and housing association tenant households were still in fuel poverty. They were also the four sub-groups with the lowest percentage of households needing to spend more than 15% of their income on fuel afterwards. However, these were not always the groups spending the least on fuel (see Table 7.11).

7.36 Removing housing costs from the income calculation would appear to be more significant for some groups within society than others in terms of the impact on the numbers of households in fuel poverty. Again, the sub-groups do not move in parallel.

**Table 7.11: Household income (excluding all housing costs) needed to be on fuel:
By sub-group**

sub-group	Number of Households (%) in Sub-group needing to spend on fuel						average expenditure
	up to 10%	>10% up to 15%	>15% up to 20%	>20% up to 25%	>25% up to 30%	>30%	
HOUSEHOLDER							
Non-pensioners (n=104) Before CHP	40 (38.5%)	23 (22.1%)	17 (16.1%)	12 (11.5%)	6 (5.8%)	6 (5.8%)	11.4
Non-pensioners After CHP	77 (74.0%)	19 (18.3%)	4 (3.8%)	0	3 (2.9%)	1 (1.0%)	6.3
Net % change After CHP works	+37 (+35.6%)	-4 (-3.8%)	-13 (-12.5%)	-12 (-11.5%)	-3 (-2.9%)	-5 (-4.8%)	-5.1
Pensioners (n=365) Before CHP	91 (24.9%)	116 (31.8%)	81 (22.2%)	44 (12.1%)	18 (4.9%)	15 (4.1%)	13.2
Pensioners After CHP	295 (80.8%)	65 (17.8%)	0	4 (1.1%)	1 (0.3%)	0	6.4
Net % change After CHP	+204 (+55.9%)	-51 (-14.0%)	-81 (-22.1%)	-40 (-11.0%)	-17 (-4.6%)	-15 (-4.1%)	-6.8
URBAN / RURAL							
Rural (n = 79) Before CHP	16 (20.3%)	20 (25.3%)	18 (22.8%)	15 (19.0%)	1 (1.3%)	9 (11.4%)	15.2
Rural households After CHP	56 (70.9%)	18 (22.8%)	0	2 (2.5%)	3 (3.8%)	0	7.3
Net % change After CHP	+40 (+50.6%)	-2 (-2.5%)	-18 (-22.8%)	-13 (-16.5%)	+2 (+2.5%)	-9 (-11.4%)	-7.9
Urban (n = 390) Before CHP	115 (29.5%)	119 (30.5%)	80 (20.5%)	41 (10.5%)	23 (5.9%)	12 (3.1%)	12.3
Urban households After CHP	316 (81.0%)	66 (16.9%)	4 (1.0%)	2 (0.5%)	1 (0.3%)	1 (0.3%)	6.2
Net % change After CHP	+201 (+51.5%)	-53 (-13.6%)	-76 (-19.5%)	-39 (-10.0%)	-22 (-5.6%)	-11 (-2.8%)	-6.1
TENURE							
Owner-occupiers (n = 209) Before CHP	57 (27.3%)	67 (32.1%)	44 (21.1%)	22 (10.5%)	11 (5.3%)	8 (3.8%)	12.9
Owner-occupiers After CHP	172 (82.3%)	36 (17.2%)	0	1 (0.5%)	0	0	6.2
Net % change After CHP	+115 (+55.0%)	-31 (-14.8%)	-44 (-21.1%)	-21 (-10.0%)	-11 (-5.3%)	-8 (-3.8%)	-6.7
Local authority (n = 169) Before CHP	52 (30.8%)	45 (26.3%)	28 (16.6%)	24 (14.2%)	10 (5.9%)	10 (5.9%)	12.2
Local authority After CHP	128 (75.7%)	31 (18.3%)	3 (1.8%)	3 (1.8%)	3 (1.8%)	1 (0.6%)	6.4
Net % change After CHP	+76 (+45.0%)	-14 (-8.3%)	-25 (-14.8%)	-21 (-12.4%)	-7 (-4.1%)	-9 (-5.3%)	-5.8
Housing Assoc. (n = 58) Before CHP	17 (29.3%)	16 (27.6%)	18 (31.0)	4 (6.9%)	2 (3.4%)	1 (1.7%)	12.6
Housing Assoc. After CHP	49 (84.5%)	8 (13.8%)	1 (1.7%)	0	0	0	6.8
Net % change After CHP	+32 (+55.2%)	-8 (-13.8%)	-17 (-29.3%)	-4 (-6.9%)	2 (-3.4%)	-1 (-1.7%)	-5.8
Private rented (n = 30) Before CHP	4 (13.3%)	10 (33.3%)	8 (26.1)	5 (16.9%)	1 (3.3%)	2 (6.7%)	15.6
Private rented After CHP	20 (66.7%)	9 (30.0)	0	0	1 (3.3%)	0	7.4
Net % change After CHP	+16 (+53.3%)	-1 (-3.3%)	-8 (-26.1%)	-5 (-16.9%)	0	-2 (-6.7%)	-8.2

Table 7.12: Households needing to spend more than 15% of income (ex. ALL Housing costs) on fuel: by Sub-group

sub group: HOUSEHOLDER	% of households needing to spend more than 15% of their income (excluding all housing costs) on fuel	
	Before CHP improvements (% of households)	After CHP improvements (% of households)
Non-pensioner households	39.4	7.7
Pensioner households	43.3	1.4
URBAN-RURAL		
Rural households	54.4	6.3
Urban households	40.0	2.1
TENURE		
Owner-occupiers	40.6	0.5
Local authority tenants	42.9	6.0
Housing Association tenants	43.1	1.7
Private rented tenants	53.4	3.3

FUEL POVERTY, FUEL COSTS, NHER AND HOUSEHOLD INCOME

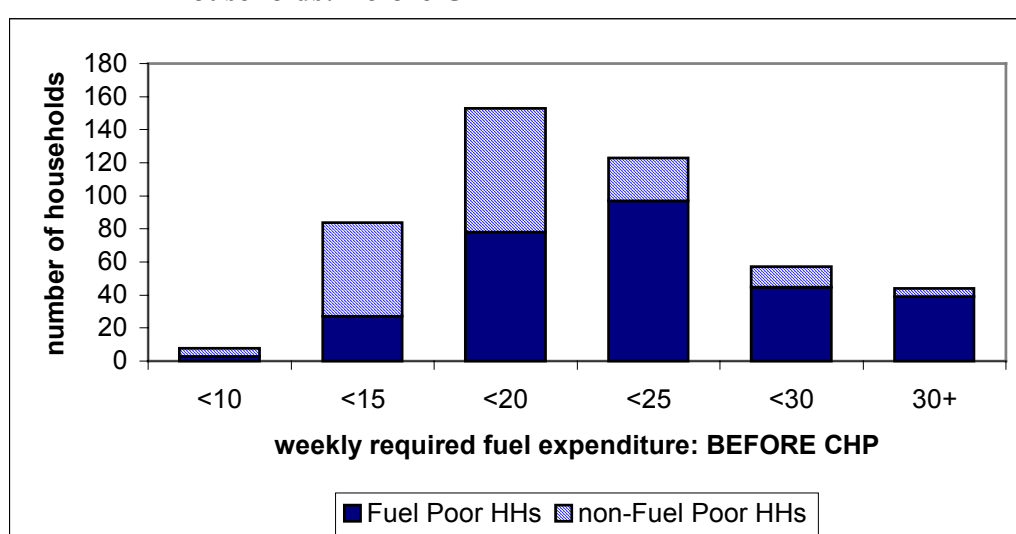
7.37 The cost of heating a dwelling through using room heaters can be expensive, particularly if a household has to rely upon expensive to run direct electric or LPG appliances. High fuel costs are reflected in poor NHER scores, with implications for fuel poverty - the higher the fuel costs associated with heating the dwelling to a satisfactory temperature standard, the higher the income needed if fuel poverty is to be avoided.

7.38 What is evident from the survey results, given the high percentage of households that needed to spend more than 10% of their income (however defined) on fuel before the CHP improvements, is that prior to the CHP improvements many of those sampled were in fuel poverty. Fuel poverty is not simply an issue of high fuel costs or energy inefficient dwellings, but may reflect low household incomes. The relationships between household fuel costs, the NHER, household income⁵⁰ and fuel poverty are examined in this section.

⁵⁰ This section uses the SFPS definition of total household income. The relevant figure calculated for household income excluding all housing costs will be reported alongside in brackets. These two figures represent the two extremes arising as a result of the different definitions of household income.

7.39 In Figure 7.2, weekly fuel costs of the fuel poor households prior to the CHP improvements are compared with the overall survey results. As may be expected, households in fuel poverty comprised a majority of households amongst the higher ranges of expenditure on fuel. Prior to the CHP improvements, 88.6% of households needing to spend £30 or more per week on average (90.9%, if all housing costs excluded from household income (exHC)), and 78.9% (84.4% exHC) of households needing to spend between £20 and £30 per week on average were found to be in fuel poverty. However, fuel poor households are seen across almost the complete range of weekly fuel expenditures. It is not until weekly fuel costs fall below £16 per week on average that fuel poor households constitute less than half of the households in each band⁵¹. Fuel poor households account for 71.1% of all households needing to spend £16 or more on fuel per week on average, compared with 35% of households needing to spend less than £16 per week on average being fuel poor.

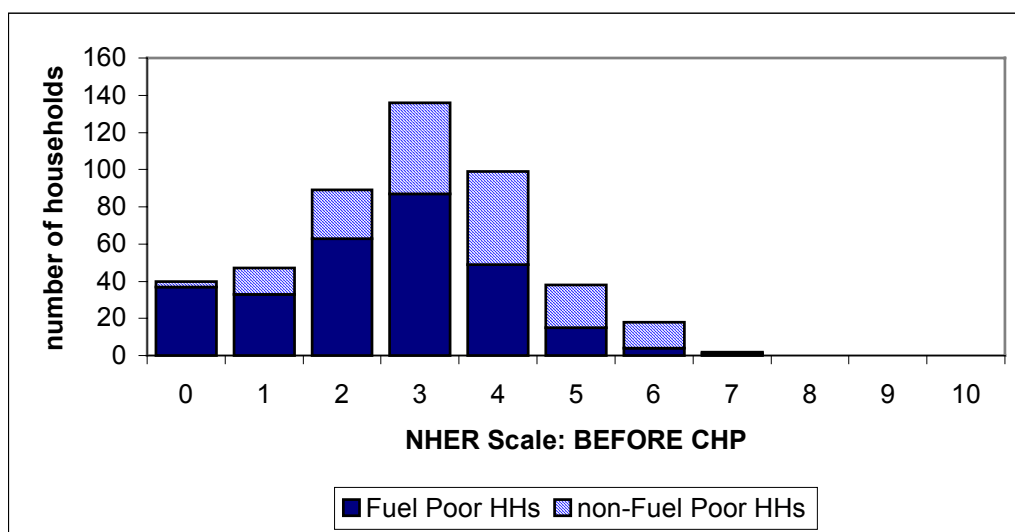
Figure 7.2: Required Weekly Fuel Expenditure: Fuel Poor and Non-Fuel Poor Households: Before CHP



7.40 The high fuel costs are reflected in the generally poor NHER ratings achieved by the dwellings prior to the CHP works. No house scored better than 7 on the NHER scale, and only 4.2% dwellings in total scored 6 or better. In Figure 7.3, the NHER ratings of the dwellings of the fuel poor households are compared with those of the overall survey. Although the percentage of fuel poor households decreases as the NHER scores rise, dwellings occupied by fuel poor households are found across the range of NHER scores prior to the CHP improvements. It is not until a NHER rating of 5 or better is achieved that fuel poor households do not account for more than half of the households within the NHER rating band. Households living in dwellings that scored 5 or higher on the NHER scale only represented about a third (34.5%) of those surveyed prior to the CHP improvements.

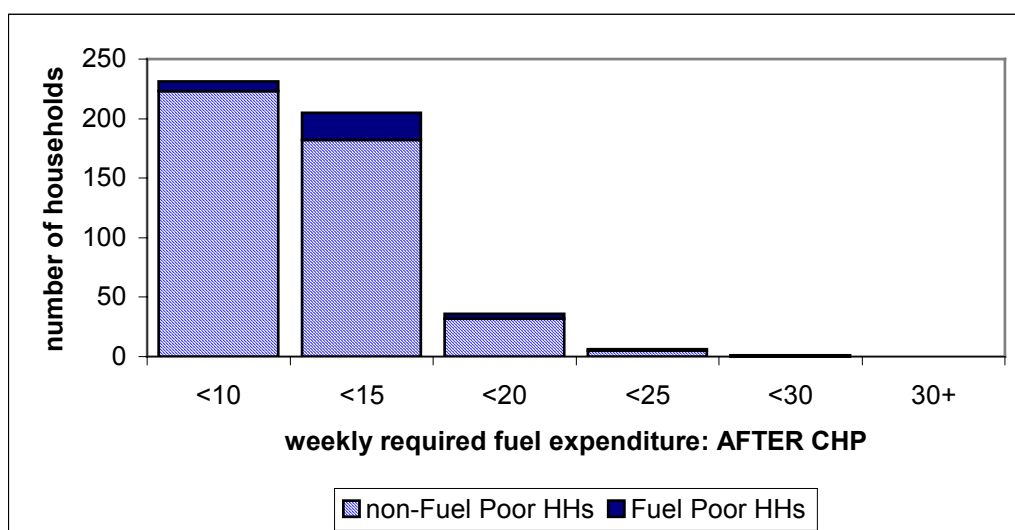
⁵¹ When assessed against household income that excludes all housing costs, it is only when weekly expenditure on fuel is £8 per week or less that fuel poor households constituted less than 50% of the households, and this covers only 2 of the households surveyed.

Figure 7.3: NHER scores of Fuel Poor and Non-Fuel Poor Households: Before CHP



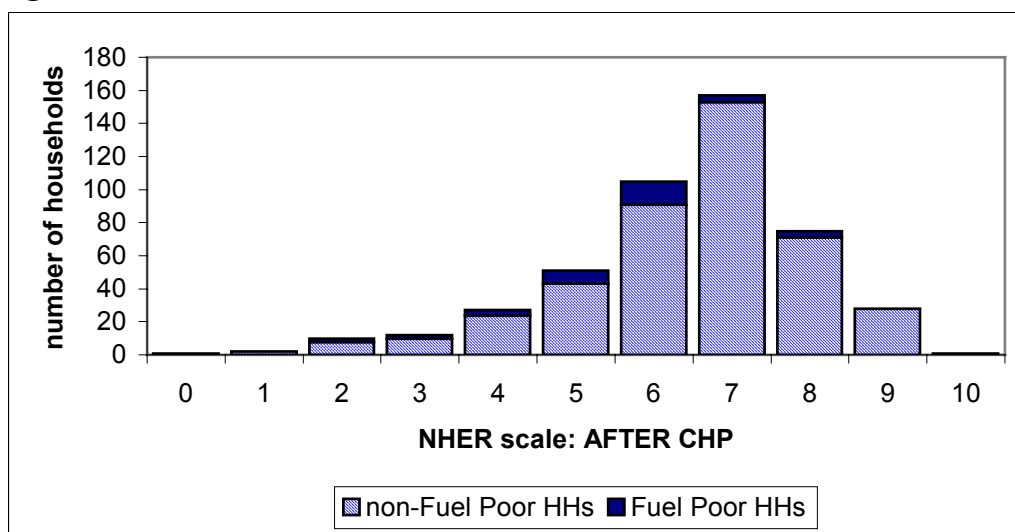
7.41 After the CHP improvements, the levels of fuel expenditure required to achieve the satisfactory heating regime reduced considerably, with the consequence of removing many households from fuel poverty. Figure 7.4 compares the weekly fuel costs of the fuel poor households after the CHP improvements with the overall survey results. The overall reduction in the number of fuel poor households is considerable: only 16.7% of households needing to spend £16 or more on fuel per week, and 7.2% needing to spend less than £16 per week, were found to be fuel poor (41.7% and 19.6% respectively exHC). However, some fuel poor households are still found across most of the range of weekly fuel costs.

Figure 7.4: Required Weekly Fuel Expenditure: Fuel Poor and Non-Fuel Poor Households: After CHP



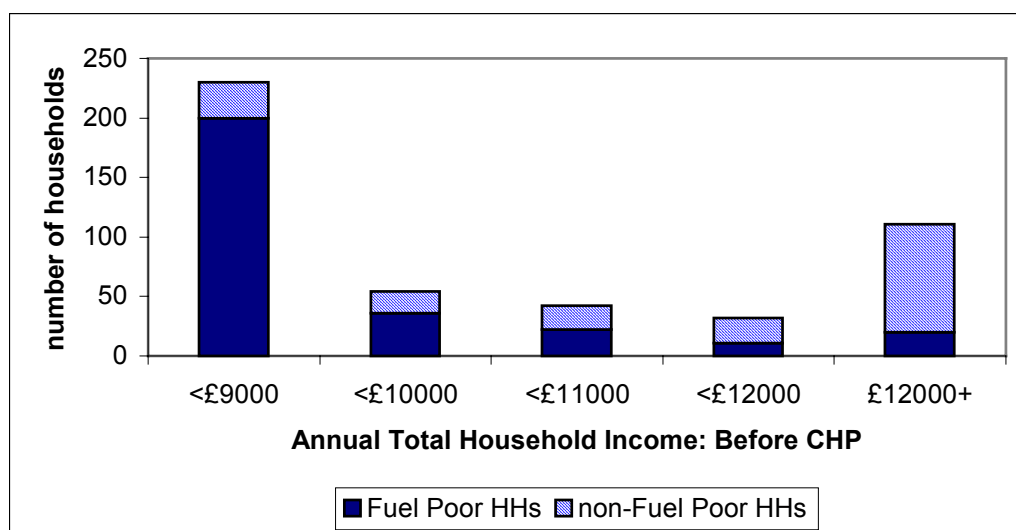
7.42 The impact of installing new central heating systems on reducing the overall cost of heating is reflected in higher NHER scores. In Figure 7.5, the NHER scores of the dwellings occupied by the fuel poor households subsequent to the CHP improvements are compared with those for the overall survey. The change is dramatic, but fuel poor households are still present across much of the range of the NHER scale. While the percentage of fuel poor households within each NHER banding generally falls as the NHER score increases, it is not until a NHER of 9 or 10 is achieved that no fuel poor households are found amongst those surveyed, regardless of how income is calculated.

Figure 7.5: NHER scores of Fuel Poor and Non-Fuel Poor Households: After CHP



7.43 As income increases (regardless of how it is calculated), the percentage of fuel poor households generally falls. In Figure 7.6, the annual income of the fuel poor households are compared with the overall survey results prior to the CHP improvements. While households in fuel poverty comprise a larger proportion of households amongst the lower ranges of annual income, fuel poor households extend across much of the range of income found in the survey. Not until household income reaches £11,000 a year is the percentage of fuel poor households less than half of the households within the income band, and not until household income reaches £19,000 are there no fuel poor households found within an income band. By contrast, 87% of all households with an annual income of less than £9,000 are fuel poor, and these account for over two-thirds of all the fuel poor households (69.2%).

Figure 7.6: Total Household Income of Fuel Poor and Non-Fuel Poor Households: Before CHP



7.44 Prior to installing the new heating systems, given the cost of heating many of the dwellings surveyed to the satisfactory heating regime, a considerable increase in household income would have been needed to avoid fuel poverty for many households. The same level of income is not needed to avoid fuel poverty subsequently because of the dramatic reductions in fuel costs. Whereas fuel poor households were found across much of the respective ranges of fuel costs and NHER scores after the CHP works, with income, the fuel poor households are concentrated amongst the lower income bands afterwards (see Figure 7.7). With the central heating system installed, no fuel poor households were found amongst the 51.4% of the sample with an annual income of £9,000 or more. Amongst households with an annual income of less than £9,000, the fuel poor accounted for 16.2% after the central heating was installed, compared to 87% before⁵². The impact of low income becomes even more apparent when annual household income is examined against fuel costs and NHER scores with regard to fuel poor households, both before and after the CHP improvements.

7.45 In Table 7.13, the fuel poor households are broken down by both annual income and the average weekly fuel costs required to heat the dwelling to the satisfactory heating regime. As fuel costs increase and annual income falls, the percentage of fuel poor households increase. Prior to the CHP improvements, 100% of households with an annual income of less than £11,000 that needed to spend £20 or more per week on fuel were in fuel poverty (see shaded area of Table 7.13). This group represents over a quarter of all the households surveyed (25.2%). By contrast, only 7% of all the households with an annual income of £9,000 or more and needing to spend less than £20 per week on fuel were fuel poor. No household needing to spend less than £20 per week on fuel on average, with an annual income of £11,000 or more was fuel poor. This group accounted for less than 15% of all the households surveyed.

⁵² When income excluded all housing costs, no fuel poor households were found with an annual income of £10,000 or more, which covered over a quarter of the households surveyed (26.2%). Amongst those with an annual income of less than £10,000, 26.2% were fuel poor after the central heating was installed, compared to 87.3% before it was.

Figure 7.7: Total Household Income of Fuel Poor and Non-Fuel Poor Households: After CHP

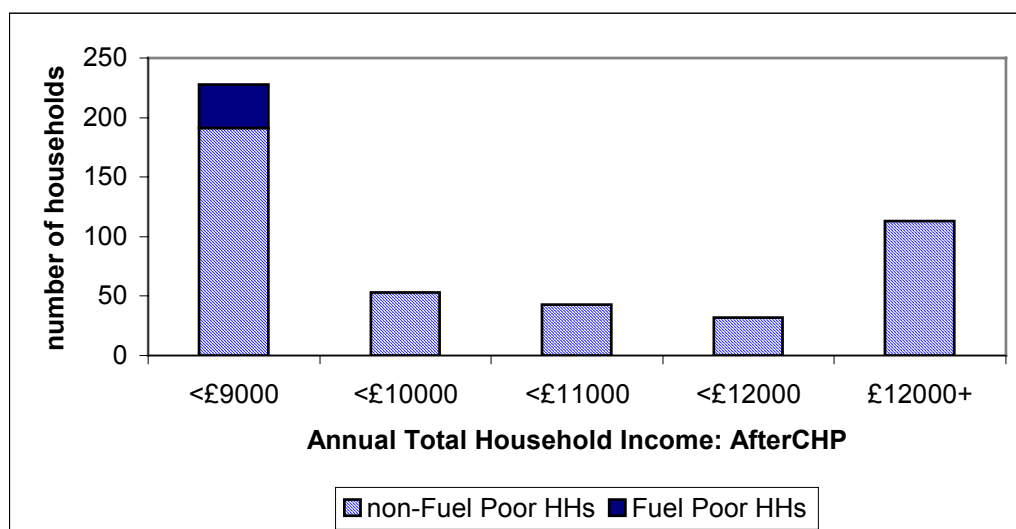


Table 7.13: Fuel poor households: total household income by average weekly fuel costs: Before CHP

annual income	average weekly fuel costs to attain satisfactory heating regime						Row totals and %s
	less than £10 p.w.	£10 - £14.99 p.w.	£15 - £19.99 p.w.	£20 - £24.99 p.w.	£25 - £29.99 p.w.	£30+ p.w.	
less than £9,000	42.9% (n=7)	56.2% (n=48)	93.3% (n=75)	100% (n=62)	100% (n=25)	100% (n=13)	87.0% (n=230)
£9,000 - £9,999	* ⁵³	0% (n=9)	43.7% (n=16)	100% (n=20)	100% (n=6)	100% (n=3)	66.7% (n=54)
£10,000 - £10,999	*	0% (n=7)	7.1% (n=14)	100% (n=11)	100% (n=5)	100% (n=5)	52.4% (n=42)
£11,000 - £11,999	0% (n=1)	0% (n=9)	0% (n=9)	60.0% (n=5)	100% (n=2)	100% (n=6)	34.3% (n=32)
£12,000+	*	0% (n=11)	0% (n=39)	4.0% (n=25)	36.8% (n=19)	70.6% (n=17)	18.0% (n=111)
Col. totals and %s	37.5% (n=8)	32.1% (n=84)	51.0% (n=153)	78.9% (n=123)	78.9% (n=57)	88.6% (n=44)	61.6% (n=469)

7.46 Subsequent to the CHP improvements, fuel poor households remain across the fuel cost bands used here. However, there are very few fuel poor households, and all have an annual income of less than £9,000 (see Table 7.14).

⁵³ The asterisked cell in Tables 7.13 – 7.16 indicates that no households amongst those surveyed fell within this category.

Table 7.14: Fuel poor households: total household income by average weekly fuel costs: After CHP

annual income	average weekly fuel costs to attain satisfactory heating regime						Row totals and %
	less than £10 p.w.	£10 - £14.99 p.w.	£15 - £19.99 p.w.	£20 - £24.99 p.w.	£25 - £29.99 p.w.	£30+ p.w.	
less than £9,000	6.1% (n=132)	25.8% (n=89)	80.0% (n=5)	100% (n=1)	100% (n=1)	*	16.2% (n=228)
£9,000 - £9,999	0% (n=24)	0% (n=29)	*	*	*	*	0% (n=53)
£10,000 - £10,999	0% (n=21)	0% (n=19)	0% (n=3)	*	*	*	0% (n=43)
£11,000 - £11,999	0% (n=12)	0% (n=15)	0% (n=4)	0% (n=1)	*	*	0% (n=32)
£12,000+	0% (n=41)	0% (n=53)	0% (n=16)	0% (n=3)	*	*	0% (n=113)
Col. totals and %	3.5% (n=230)	11.2% (n=205)	14.3% (n=28)	20.0% (n=5)	%100 (n=1)	*	7.9% (n=469)

7.47 With the NHER and annual income, as both the NHER score and annual income increase, the percentage of fuel poor households generally declines, both before and after the CHP improvements (see Table 7.15 and Table 7.16). The difference is that before the heating was installed, fuel poor households were spread across the range of NHER scores and incomes. It is not until the NHER is 6 or more and the annual income is £11,000 or more that there are no fuel poor households, but this group represents a very small percentage (1.5%) of all the households surveyed (see Table 7.15).

Table 7.15: Fuel poor households: total household income by NHER Score: Before CHP

annual income	NHER score											Row totals and %s
	0	1	2	3	4	5	6	7	8	9	10	
less than £9,000	100% (n=14)	100% (n=22)	95.7% (n=47)	92.6% (n=68)	81.2% (n=48)	66.7% (n=18)	33.3% (n=12)	100% (n=1)	*	*	*	87.0% (n=230)
£9,000 - £9,999	80.0% (n=5)	83.3% (n=6)	77.8% (n=9)	68.2% (n=22)	45.5% (n=11)	0% (n=1)	*	*	*	*	*	66.7% (n=54)
£10,000 - £10,999	85.7% (n=7)	100% (n=3)	66.7% (n=6)	30.0% (n=10)	36.4% (n=11)	40% (n=5)	*	*	*	*	*	52.4% (n=42)
£11,000 - £11,999	83.3% (n=6)	0% (n=1)	33.3% (n=3)	50.0% (n=8)	11.1% (n=9)	0% (n=4)	0% (n=1)	*	*	*	*	34.3% (n=32)
£12,000+	100% (n=8)	20% (n=15)	25% (n=24)	7.1% (n=28)	0% (n=20)	10% (n=10)	0% (n=5)	0% (n=1)	*	*	*	18.0% (n=111)
Col. totals and %	92.5% n=40	70.2% n=47	70.8% n=89	64.0% n=136	49.5% n=99	39.5% n=38	22.2% n=18	50% n=2	*	*	*	61.6% (n=469)

7.48 After the CHP improvements, regardless of the NHER score, there are no fuel poor households where the annual income was £9,000 and upward (see Table 7.16). While all of the fuel poor households were concentrated amongst those households with an annual income of less than £9,000, these households are spread across almost the complete range of NHER ratings. It is only at a rating of NHER of 9 and higher, that there are no fuel poor households amongst those with the lowest incomes.

7.49 When household income excluding all housing costs is examined against fuel costs and the NHER scores with regard to the fuel poor households, there are more fuel poor households to distribute across the different bands. However, very similar trends to those seen above with total household income emerge, before and after the CHP improvements. One difference to emerge is that there are two fuel poor households subsequent to the CHP improvements with an annual income of just over £9,000 a year.

Table 7.16: Fuel poor households: total household income by NHER Score: After CHP

annual income	NHER score											Row totals and %
	0	1	2	3	4	5	6	7	8	9	10	
less than £9,000	*	0% (n=1)	100% (n=2)	33.3% (n=6)	25.0% (n=12)	33.3% (n=24)	26.9% (n=52)	5.1% (n=78)	10.5% (n=38)	0% (n=15)	*	16.2% (n=228)
£9,000 - £9,999	*	*	0% (n=1)	0% (n=4)	0% (n=3)	0% (n=8)	0% (n=8)	0% (n=16)	0% (n=11)	0% (n=2)	*	0% (n=53)
£10,000 - £10,999	*	*	0% (n=2)	*	0% (n=3)	0% (n=3)	0% (n=10)	0% (n=21)	0% (n=3)	0% (n=1)	*	0% (n=43)
£11,000 - £11,999	0% (n=1)	*	0% (n=2)	*	0% (n=2)	0% (n=7)	0% (n=4)	0% (n=18)	0% (n=9)	0% (n=1)	0% (n=1)	0% (n=32)
£12,000+	*	0% (n=1)	0% (n=3)	0% (n=2)	0% (n=7)	0% (n=9)	0% (n=31)	0% (n=34)	0% (n=17)	0% (n=9)	*	0% (n=113)
Col. totals and %	0% n=1	0% n=2	20% n=10	16.7% n=12	11.1% n=27	15.7% n=51	13.3% n=105	2.5% n=157	2.5% n=75	0% n=28	0% n=1	61.6% (n=469)

7.50 When the annual incomes of the fuel poor households subsequent to the CHP improvements are examined in more detail, what emerges is just how low their income can be. Regardless of how income is calculated, more than half of the fuel poor households have an annual income of less than £5,000 (see Table 7.17).

Table 7.17: Breakdown of Income of Fuel Poor households: After CHP

annual income	Total Household Income		Household income ex ALL housing costs	
	count	% of fuel poor households	count	% of fuel poor households
less than £1,000	* ⁵⁴	*	1	1.0
£1,000 - £1,999	*	*	2	2.1
£2,000 - £2,999	*	*	6	6.2
£3,000 - £3,999	4	10.8	17	17.5
£4,000 - £4,999	15	40.5	34	35.1
£5,000 - £5,999	9	24.3	18	18.6
£6,000 - £6,999	4	10.8	9	9.3
£7,000 - £7,999	1	2.7	3	3.1
£8,000 - £8,999	4	10.8	5	5.2
£9,000	*	*	2	2.1
Total	37		97	

OVERALL COMMENT ON CHAPTER SEVEN

7.51 The impact of the CHP improvements on fuel poverty was assessed here against four alternative definitions of income. The results for the four approaches are summarised in Table 7.18. Overall, regardless of the method of calculating income, the CHP improvements have a considerable impact on:

- reducing the overall level of expenditure needed to maintain a satisfactory heating regime;
- reducing the number of households spending more than 10% of their income to achieve these temperature standards; and,
- reducing the severity of fuel poverty.

7.52 The different definitions of household income provide a range between the ‘high’ of total household income that includes all benefits and a ‘low’ when all housing costs are removed. The tangible difference between the various definitions of income is the number of fuel poor households both before and after the CHP improvements - the higher the income, the fewer households in fuel poverty prior to the CHP improvements, and subsequently. The inverse was also found to hold true - the lower the income, the more households in fuel poverty both before and after the improvements. Yet, the CHP was found to move a similar percentage of the overall households surveyed out of fuel poverty, regardless of the method of calculating household income.

⁵⁴ The asterisked cells indicate that no households amongst those surveyed fell within this category.

Table 7.18: Comparison Impact of CHP by Definition of Income

	average expenditure on fuel before CHP works	average expenditure on fuel after CHP works	households spending >10% of income before CHP works	households spending >10% of income after CHP works	households spending >20% of income before CHP works	households spending >20% of income after CHP works	fuel poor households removed from fuel poverty
Household reported fuel costs / household reported Income (n=461)	8.5%	7.6%	115 (24.9%)	88 (19.1%)	16 (3.3%)	9 (1.5%)	27 net (49 out; 22 in) 23.4%
Fuel Costs (SHR) / Total Household Income (n=469)	10.9%	5.5%	289 (61.6%)	37 (7.9%)	44 (9.3%)	0 (0%)	252 (87.2%)
Fuel Costs (SHR) / Household Income ex HB and ISMI (n=469)	12.0%	6.0%	321 (68.4%)	70 (15.0%)	78 (16.7%)	0 (0%)	251 (79.2%)
Fuel Costs (SHR) / Household Income ex all housing costs (n=469)	12.8%	6.4%	338 (72.1%)	97 (20.7%)	101 (21.5%)	9 (1.9%)	241 (71.3%)

7.53 The overall results seem to confirm the Scottish Executive's view that while the definition of income will effect the base line, the numbers will move in parallel. However, when the experience of different sub-groups is examined in detail, this view does not appear to be supported by the results from examining different sub-groups.

7.54 The CHP improvements are bringing considerable improvements across all of the sub-groups examined in this report. Yet, the recipients of the CHP improvements are not a homogeneous group. Eligibility for the improvements varies between tenures. What emerges from the results is the differential impact of the CHP improvements on different sub-groups within the households. Some sub-groups are benefiting more or less than others. This variation is further compounded depending on the method used to calculate household income. The impact on the different sub-groups is not consistent across all definitions, with sub-groups being more effected by one definition than another. The implication here is that different policies and programmes may need to target specific sub-groups if fuel poverty is to be eradicated completely.

7.55 The intention of the Scottish Executive, in removing all households from fuel poverty by 2016, is to free households from the actual hardship and consequences of fuel poverty. The CHP is successfully removing households from fuel poverty.

7.56 However, regardless of how income is defined, the CHP improvements have not removed all households from fuel poverty. There are still fuel poor households present after the CHP improvements, despite living in dwellings with relatively low heating costs and a high degree of energy efficiency (as characterised by a high NHER score). The results from the survey indicate that physical measures alone may be insufficient to eradicate fuel poverty. Those that remain in fuel poverty after the CHP improvements are characterised generally by low and very low incomes.

CHAPTER EIGHT DAMPNESS, CONDENSATION and MOULD

INTRODUCTION TO DAMPNESS, CONDENSATION, AND MOULD

8.1 While not a primary objective of the CHP, tackling dampness, condensation, and mould in Scottish housing has been a major priority in Scotland for over a decade. Dampness, condensation, and mould, although they can be separate issues with very different causal factors, can be inter-related. They are particular problems in badly or inadequately heated dwellings, with attendant health consequences for the occupants⁵⁵.

8.2 The general solution for tackling condensation and mould is to increase the heating used within the home, to increase the insulation of the dwelling, and to improve the ventilation. Thus, installing central heating and insulation under the CHP improvements should help reduce the extent of the problems of dampness, condensation, and mould growth. As will be seen in this chapter, it would appear that the CHP improvements are reducing the extent of these problems in the homes surveyed.

DAMPNESS AND CONDENSATION

8.3 Both the household questionnaire and energy audit survey sought information on the presence and extent of dampness and condensation in each dwelling surveyed. Information was collected on a room by room basis, for the periods prior to the CHP improvements and subsequently, through questioning of the household and visual inspections of the individual rooms by the surveyors. Given the difficulties associated with identifying the actual cause of the problem, no distinction was made by the surveyors on whether the problem was condensation or some other form of dampness.

8.4 The presence of condensation and dampness was scored on a 3-point scale:

1. small spots on the walls or the ceiling or misting of window surfaces
2. hand-sized patches on the walls or the ceilings or streaming windows and minor pooling of water of window sills
3. large patches on walls or the ceilings, or the formation of large pools of water on the sills that risked overflowing onto the wall.

This information was then aggregated for the whole house and an overall average score for each dwelling was produced. The findings are presented below on an individual room basis before being summarised across the whole house.

8.5 From combining the information from the questionnaire and the energy audit survey, the majority of all of the individual rooms were recorded as being dampness and condensation-free for the periods before and after the CHP improvements (see Table 8.1). Subsequent to the CHP improvements, there is a reduction in the number of rooms where dampness or condensation was present, as well as a reduction in the overall severity of the condensation and dampness problem.

⁵⁵ Right to Warmth Campaign (1992) *Dampness and Condensation*, Glasgow: Right to Warmth Campaign

Table 8.1 Incidence and Severity of Dampness or Condensation

Room	Before CHP improvements			After CHP improvements		
	Number of dampness and condensation -free dwellings	Average severity of dampness and condensation (across all dwellings)	Average severity of dampness and condensation (across only rooms with problem)	Number of dampness and condensation -free dwellings	Average severity of dampness and condensation	Average severity of dampness and condensation (across only rooms with problem)
Lounge (n=469)	417	0.18	1.58	457	0.03	1.17
Main Bedroom (n=465)	387	0.31	1.79	444	0.06	1.24
Second Bedroom (n=397)	306	0.41	1.81	375	0.08	1.41
Third Bedroom (n=154)	115	0.43	1.83	144	0.07	1.10
Hall (n=468)	418	0.19	1.78	459	0.02	1.22
Kitchen (n=468)	399	0.25	1.75	450	0.04	1.00
Bathroom (n=469)	375	0.36	1.85	446	0.06	1.22

8.6 Generally, the use of more heating appears to have had a considerable effect on reducing the incidence and severity of condensation and dampness problems in the home. Where condensation and dampness problems had reportedly cleared completely, more heating was being used in:

- 49 of the 61 main bedrooms
- 52 of the 69 second bedrooms
- 22 of the 27 third bedroom
- 34 of the 41 hallways
- 35 of the 51 kitchens
- 65 of the 71 bathrooms.

8.7 Where the severity of the reported condensation and dampness problems had lessened, more heating was being used in:

- all 13 main bedrooms
- 13 of 14 second bedrooms
- 6 of 7 third bedrooms
- all 5 hallways
- 8 of 10 kitchens
- 12 of the 13 bathrooms

8.8 Overall, in 82% of all of the rooms where condensation or dampness problems had reportedly cleared completely or lessened subsequent to installing the new heating, more heating was used than before. The one exception here is the lounge, where the condensation or dampness problems cleared up in 41 rooms, and the severity reduced in 7 more, without any increase (and often a reduction) in the use of heating. An inverse correlation in the room results is seen in the average severity of the condensation or dampness problem and the use of heating: generally, the more heating is used (hours per day), the lower the average severity of the condensation or dampness problem (as set out in Table 8.1).

8.9 However, just using more heating does not appear to be sufficient to eradicate the problem of condensation and dampness. The severity of the condensation or dampness problem had not changed, despite the householder stating that they were heating the room more in

- all 6 main bedrooms
- 6 of 14 second bedrooms
- 1 of 2 third bedroom
- 2 of 5 hallways
- 4 of 7 kitchens
- 6 of 7 bathrooms

8.10 There were also 10 instances where the incidence of condensation or dampness was reported to either have appeared for the first time or worsened subsequent to the CHP improvements. In 6 instances, the householders stated the problem had occurred despite heating the room more; one householder reported using the heating less; and 3 reported not having changed their heating pattern.

8.11 When these room results were aggregated and averaged across the whole house, the overall incidence and severity of condensation and dampness decreased subsequent to the CHP improvements. The number of completely condensation and damp free homes increased from 308 prior to the CHP improvements to 425 after (see Table 8.2). The average overall severity of condensation and dampness in the home fell from 0.28 on the 3-point scale before to 0.05 subsequent to the CHP improvements.

Table 8.2: Average severity of dampness or condensation: Overall dwelling

Severity of condensation (average on 3-point scale)	Number of Dwellings before CHP improvements	Number of Dwellings after CHP improvements
No condensation	308	425
up to 1	132	43
up to 2	20	1
up to 3	9	0

PRESENCE OF MOULD IN THE HOME

8.12 The presence of mould in the home was assessed in a similar way to the presence of condensation or dampness: through the questioning of the occupants and the visual inspection of the individual rooms by the surveyor. Again, the extent and severity of the mould was scored on a 3-point scale for both before and after the CHP improvements:

1. small spots on the walls or the ceiling;
2. hand-sized patches on the walls or the ceilings;
3. large patches on walls or the ceilings

8.13 The majority of all the individual rooms were recorded as being mould-free for the periods before and after the CHP improvements (see Table 8.3). After the CHP improvements, there is a reduction in the number of rooms where mould is present, as well as a decline in the overall severity of the extent of mould.

8.14 Again, the use of more heating appears to have had a considerable effect on reducing both the incidence and severity of mould problems in the home. In those rooms that were mould-free subsequent to the CHP improvements, more heating was used in:

- 17 of the 20 main bedrooms
- 20 of the 27 second bedrooms
- 8 of the 10 third bedrooms
- 7 of the 9 hallways
- 11 of the 21 kitchens
- 24 of the 27 bathrooms.

Table 8.3: Incidence and Severity of Mould in Home

Room	Before CHP improvements			After CHP improvements		
	Number of mould-free dwellings	Average severity of mould (across all dwellings)	Average severity of mould (across only rooms with problem)	Number of mould-free dwellings	Average severity of mould	Average severity of mould (across only rooms with problem)
Lounge (n=469)	454	0.05	1.60	465	0.01	1.00
Main Bedroom (n=465)	438	0.135	2.33	458	0.02	1.00
Second Bedroom (n=397)	363	0.20	2.38	388	0.03	1.00
Third Bedroom (n=154)	138	0.28	2.69	145	0.06	0.78
Hall (n=468)	456	0.07	2.83	465	0.01	1.00
Kitchen (n=468)	442	0.14	2.54	463	0.01	1.00
Bathroom (n=469)	435	0.17	2.78	461	0.02	1.12

8.15 Where the severity of the mould problem had lessened, more heating was used in:

- all 7 main bedrooms
- 6 of 7 second bedrooms
- 5 of 6 third bedrooms
- all 3 hallways
- 3 of 5 kitchens
- 5 of 6 bathrooms

8.16 Overall, in 78.4% of all of the rooms where the mould problems had reportedly cleared completely or lessened subsequent to the CHP improvements, more heating was used than before. Again, the exception is the lounge, where the mould problem had cleared up in 6 rooms and the severity of the mould reduced in another 4, without any increase in the heating pattern. An inverse correlation in the room results is seen in the average severity of the mould problem and the use of heating: generally, the more heating is used (hours per day), the lower the average severity of the mould problem (as set out in Table 8.3).

8.17 As with the dampness and condensation problems, just using more heating does not appear to be sufficient to eradicate the problem of mould completely. In all of the dwellings where there was no change in the severity of the mould problem, the householders stated they used more heating than before the CHP improvements. There were also 4 instances where the incidence of mould was reported to have either appeared or worsened subsequent to the CHP improvements. In 2 of these, the householders stated that they had not changed their heating pattern; in the other 2, the householders stated the problems had occurred despite heating the rooms more.

8.18 When these room results are aggregated and averaged across the whole house, the overall incidence and severity of mould has decreased subsequent to the CHP improvements.

The number of completely mould-free homes increased from 397 prior to the CHP improvements to 452 afterwards (see Table 8.4). The average overall severity of mould in the home fell from 0.13 on the 3-point scale before, to 0.02 subsequent to the CHP improvements.

Table 8.6: Average severity of mould: overall dwelling

Severity of mould (average on 3-point scale)	Number of Dwellings before CHP improvements	Number of Dwellings after CHP improvements
No Mould	397	452
up to 1	55	17
up to 2	10	0
up to 3	7	0

OVERALL COMMENT ON CHAPTER EIGHT

Increased use of heating, improved insulation, and extra ventilation are advocated as the solutions to tackling condensation and mould problems in homes. The CHP improvements addresses two of these solutions directly, and appear to have reaped the benefits in terms of reducing both the number of dwellings suffering from condensation or dampness and mould problems, and the severity of these problems where they continue to persist. However, the causes of dampness and mould are not always related to poor heating, insulation or ventilation, and may need other remedial measures to eradicate them. Therefore the problems of condensation, dampness and mould have not been completely eradicated.

CHAPTER NINE ANCILLARY ISSUES

9.1 The household questionnaire sought information on a variety of ancillary issues that are associated with the fuel poverty debate that may have been effected by the installation of the CHP improvements. These issues include:

- level of fuel debt
- prepayment meters and self-disconnection
- choice of fuel supplier
- choice of tariffs and ease of payment for fuel
- use of the whole house
- improvements in health

Each of these issues will be looked at in turn in this chapter.

THE LEVEL OF FUEL DEBT

9.2 With the installation of central heating systems into homes for the first time, there is a worry amongst some householders, particularly low-income households that they will not be able to afford to run the system. However, central heating systems may be so much more effective at delivering warmth that is affordable than previously used room heaters that installing new systems may assist households with paying off any debts that they may have with the fuel utilities.

9.3 All households were asked about whether they had any outstanding debts or arrears with their electricity or gas supplier or both in the period prior and subsequent to the CHP improvements, and any changes since the CHP improvements had been completed. In total,

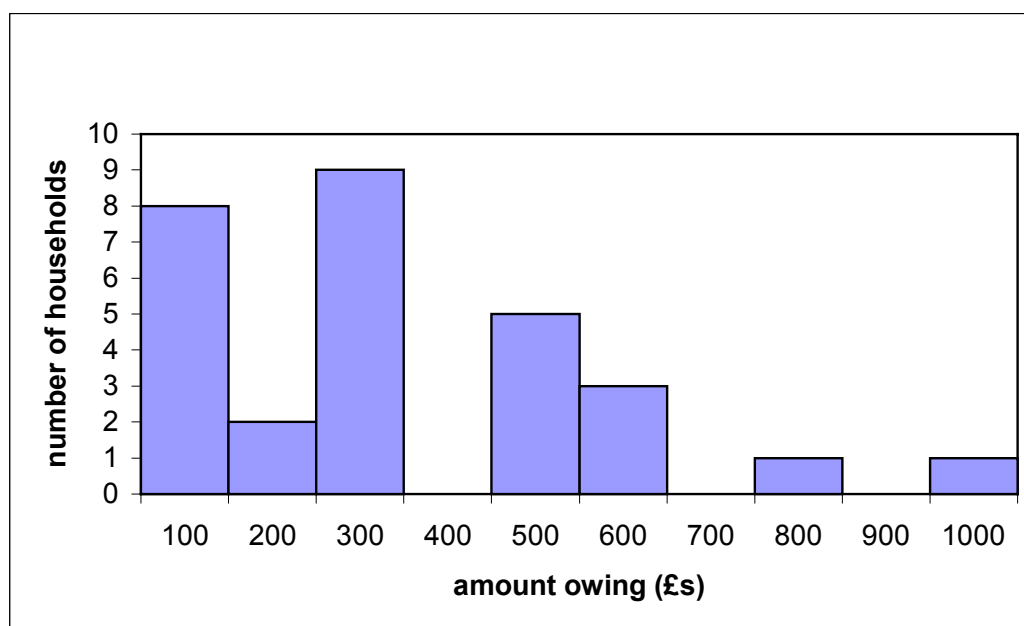
- 5.5% of households admitted to having a debt with an electricity supplier;
- 1.1% of households admitted to having a debt with a gas supplier; and;
- 1 household admitted to owing money to both a gas and electricity supplier.

9.4 For the 26 households with a debt to an electricity supplier, all of them stated that this debt had been incurred prior to the installation of the new heating system. The debts ranged in amount from £70 to £800 (see Figure 9.1)⁵⁶. All but one of the households were in the process of paying the debt off either through weekly or monthly payments agreed with their supplier⁵⁷. These arrangements ranged from the equivalent of £2.50 to £14 per week, with most falling between £5 and £7.50 per week. Since the new heating system had been installed, 23 of the households had reduced the level of their arrears to the point where 9 households had cleared their debt completely.

⁵⁶ Two households would not discuss the amount of their electricity debt.

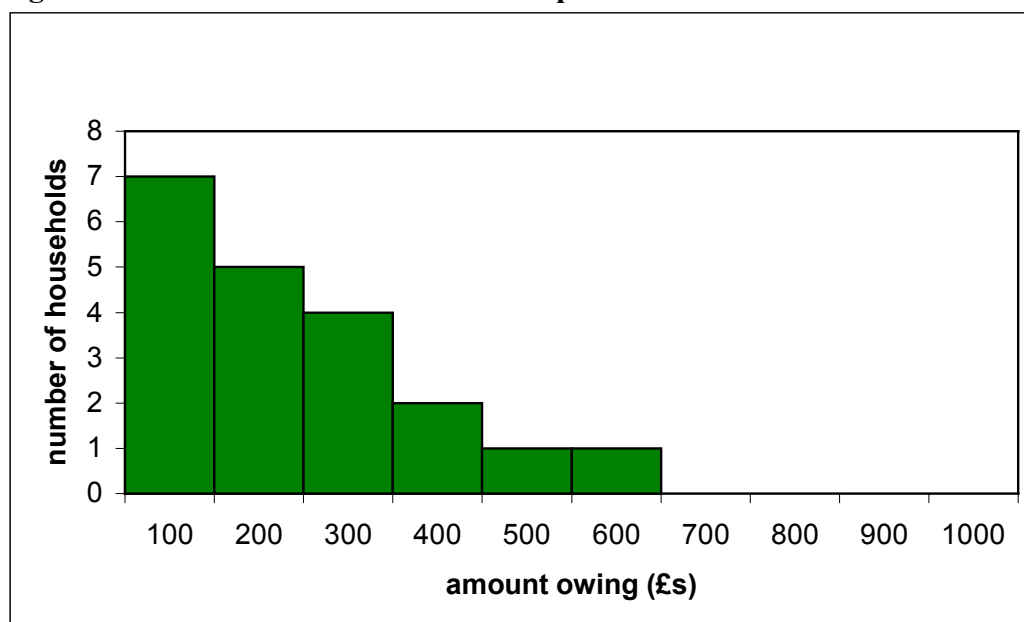
⁵⁷ One householder stated that they were in dispute with a utility over supposed arrears and had not entered into any arrangement to pay off the amount in dispute.

Figure 9.1: Fuel Arrears Before CHP Improvements: Electricity



9.5 Amongst the 6 households who had incurred a debt with their gas supplier, the level of debt ranged between £200 to £500 (see Figure 9.2) before the CHP improvements. Four of the 6 households that were willing to discuss the level of this debt reduced the amount owed in the year following the installation of the new heating system, with one householder having cleared this debt completely.

Figure 9.2: Fuel Arrears Before CHP Improvements: Gas



9.6 Two households stated that they had incurred a debt with their gas supplier following installation of the new heating system. However, given the amount of debt involved (less than £79 in both instances), and that these households were paying weekly for their fuel use

via gas payment cards at the local shops, these amounts may be simply short-term and may be caught up over the whole of the year.

9.7 What cannot be said here is that the reductions in these fuel debts were directly attributable to CHP improvements. As most of the households had entered into an agreement with their respective fuel supplier prior to the CHP, they would have been paying off these arrears regardless of the CHP improvements. However, all of the households that admitted to a fuel debt were in the process of reducing their outstanding debt, or had paid it off completely after the new heating had been installed; none had got worse.

9.8 A problem with fuel debts may arise in the future. As already noted above, a small number of households had yet to receive any fuel bill since their new heating had been installed⁵⁸. This situation tended to be associated with households that had:

- a new fuel supply installed (e.g. where gas was installed in a previously all-electric house);
- changed the tariff they were on (e.g. from standard electric to an off-peak electric tariff); or
- switched supplier after the new heating system had been installed.

In these cases, demands for large lump sum payments at some time in the future, by the fuel suppliers in question, may cause elderly or other low-income households problems with their household budgeting.

PREPAYMENT METERS AND SELF-DISCONNECTION

9.9 Within the fuel poverty debate, prepayment meters give rise to concerns over higher fuel tariffs associated with having a prepayment meter (compared to the standard tariff), and self-disconnection⁵⁹. Historically, households that ran up arrears with a fuel supplier risked having their fuel supply disconnected until they paid the amounts owed to the utility. Rates of disconnection have declined dramatically since the advent of prepayment meters as they can be calibrated to collect outstanding arrears as well as the cost of current consumption. The concern within the fuel poverty lobby is that prepayment meters now hide the true extent of the problem of disconnection⁶⁰.

9.9 The use of prepayment meters does not appear to be an issue for households surveyed. Many happily had prepayment meters installed to help with budgeting for fuel.

9.10 Those households with either an electricity or a gas prepayment meter installed in their home, either prior to the new heating system being installed or subsequently, were questioned about their use of the prepayment meter. Again, this question differentiated between the periods prior to the CHP improvements and the period subsequent, and any changes since the CHP improvements had been completed.

⁵⁸ In extreme cases, the households claimed they had yet received a bill even a year after the new heating had been installed.

⁵⁹ Self-disconnection refers to the situation where a householder with a prepayment goes without electricity or gas for a period of time because their credit has run out.

⁶⁰ Statistics are not collected on the incidence of self-disconnection.

9.11 The presence of prepayment meters varied across the sample:

- 367 households (78.3%) had no prepayment meter (PPM) either prior to the CHP improvements or subsequently;
- 16 households (3.4%) had a PPM for gas and electricity, both before and after the CHP works;
- 69 households (14.7%) had an electricity PPM before and after;
- 4 households (0.9%) had a gas PPM before and after;
- 9 households (1.9%) had an electricity PPM prior to the CHP improvements but had it removed since the heating was installed;
- 1 household had both a gas and an electricity PPM prior to improvements but both were removed subsequently;
- 1 household had no PPM prior to the improvements, but had both a gas and an electricity PPM installed since;
- 1 dwelling which had an electricity PPM prior to the CHP improvements, had a gas PPM installed when a gas supply was connected for the heating;
- 1 dwelling which had both an electricity and a gas PPM prior to the CHP improvements had the gas prepayment meter removed subsequently, but still had the electricity PPM.

9.12 In total, amongst the households surveyed, 98 households had an electricity PPM, and 24 had a gas PPM at some time. Self-disconnection does not seem to have been much of a problem, either before the CHP improvements or since: 76 (77.3%) of the households with an electricity PPM, and 21 (87.5%) of those with a gas PPM, stated that they had never let the PPM run out of credit completely. However, 12 (12.4%) of the households with an electricity PPM and 3 (12.5%) of those with a gas PPM, stated that they had sometimes used the emergency credit facility on the PPM, though that they had not allowed it to run out altogether.

9.13 Amongst the small number of households (that is, 22 with an electricity PPM and 3 with a gas PPM) that stated that they had self-disconnected their supply at some time:

- 6 (6.2%) of households with an electricity PPM stated that it had only happened once (all before the new heating had been installed), and they now ensured that it never happened again;
- 12 (12.4%) of the households with an electricity PPM, and 2 (8.3%) with a gas PPM, stated that it happened occasionally, that is, they self-disconnected maybe once or twice a year, usually because they were not paying attention to the amount left in the meter;
- 1 household with an electricity PPM, and 2 with a gas PPM, stated that they self-disconnected regularly, that is, once every two months;
- only two households, one with an electricity PPM, and one with a gas PPM, stated that they self-disconnected frequently, or had self-disconnected frequently, that is, at least once month.

9.14 The only difference in the incidence of self-disconnection before and after the new heating system was installed noted during the survey was that 3 households, all with an electricity PPM, stated that they had not self-disconnected since the installation of the new heating system. One of these households had previously frequently self-disconnected; one

had regularly self-disconnected; the third had only occasionally self-disconnected. The one household that had frequently self-disconnected their electricity supply attributed the change to the new heating being much more affordable to run.

CHANGING FUEL SUPPLIERS

9.15 With the introduction of competition in the domestic fuel supply market, households are free to shop around for their fuel supplier. A significant marketing effort has been made by fuel suppliers to promote themselves, usually along the lines of being cheaper than the competitors. At the time of this survey, it is likely that the incumbent fuel supplier within an area would have been amongst the more expensive suppliers⁶¹.

9.16 As part of the household questionnaire, households were asked about their electricity and gas supplier, for both before and after the CHP improvements. Where households had changed either their electricity or gas supplier since the CHP improvements, the householders were asked, 'why had they changed?'

9.17 Overwhelmingly, the majority of households had not switched supplier at all. In total, the households surveyed reported 101 changes of supplier:

- 57 households (12.2%) reported that they had changed their electricity supplier
- 44 (10.8%) of the households with a gas supply reported that they had changed their gas supplier

9.18 This total understates the total number of changes as a small number of households reported that they had changed a fuel supplier more than once since the new heating was installed. However, it also overstates the total number of households that have actually changed supplier, as 27 households changed both of their suppliers, thus,

- 30 households reported that they had changed their electricity supplier;
- 17 households reported that they had changed their gas supplier; and,
- 27 households reported that they had changed both their electricity and gas supplier.

9.19 Prior to the CHP improvements, the 3 traditional Scottish fuel suppliers⁶² accounted for the electricity supply of 98.1% of the households surveyed. Five different suppliers accounted for the electricity supply of the remainder. Subsequently, there has been a slight shift away from the three traditional Scottish suppliers. At the time of the survey, 95.3% of households reported that they received their electricity supply from one of the three traditional Scottish suppliers, a drop of 2.8%, although there has been some switching between these three traditional suppliers.

9.20 Fewer households have a mains gas supply compared to an electricity supply. Prior to the CHP improvements, 357 households had a gas supply. Here, the position of the traditional Scottish fuel suppliers was even more dominant with the 3 traditional Scottish fuel

⁶¹ Initially, to encourage competition, the regulators restricted the ability of incumbent suppliers (ScottishPower, for electricity in the south of Scotland, and Scottish Hydro-Electric in the north, and Scottish Gas for gas across Scotland) to reduce their supply tariffs.

⁶² that is, ScottishPower, Scottish Hydro-Electric, and Scottish Gas.

suppliers accounting for the gas supply of 98.6% of the households surveyed. As a result of the CHP programme, the gas supply market has been expanded, as an additional 50 households were connected during the programme. New suppliers have been more successful in gaining customers in this market, with some 40% these households going to other gas suppliers.

9.21 Householders cited a variety of reasons for changing their electricity supplier, but the primary reason would be considered to be for economic reasons, that is cheaper fuel. Of the 57 households that changed their electricity supplier

- 68.4% stated it was to get a cheaper fuel bill
- 3.5% stated that they wanted to get both their gas and electricity from the same supplier, to take advantage of a 'dual fuel' offer
- 10.5% stated that they had a preference for a particular supplier
- 3.5% stated that were required to change by the CHP
- 12.3% stated that they changed because of the advice that they received from an energy adviser that visited them as part of the CHP programme
- 1.8% stated that they changed because, after significant problems with their previous supplier not sending out fuel bills, the household wanted reliable billing to avoid running up huge deficits.

9.22 The reasons cited by the 44 households for changing their gas supply were very similar, both in the variety of reasons, and the relative weightings of the reasons:

- 59% stated that they changed for a cheaper fuel bill
- 6.8% stated that they changed to get a dual fuel deal
- 18.2% stated that they had a preference for a particular supplier
- 4.5% households stated that they were required to change by the CHP
- 11.4% stated that they changed because of the advice that they received from an energy adviser that visited them as part of the CHP programme.

Regardless of the reason that was cited, 85% of the households that did change their supplier ended up obtaining both their electricity and gas supply from the same supplier (that is, they became dual fuel customers).

9.23 A small number of the households that changed their supplier may have done so as a result of the CHP (those that stated that they were required to do by the CHP, and those that did so after the energy advice visit which is an integral part of the scheme). Most of the rest did so in search of lower fuel bills or because of a specific preference. These options were available to these households, regardless of the CHP.

CHANGING PAYMENT METHODS OR TARIFFS

9.24 Regardless of the actual supplier, some methods of payment and some tariffs are cheaper than others are. For example, paying by direct debit is usually about 10% cheaper

than paying the bill when it arrives⁶³. By contrast, prepayment meters tend to have the most expensive tariffs.

9.25 Again, as part of the household questionnaire, households were asked about the method they used to pay for fuel, both for the periods prior to the CHP improvements, and since. Where households had changed any of their methods of paying for fuel, the householders were asked, ‘why they had changed?’

9.26 The methods by which households paid for fuels before and after the CHP improvements are set out in Table 9.1. Amongst those households where a direct comparison can be made (that is, excluding those taking a new supply such as with gas and oil), there is a shift away from paying the bill when it arrives towards a more managed payment method, across all fuels.

9.27 For electricity, there has been a slight shift away from quarterly billing and prepayment meters, towards paying for electricity consumption by regular amounts. There is an increase in both the numbers paying for electricity by direct debit and weekly payment methods. Gas customers also show an increase in the number of households paying by direct debit or by a weekly payment scheme subsequent to the CHP improvements, and a drop in those paying quarterly. With solid fuel, there is a large switch away from solid fuel altogether, even for those in receipt of a free fuel subsidy. The purchase of LPG (i.e. bottled gas), which was used primarily as portable heating before the CHP improvements, has also declined dramatically.

9.28 No household was paying for oil prior to the CHP improvements, so the increase in these methods all represent households taking oil central heating for the first time.

9.29 Amongst those surveyed, 40 households in total (8.5% of the total) stated they had switched their method of paying for electricity. The main reasons cited by households for switching their method of paying for electricity varied:

- 12 (30%) stated that they changed to a cheaper method of payment (e.g. direct debit);
- 22 (55%) stated that they changed their method of payment for ease and convenience (e.g. weekly payment card);
- 4 (10%) stated that they changed at the request of their electricity supplier;
- 1 stated that they had changed to help reduce an outstanding debt (i.e. had a prepayment meter installed)

⁶³ Although the unit cost of a fuel purchased by direct debit is usually cheaper, reconciliation of actual consumption with the amount paid usually takes place only once a year. When a major change occurs, such as the installing of a central heating system, which should reduce a household’s fuel costs, until there is reconciliation, a customer may be paying more for fuel than they are actually consuming. If so, the customer should ultimately get a rebate.

Table 9.1: Comparison of methods of payment**

method of payment	electricity		gas		solid fuel		LPG	
	before	after	before	after	before	after	before	after
billed (e.g. quarterly)	156	135	121	102	0	0	0	0
cash on delivery	0	0	0	0	28	4	72	3
direct debit	91	108	86	100	0	0	0	0
standing order	1	1	0	0	0	0	0	0
weekly, monthly payment card, scheme or book	113	122	107	111	0	0	0	0
prepayment meter	97	92	24	23	0	0	0	0
Fuel Direct	3	3	0	0	0	0	0	0
free fuel	0	0	0	1	8	2	0	0
other	2	2	2	1	0	0	0	0
gave up supply	0	0	0	2	0	30	0	69

**The figures do not include those households that received a new supply (such as gas).

9.30 For those with a gas supply, 31 households (7.6% of all households with gas) stated they had switched their method of payment. The main reasons cited for switching the method of paying for gas were as varied as those for electricity and with similar weightings were:

- 8 (25.8%) stated that they changed to a cheaper method of payment (e.g. direct debit);
- 19 (61.3%) stated that they changed for convenience (e.g. weekly payment card);
- 3 (9.7%) stated that they changed at the request from their gas supplier;
- 1 household stated that they had changed to help reduce an outstanding debt (i.e. had a prepayment meter installed)

9.31 It is not possible to claim that any of the households that changed their method of payment did so as a result of the CHP. None of the households stated that they had changed their method of payment because of advice received through the CHP. Those that did change did so in search of lower fuel bills or convenience. These options were available to these households, regardless of the CHP.

USE OF THE HOUSE

9.32 Within the fuel poverty debate, there is a concern about ‘spatial shrinkage’, that is, fuel poor householders retreating to one room and trying to keep that one room warm, and not using other rooms in the home.

9.33 Certainly, from the information collected during the survey, many householders were only keeping one room warm in the winter (that is, the lounge). This could be interpreted as

retreating to that room, but it could also be simply that that was the only room with the installed heating.

9.34 As part of the household questionnaire, all households were asked about the use of each of the rooms in their home in the period (how long) prior and subsequent to the CHP improvements. Their answers were scored on a 5-point scale:

0. never used
1. visitors only
2. occasionally, once a week
3. occasionally, more than once a week
4. daily

9.35 The average scores for each room, derived from this 5-point scale, for the period prior to the CHP improvements are set out in Table 9.2. Generally, the lounge, kitchen, bathroom and hall in homes were used daily. A few households indicated that they did not always use the main bedroom in winter. The lowest scores were achieved in the second and third bedrooms. Given the large proportion of single householders within the overall sample, many of these bedrooms were not in regular use, except when visitors came.

Table 9.2: Room Use before CHP improvements

Room	Average Room Use before CHP improvements (maximum 4)
Lounge (n=469)	4
Main Bedroom (n=465)	3.9
Second Bedroom (n=497)	2.77
Third Bedroom (n=154)	2.21
Hall (n=468)	4
Kitchen (n=468)	4
Bathroom (n=469)	4
Average of other rooms (n=73)	3.1

9.36 All households were asked about whether their use of individual rooms had remained unchanged, had increased, or had decreased subsequent to the CHP improvements. The range of household responses is set out in Table 9.3. What emerges from this assessment of room use is that there is small, net increase in the use of all rooms in the home, subsequent to the CHP improvements.

Table 9.3: Room Use after CHP improvements

Frequency of room use	Lounge No. of households	Main Bedroom No. of households	Second Bedroom No. of households	Third Bedroom No. of households	Hall No. of households	Kitchen No. of households	Bathroom No. of households	Other rooms No. of households
Less use	2	2	3	2	1	0	0	0
No change	459	434	371	144	449	450	447	65
More use	8	29	23	8	18	19	22	8

9.37 It would appear that prior to the central heating programme these households might have limited their use of unheated rooms. Certainly, subsequent to installing of the new heating, households (on average) are making more use of more rooms in their home.

HEALTH IMPROVEMENTS

9.38 As a part of this survey, households were asked whether they or anyone else in the home had a long-standing health or medical problem or disability and whether this had changed subsequent to the CHP improvements. No attempt was made to follow up the householders' answers or explore the answers further. The intention of the question was to be no more than a 'self-reported' barometer of the impact of the CHP⁶⁴.

9.39 Answers to these health questions were received for 783 occupants spread across the 469 households questioned during the survey. Of this total, 515 occupants (65.8% of the total) were reported as having no health problems. Of the 268 individuals that were reported with a health problem⁶⁵:

- 25.7% were primarily of a respiratory nature (e.g. asthma, bronchitis, emphysema, chest complaints) either alone or in combination with some other complaint;
- 46.3% were primarily of a cardiac or circulatory nature (e.g. angina, heart attack, stroke, heart condition, high blood pressure) either alone or in combination with some other complaint;
- 25.7% reported a variety of other conditions (e.g. arthritis, rheumatism, diabetes, thyroid problems) either alone or in combination with some other complaint; and,
- 2.2% did not state what was wrong or did not know.

⁶⁴ A more detailed health study of the impacts of the CHP is being undertaken elsewhere on behalf of the Scottish Executive.

⁶⁵ To avoid double counting, a person was scored only once via a hierarchy with respiratory first, followed by cardiac / circulatory, and then other. So if a householder reported they suffered from asthma, angina and diabetes, they were scored under the respiratory category. If a householder reported a heart attack and arthritis, they were scored under the cardiac / circulatory category.

9.40 Overall, for those occupants that reported any health problems,

- 15.7% stated that it was too soon after the installation of the new heating system to assess its impact on their condition
- 44.4% stated that their condition or problem had not improved
- 39.9% (that is, 107 householders) reported that their condition or problem had eased or improved subsequent to the CHP improvements.

9.41 Of the group of 107 householders that stated their condition or problem had eased or got better subsequent to the CHP improvements:

- 25 (23.4%) were classified as having a complaint primarily of a respiratory nature
- 50 (46.7%) were classified as having a complaint primarily of a cardiac or circulatory nature
- 30 (28.0%) were classified as having a complaint within the 'other' category, of which the largest group here included those reported suffering from arthritis and rheumatism.
- 2 (1.9%) did not know what was wrong with them although they felt better

9.42 Despite all of the qualifications that must be applied to the above results, the results from the health questions still look very good. That within a year of installing the new heating system, more than a third of householders with a medical complaint reported that their condition had eased or improved subsequent to the installing of the central heating system. Without claiming that the installing of the systems and the improved health are directly linked, the results are positive. No householder reported feeling worse subsequent to the central heating system being installed.

OVERALL COMMENT ON CHAPTER NINE

9.43 Subsequent to the CHP improvements, levels of fuel debt have reduced, self-disconnection has not been a significant concern, households have switched suppliers and methods of payments to seek out cheaper fuel bills (though not in large numbers), more of the home is being used, and people are feeling better. While all of these ancillary benefits appear to complement considerably the success of the CHP at reducing fuel poverty, only a small part of these benefits can be attributed directly to the CHP.

CHAPTER TEN HOUSEHOLD EXPERIENCE WITH NEW CENTRAL HEATING SYSTEM

10.1 All households were asked three specific questions about their general experience associated with the installation of the new heating system under the CHP. Overall, the results are very positive.

HEATING SYSTEM PERFORMANCE

10.2 Each household was asked to describe on a five-point scale how well they considered the new system to heat their home overall:

1. Useless
2. Not very well
3. It's okay
4. Well
5. Extremely well

10.3 The overwhelming response was that the system heated the home either well or extremely well (see Table 10.1). These two responses accounted for 83.4% of all responses. The average score was 4.29 on the five-point scale. However, not everyone agreed with these opinions. Seven households rated the new systems as useless. Given the problems that a very small number of households have had with the new system or getting new meters installed, such opinions are not surprising.

10.4 When this question was broken down by tenure, there were some differences in the emphasis between tenure groups. Over 70% of each of the tenures, ranging between 72% of housing association tenants to 89.8% of owner-occupiers, stated that the system heated the home either well or extremely well (see Table 10.1). Again, there was a small percentage of households within each tenure that considered the new system to be either useless, or not heating their home very well. Overall, the owner-occupiers were the most positive tenure with regard to their opinion about how well the system heated their home.

Table 10.1: Household rating of heating system performance

	Rating of Heating System on 5-point scale (% of householders)					average
	useless	not very well	okay	well	extremely well	
total sample	1.5	2.1	12.1	35.6	47.8	4.29
owner-occupiers	1.0	0	9.2	27.5	62.3	4.50
local authority	2.4	3.0	14.8	42.0	37.9	4.10
housing association	1.7	3.4	22.4	48.3	24.1	3.90
private rented	0	10.0	6.7	33.3	50.0	4.22

10.5 In terms of the type of central heating, 72.3% of those households that received an electric storage system considered it to heat the home well or extremely well, compared with

84.5% of those that received a gas system. However, almost 15% (14.9%) of those that received an electric storage system rated its performance negatively, compared to only 2.4% of those that received a gas system. The few households that received a solid fuel or an oil system (12 in total) all considered their system to heat their home well or extremely well (see Table 10.2).

Table 10.2: Household rating of heating system performance: By heating fuel

heating fuel	Rating of Heating System on 5-point scale (% of householders)					average
	useless	not very well	okay	well	extremely well	
oil (n=9)	0	0	0	22.2	77.8	4.78
solid fuel (n=3)	0	0	0	100	0	4.0
electric (n=48)	8.5	6.4	12.8	38.3	34.0	3.83
gas (n=408)	0.7	1.7	13.0	35.3	49.2	4.31

OVERALL SATISFACTION

10.6 Each household was asked to describe, again on a five-point scale, their overall degree of satisfaction with the new heating system.

1. Extremely dissatisfied
2. Dissatisfied
3. It's okay
4. Satisfied
5. Extremely satisfied

10.7 The overwhelming response was again positive, with more than three-quarters of householders (78.5%) either satisfied or extremely satisfied with their new heating system (see Table 10.3). The average degree of satisfaction was 4.08 on the five-point scale. Again not all the households were happy with their new heating system with 8.5% either dissatisfied or extremely dissatisfied. The main causes of complaint tended to relate to damage to house decoration during installation of the system, and the rate of delivery of hot water with some of the gas combi boilers.

10.8 Similar responses were received when this question was broken down by tenure. Over 70% in each of the tenures, ranging between 70.4% of housing association tenants to 86.1% of owner-occupiers, stated that they were either satisfied or extremely satisfied with the system overall (see Table 10.3). There were also households within each tenure that were dissatisfied or extremely dissatisfied with the new system. The highest percentages of dissatisfied households were found amongst the local authority and housing association groups: 13.6 and 12.1% respectively. Electric heating accounted for a larger percentage of the systems installed within these two tenure groups - 14.8% of local authority and 17.2% of housing association tenants, compared to only 5.3% of owner occupiers and 6.7% of private rented households – this may account for some of this difference in satisfaction between tenures. Almost a quarter of all those households that received an electric system (22.9%)

were either dissatisfied or extremely dissatisfied with it (see Table 10.4). Overall, the owner-occupiers were the most satisfied tenure.

Table 10.3: Household satisfaction with new heating system

	Satisfaction with new heating system on 5-point scale (% of householders)					
	extremely dissatisfied	dissatisfied	okay	satisfied	extremely satisfied	average
total sample	3.6	4.9	13.0	36.9	41.6	4.08
Owner-occupiers	2.4	1.0	10.5	30.6	55.5	4.36
local authority	4.7	8.9	16.0	42.6	27.8	3.80
Housing association	5.2	6.9	13.8	41.4	32.8	3.90
private rented	3.3	6.7	10.0	40.0	40.0	4.07

Table 10.4: Household satisfaction with new heating system: By heating fuel

heating fuel	Satisfaction with new heating system on 5-point scale (% of householders)					
	extremely dissatisfied	dissatisfied	okay	satisfied	extremely satisfied	average
oil (n=9)	0	0	11.1	22.2	66.7	4.56
solid fuel (n=3)	0	0	0	100	0	4.0
electric (n=48)	12.5	10.4	10.4	29.2	37.5	3.70
gas (n=408)	3.4	4.4	13.4	37.7	41.8	4.12

EASE OF USE

10.9 All households were asked to rate how easy they found it to use the new heating system on a five-point scale:

1. Extremely difficult to use
2. Difficult to use
3. Could be easier
4. Easy to use
5. Extremely easy to use

10.10 The overwhelming majority of householders (78.9%) found the new systems either easy or extremely easy to use (see Table 10.5). The average rating of the ease of use was 4.04 on the five-point scale. Again these opinions did not apply to all respondents, as 8.5% stated that they found the systems difficult or extremely difficult to use. The two main concerns were the inability to understand the digital programmers on some systems and the ability to manipulate the settings on certain boiler-mounted time clocks.

10.11 Similar responses were received when this question was broken down by tenure. Over 70% of each of the tenures, ranging between 73.3% of local authority tenants and 84.5% of owner-occupiers, stated that they found the new systems easy or extremely easy to use (see Table 10.5). Again, there were households within each tenure group that found the new systems difficult or extremely difficult to use. Local authority tenants had the most problems with the new systems with 13.1% stating they found the system difficult or extremely difficult to use. Overall, the owner-occupiers found the new systems the easiest to use.

Table 10.5: Household rating on ease of use of new heating system

	Easy to Use Rating on 5-point scale (% of householders)					
	extremely difficult	difficult	okay	easy	extremely easy	average
total sample	1.7	6.8	11.9	47.5	31.3	4.04
owner-occupiers	0.5	3.4	11.6	39.6	44.9	4.25
local authority	3.0	10.1	13.0	53.8	19.5	3.75
housing association	0	10.5	12.3	63.2	14.0	3.81
private rented	3.3	6.7	10.0	43.3	46.7	4.03

10.12 The large majority of households, 80.4% of those that received an electric system and 78.9% of those that received a gas system, found the new heating to be either easy or extremely easy to use. A small percentage of households had problems with using the new systems - 10.4% of those that received an electric system, and 8.3% of those that received a gas system found them difficult or extremely difficult to use (see Table 10.6).

Table 10.6: Household rating of ease of use of new heating system: By fuel

heating fuel	Easy to Use Rating on 5-point scale (% of householders)					
	extremely difficult	difficult	okay	easy	extremely easy	average
oil (n=9)	0	0	11.1	55.5	33.3	4.22
solid fuel (n=3)	0	0	0	100	0	4.0
electric (n=48)	4.3	6.5	8.7	45.7	34.8	4.02
gas (n=408)	1.2	7.1	12.5	47.7	31.2	3.99

OVERALL COMMENT ON CHAPTER TEN

10.13 The overall responses for all three questions indicate that the general experience with the CHP and the new heating system installed is very positive. This high degree of general

satisfaction should not disguise that there are some households whose experiences have not been as positive as others have. Seeking out and remedying the causes of their concerns will improve the scheme overall.

CHAPTER ELEVEN CONCLUSION

11.1 The primary aims of this research project are threefold:

- first, to determine the extent to which the beneficiaries were in fuel poverty prior to the CHP improvements;
- second, for those who were in fuel poverty, to determine whether they have been removed from fuel poverty, or have had their degree of fuel poverty reduced;
- third, for those not in fuel poverty, to determine whether they have benefited from lower fuel bills or other improvements.

11.2 The CHP has had a considerable effect on reducing the average expenditure on fuel to achieve warm homes, on reducing the percentage of households in fuel poverty, and reducing the severity of fuel poverty, both overall, and amongst various sub-groups within the population.

11.3 In the first year of the CHP, and using the Scottish Fuel Poverty Statement definition of total household income, 61.6% of the households surveyed were found to be in fuel poverty, that is, they needed to spend more than 10% of their income to achieve the satisfactory heating regime. As a result of installing the new heating system, 87.2% of these fuel poor households were removed from fuel poverty. In total, after the CHP improvements, 92.1% of all the households surveyed need to spend less than 10% of their total income on fuel.

11.4 Of the 37 households found to still need to spend more than 10% of their total household income on fuel, all but one needed to spend more than 16% of their total income fuel prior to the CHP improvements. Although still needing to spend more than 10% of their income on fuel, these households have seen their fuel costs as a proportion of their total household income fall by between 6.1% and 19%. Most of them are just over the fuel poverty threshold figure: 21 (56.8%) needed to spend between 10 and 12% of their income after the CHP improvements.

11.5 The numbers do vary with different definitions of income. For example, removing all housing costs from the income calculation reduced household income by 14% when compared against the SFPS definition. The result was to increase the number of households in fuel poverty before the CHP (to 72.1% of all those surveyed), and the number still in fuel poverty afterwards (20.1%). Yet, the impact of the CHP improvements was to remove a very similar number of households overall from fuel poverty (241 compared to 252). Regardless of the definition of fuel poverty used, what emerges is that the impact of the CHP on removing households from fuel poverty was considerable.

11.6 The results indicate that for the Scottish Executive to achieve its overall objective of removing all households in Scotland from fuel poverty, that

- first, specific programmes may have to be developed to target specific groups within society. The impact of the CHP varies between groups within society.

- second, measures other than physical improvements may be required. The households found to still be in fuel poverty all have low incomes, and some of them very low incomes.

11.7 In addition to assessing the impact of the CHP on fuel poverty, the research was concerned with assessing other potential benefits, including any changes in:

- the level of fuel debt
- the choice of fuel tariffs
- methods of payments
- the incidence of self-disconnection
- the incidence and severity of condensation dampness
- the use of the whole house
- health

11.8 All of these benefits were found amongst the households. Levels of debt have reduced. Households have switched fuel suppliers to take advantage of cheaper tariffs. Households have switched to cheaper and more convenient methods of payment. The incidence of self-disconnection has reduced. The incidence and severity of condensation or dampness in the home has dropped. Households are heating and using more of their homes. Households reported that their health had improved since the new heating had been installed. However, many of these benefits were found to effect only a small number of households, or could not be attributed solely to the CHP.

11.9 The CHP has succeeded in reducing the cost of heating the home to a reasonable temperature standard and, as a result, has removed significant numbers of households from fuel poverty. Installing the new heating systems appears to have achieved very noticeable and tangible benefits for the households surveyed. Conditions within the home have improved. Homes are being heated more; rooms are being used more; and, households consider their homes to be warmer and more comfortable to live in.

APPENDIX ONE: SFPS DEFINITION OF HOUSEHOLD INCOME⁶⁶

“Under this definition, income includes total income from all members of the household, including dependants, and includes the following components:

- usual net earnings from employment;
- profit or loss from self-employment;
- all Social Security benefits (including Housing Benefit, Social Fund, maternity, funeral, and community care grants, but excluding Social Fund loans) and Tax Credits;
- income from occupational and private pensions;
- investment income;
- maintenance payments, if a person receives them directly;
- income from education grants and scholarships (including, for students, top-up loans and parental contributions);
- the cash value of certain forms of income in kind (free school meals, free welfare milk, and free school milk)

Under this definition, income is net of the following items:

- income tax payments;
- National Insurance contributions;
- Council Tax;
- Contributions to occupational pension schemes (including additional voluntary contributions) and any contributions to personal pensions;
- All maintenance and child support payments, which are deducted from the income of the person making the payment;
- Parental contributions to students living away from home.”

⁶⁶ Scottish Executive (2002) *The Scottish Fuel Poverty Statement*, Edinburgh: The Stationery Office, Annex B

APPENDIX TWO: SAMPLE SIZE AND SURVEY

A2.1 The sample drawn upon for this report forms the first of three to assess the impact of the Central Heating Programme on fuel poverty.

The sample size necessary to produce statistically valid results is determined by a number of variables:

- size of the population (N)
- proportion of homes in fuel poverty in the population (P)
- proportion of homes that come out of fuel poverty (y_i)
- confidence level to be place on the survey results
- the precision of the survey results

A2.2 The sample size equation (for a precision 'z' which needs to be defined, see below) used here is:

$$n \geq N (\sigma^2 + D) / (\sigma^2 + (D*N)) \quad \text{where } \sigma^2 = P(1-P) \quad \text{and} \quad D = z^2 / 1.96^2$$

Not all of these variables were known in advance of undertaking of the fuel poverty surveys, so assumptions were required to determine the actual sample size required for this research.

A2.3 The total size of the population (taken from the Tender Specification) was estimated by the Scottish Executive to be about 70,000 dwellings, which was comprised of an estimated 40,000 private sector, 23,000 local authority, and 6,500 housing association dwellings. However in 2001/2002, the total number of dwellings that received central heating systems under the programme was 8500, comprised of 3,550 private sector households, 4,100 local authority dwellings, and 850 housing association dwellings).

A2.4 Before this survey was carried out, it was not known how many households or dwellings would be in fuel poverty prior to receiving a central heating system under the Central Heating Programme, or how many would be removed as a result of installing the new heating system. It was assumed for the purposes of calculating an initial sample size that 50% of private sector households, 80% of local authority households, and 60% of housing association households would be in fuel poverty.

A2.5 Measuring the actual number of dwellings coming out of fuel poverty as a result of the CHP was the task for this research. If a household was fuel poor before the new heating and any associated insulation work was installed, one of two outcomes was possible: either these improvements would remove the household from fuel poverty, or they would not. So, it was assumed that 50% of the fuel poor households would be removed from fuel poverty.

A2.6 A standard level of confidence for statistical reporting is at least 95%, and this was the level of confidence assumed here.

A2.7 Finally, the level of precision is the error bar attached to a quoted figure. For example, the Scottish House Condition Survey reports at a precision of $\pm 5\%$. At a precision of $\pm 5\%$, a cited figure of 60% means that the actual percentage will fall between 55 and 65%. A level of precision of $\pm 5\%$ was assumed for this research project.

A2.8 When the 8,500 households included in the CHP in 2001/2002 were segmented into the three separate 'programme' groups (i.e., the private sector, the local authority and the housing association households), and the above assumptions applied, the result was a minimum sample size of 440 being required.

A2.9 A small change in the proportion of homes in fuel poverty in the population before the central heating is installed, or in the proportion of homes that come out of fuel poverty as a result of the improvements, has only a small impact on the required sample size. For example, assuming 80% of all three groups are in fuel poverty to start with would reduce the required sample size to 342, while assuming 50% of all three groups were fuel poor to start would increase the sample size to 530.

A2.10 By contrast, a small change in the precision of the results can have a very large impact on the required sample size. At a $\pm 1\%$ precision, the required sample size increases significantly to 4460 surveys, while at a $\pm 10\%$ precision, the required sample is reduced to 122 surveys.

A2.11 To obtain the required sample size, 800 addresses were selected at random: 300 from the private sector, 300 from the local authority programme, and 200 from the housing association programme.

A2.12 An attempt was made to contact each address from the sample. The approach used to contact the households evolved after an initial pilot study, and eventually differed according to the tenure group because of differences in the information available.

- with the private sector (that is, private rented and owner occupied households), basic information on the households that had received a heating system, was provided through the Scottish Executive. A personalised letter was sent to each address. This letter explained the nature and purpose of the survey, and set out a specific interview date and time, and identified the interviewer. This letter included a contact name, address and number if the appointment was inconvenient or inappropriate, or if anyone wanted more information about the survey. These letters were usually issued in the middle of the week before the appointment. In a couple of remote areas, including the islands visited, contact was made by telephone to try to group appointments. These approaches worked remarkably well overall in this sector.
- with both the local authority and housing association addresses, copies of the randomly selected survey forms submitted by local authorities to the Scottish Executive, and by the housing associations to Communities Scotland were obtained through the Scottish Executive. Initially, the same approach used for contacting the private sector households was used to contact the local authority and housing association households, but this proved incredibly inefficient. In many cases, the lack of names on the survey forms meant that letters could not be personalised, so the householder may have considered it junk mail and disposed of it without even opening it. It also became apparent that the addresses on the submitted survey form did not always include the actual flat number. With no name and no flat number to put on a letter, there was no guarantee that the letter got to the actual dwelling that received the heating system. And if it did, there was no guarantee that the surveyor would find them. Furthermore, in some areas,

there were a considerable number of void properties that received new heating systems under the CHP. These were not known about until the surveyors arrived at the respective addresses. Therefore, an alternative approach with the local authority and housing association addresses was developed. A letter was still sent to each address setting out the nature and purpose of the survey. Where names were available, the letter was personalised; otherwise it was addressed to 'the household'. Yet, rather than identify a specific date and time for an interview, the letter simply stated that a named surveyor would be in their area during a particular period of time, and that this person would be calling at their door. The letter included a contact name, address and telephone number for anyone who wanted more information about the survey, or to arrange a specific interview time. Each address was then called upon at least twice. Where there was no access a calling card was left on each occasion asking the householder to contact the survey team. The success rate in the local authority and housing association sector was never as good as in the private sector, but this second approach in contacting them was more successful than using fixed appointments with these two tenure groups.

A2.13 With all households, where contact was made and agreement to participate in the survey obtained, the approach was the same.

A2.14 An energy audit survey was used to collect information about the dwelling at the time of the survey. Households were questioned about the nature of space and water heating before the new heating was installed, and any insulation that had been added to the dwelling as part of the improvement package. In total, a team of five surveyors was used, all qualified site assessors under NHER scheme. The energy audit survey was later analysed using the NHER Surveyor 3 (version 3.71) computer program.

A2.15 The surveyor then went through questionnaire with each household. To ensure consistency across the survey results, the same person coded all of the household questionnaires.

A2.16 The results from both the energy audit and the household questionnaire were combined and initially stored in a Microsoft Excel spreadsheet. Analysis was carried out using both Microsoft Excel and Microsoft Access.

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