

Energy Efficiency and Intermediate Labour Markets: a Justification for Investment Programmes?

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Synopsis

What are the employment impacts of energy efficiency investments in buildings? What are the most appropriate forms of funding?

Abstract

This paper presents the results of recent work on the employment impacts of investment in energy efficiency in buildings. It addresses the question: are energy efficiency programmes environmental initiatives with positive employment side effects, or can they be part of a sustainable labour market development policy?

The work provides an update on previous studies in this area, many of which are based on information from the mid 1980s: changes in the structure of the labour market and the costs associated with employment are therefore reflected in this work, as are new estimates of multiplier effects. Examples of the level of investment required to generate a person-year of work are calculated from current industry information.

Critics of work on employment suggest that the impact of programmes on the supply side of the labour market result in a net effect of zero employment creation. This paper considers their arguments and presents suggestions for situations where energy efficiency programmes do generate employment.

Proponents of energy efficiency schemes increasingly present employment creation as a positive side-effect, whilst some intermediate labour market programmes have used energy efficiency investment as a tool to achieve their aims. Using current examples of both types of programme, this paper considers the question of whether employment generation is a central benefit of energy efficiency investment programmes, and should therefore be put forward as an argument to support funding for such activities.

1. Introduction.

This paper discusses the results of the Standards of Performance for Energy Efficiency programme (SoP) and analyses the job creation benefit in order to see if the programme would be viable to be funded partly as an employment creation scheme, rather than simply an energy efficiency scheme. Are the benefits large enough to justify funding from sources other than those simply promoting environmental programmes? Could Government money set aside for job creation schemes be justifiably used for such a programme?

This study provided a much needed update of employment studies from investment in energy efficiency. The last detailed employment study in this field was carried out in 1983 (ERL 1983) and the majority of later reports are based, to a greater or lesser extent, on this one.

The study reported here examined the types and numbers of jobs created by the SoP programme. Determining the cost of creating a job is important as it allows the programme to be compared to other schemes aimed at creating employment. This paper presents economic arguments both for and against the potential for direct and indirect job creation, as well as negative employment effects and problems such as free-ridership and the natural

rate of unemployment. The paper concludes with a discussion of other programmes and a justification for energy efficiency schemes receiving funding from employment creation programmes.

2. The Standards of Performance for Energy Efficiency Programme

The Standards of Performance for Energy Efficiency programme was set up by the Energy Saving Trust in the UK in order to stimulate the provision of cost-effective energy saving measures throughout all sectors of the franchise market (EST 1994). The Office of Electricity Regulation set an electricity saving target for each Public Electricity Supplier (PES), with the cumulative lifetime (discounted) savings equal to 6,103 GWh.

The programme aims to provide insulation and other energy saving measures and to promote and subsidise installation of such measures. The whole programme is overseen by the Energy Saving Trust (EST), which also promotes some of the schemes. The PESs can choose to participate in these national schemes and/or design and run their own schemes. Examples include subsidisation of compact fluorescent lightbulbs (CFLs), free cavity wall insulation for those on benefits, high efficiency lighting schemes for schools and cashback (rebate) schemes for condensing boilers.

The scheme covers all franchise customers - that is, customers using less than 100 kWh. The necessary finance is raised by a Special Allowance of up to 1 per franchise customer per year for the period 1994-1998. This gives a total of 102 million over the four year period.

The PESs should give priority to projects likely to exert general downward pressure on the charge per kWh to consumers, in order to encourage demand side management measures. All customers should be included, but priority should be given to those receiving passport benefits (EST 1994), i.e. unemployment benefit, disability allowance etc.

The data used throughout the study were for the period April 1994 to March 1996. Only the schemes completed and fully assessed within this time provide actual figures, the rest give estimates of the likely costs, energy savings and number of measures to be carried out.

Two PESs were chosen to discuss in detail the SoP programme and its likely employment effects. These two PESs were chosen because their SoP schemes covered the range of characteristics found throughout the programme. The discussions resulted in an estimate of the time involved in all the PESs and also a list of useful contacts of housing stockholders and installation firms involved in the projects. These contacts were used, along with others from ACEs member companies, to produce estimates of the time involved in individual installation measures and the time involved on the part of the local authority, or other stockholder, predominantly for the collection of data in relation to stock condition.

Using these figures, and the data for the total number of measures carried out by the 14 PESs involved in SoP, an estimate of the total number of person years involved in the whole programme was calculated.

3. Direct Job Creation

Three categories of jobs are included. Firstly, the work created in the PES itself (including any work contracted out) and the EST; this includes project development, marketing, management of installation schemes, telephone advice connected with SoP, administration of the schemes, monitoring of schemes carried out and financial and information technology time devoted to the programme.

The second category relates to the work undertaken by the installers of the energy saving measures employed by the PES, or the stockholder.

Thirdly, the local authority, or other stockholder whose properties are being improved by the social housing schemes, also has extra work because of the scheme. This is mainly administration and data collection. The PESs spoken to for this study agreed that most stockholders had very little previous knowledge of their stock and most of the time spent by these groups was in collecting information in order to identify potential measures. Further work involved the tendering of contracts and overseeing the results. These are highly unlikely to be new jobs however, but are more likely to involve a reallocation of time within the authority, as the spending is fixed in a given year. This work is therefore excluded from the job creation figures.

The approach taken in this study is to look at each measure (e.g. cavity wall insulation, CFLs and draught proofing) individually and, using figures obtained from the installers involved (shown in table 1), estimate the amount of time each scheme would take to implement and hence the number of person years of employment created.

Table 3.1: Estimates for Completions per Day for Each Energy Measure:

Measure	Estimate from installers ¹	
	Owner (One-off)	Social (Bulk)
	<i>properties per day</i>	
Cavity wall insulation	1,5	2,25
Loft	2,75	4,5
Draught stripping	2,0	2,0
as secondary measure ²	3,0	3,0
Tank and pipe lagging	2,5	5,0
as secondary measure	7,5	7,5
Heater	1,0	1,0
Heating controls	1,0	1,0
Double glazing	0,25	0,25
Floor insulation	1,0	1,0

¹ Average result from installers. These included Miller Pattison (Headquarters), Pilkington, Dyson, Miller Pattison (Leeds) and Chelmer Heating.

² This is when the measure is only undertaken if other work (usually wall or loft insulation) is already being carried out by the installation firms used by the PESs in these schemes. This therefore reduces the time necessary for further installations in the same property.

The person days involved in each measure are estimated for both bulk schemes and one-off contract schemes. A bulk contract can be completed very much faster due to the close proximity of the properties involved. This gives a vast reduction in travelling time and thus more completions are made per day. Social schemes are assumed to be bulk contracts and owner occupier schemes are taken to be one-off contracts.

Several of the measures do not create employment because of the manner in which they are carried out. In most cases this is because no installation is necessary as the items are bought from retail outlets and fitted by the customer. Of course, these may create employment in the shops from which they are bought and possibly in their manufacture. This type of employment will be included under indirect employment.

The person years involved in installation in all 14 PESs are shown in table 2. The total number of person years per year, for the installers was 176; and 210 person years per year for the PESs (including outside consultants and EST). The total of all jobs, per year, is therefore 386.

The expense per job can be calculated by examining the cost of the programme. The labour costs of schemes

Table 3.2: Summary of all PESs schemes

Measure	Number of installations	Number of person years
Cavity wall insulation ¹	71.829	159,6
Loft insulation ¹	43.953	50,5
Hot water cylinder insulation	27.444	15,2
CFLs	3.844.485	0
Other lighting measures	119.945	0
Draught stripping	20.453	28,4
Heating controls and storage heater upgrade	13.015	54,2
Night blinds	7.500	0
Double glazing	3.171	52,9
Tank and pipe lagging	1.436	0,8
Replacement pumps; variable speed drives	36	0
Floor insulation	590	2,5
Other insulation ²	645	2,7
Total	4.154.802 measures	367 person years
Average total per year	2.077.401 measures	184 jobs (person years per year)

¹ Due to lack of further information, it is assumed that Cavity wall insulation and Loft insulation has been carried out half and half in social schemes and owner occupier schemes. Thus an average completion rate between the two has been used.

² Other insulation includes 'soffit' insulation, external insulation of internal walls and internal insulation of external walls in unknown proportions. An average of 1,0 measures per day was used: this is likely to be the minimum required.

such as CFLs are excluded as they create no extra employment. The remaining schemes - cavity wall insulation, loft insulation, double glazing, draught stripping, floor insulation, solid wall insulation, heating controls, tank and pipe lagging and storage heater upgrades - were looked at in detail to calculate a cost per job figure for a typical scheme.

The employment created by this programme falls into two categories - the project management, marketing and administration jobs, which includes both the higher qualified and higher paid managers and the administration support (such as telephonists); and the semi-skilled or unskilled manual jobs in the installation business.

The total number of direct jobs created by the Standards of Performance programme is calculated to be 386, at a typical cost to the PESs of 28.800 labour cost per installation job (plus 43.200 on materials) and an average cost of 24.100 per job in project management, marketing and administration. These latter types of jobs seem to cost less than the installation jobs, this may be due to a significant proportion of these being at the lower paid end of the administration scale - such as telephone support. It may also be because in the estimates for installation jobs, conservative estimates of times and costs have always been made. For example the estimates of the number of jobs being completed per day may be over-optimistic and the employment required under-estimated.

4. Indirect Job Creation

Employment will be increased, above the level calculated for the direct jobs, by two main phenomena. The first is the linkage effect, where an increase in employment in the installation business (or the other sectors with increased workloads directly as a result of the programme) leads to other employment being created in supporting industries, such as suppliers of goods and services used by the installer firms.

Secondly there is the multiplier effect, where the increase in spending, both from those newly employed and from the savings made in the reduced fuel bills of those benefiting from the schemes, benefits the economy and

generates further jobs. Some of these benefits will accrue to the local economy, others will be lost to the national economy.

These two effects are illustrated in the diagram below:

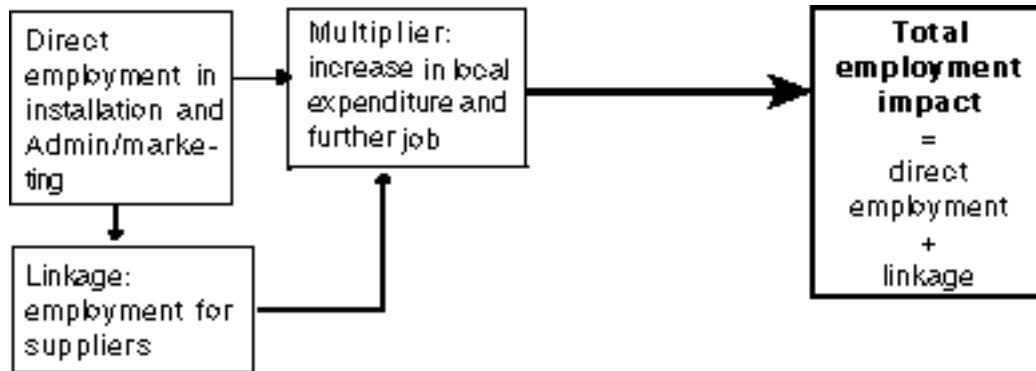


Figure 4.1: Multiplier and linkage effects

The value to be used for the indirect job creation effect is a subject of much contention. Previous estimates have been as high as three additional jobs created for every one direct job, more conservative ones have been 0,4 (e.g. used previously by the Department for Education and Employment (DfEE) and by ACE (ERL 1983)). New evidence in research for the DfEE (DfEE 1996) shows that this value may be even lower.

Because this investment programme focuses on a specific group of people i.e. those perhaps previously unemployed and those with low incomes who have saved money on their fuel bills as a result of the energy saving measures applied, some insight into the indirect effect can be gained from looking at likely spending patterns and how they change as people move up into a higher income group.

Those people who have saved money on their fuel bills are likely to take some of the savings in the form of comfort - i.e. to use more fuel to increase the temperature of their home. The figure used in this report is 50% of the theoretical energy saving. Most of the excess money resulting from the fuel bill savings is spent, though some may be saved. 48% of the total SoP domestic expenditure relates to lower income groups¹ - these people are more likely to spend any extra income than to save it. They are also likely to live locally and to spend their income in the local area (Barrow and Hall 1995).

A move from unemployment to semi-skilled manual labour is typically followed by an increased spending on housing, but has few other major effects in terms of spending patterns (Wade et al. 1996). Most other types of spending generally increase proportionally, though some proportions reduce i.e. just because the income has gone up does not mean that any more of certain goods and services will be bought. However, there is usually an increase in the leisure goods and services expenditure which may have implications for employment in the local area and could also point to a quality of life improvement (Wade et al. 1996).

The UK Treasury does not accept that there is a national multiplier effect in general, as it believes that the money levied would always have been spent elsewhere in the economy, leading to the same overall investment. It does, however, use a figure for a local multiplier effect - that is, it believes that employment in one area can be boosted at the expense of somewhere else².

The value of the local multiplier is dependent upon a number of factors, and can be calculated using a set of parameters as identified by DfEE (DfEE 1996). These include: the current rate of personal taxation allowance; the marginal rate of deductions for those in employment compared to those not in employment; the marginal pro-

pensity to consume - defined as 95% (i.e. 5% saved); the propensity to purchase goods and services from outside the local economy - defined as 70% (DfEE 1996); the proportion of firm turnover accounted for by wages - defined as 25% on average (calculated from Central Statistical Office 1994a).

Using these parameters, a figure is obtained for the multiplier and linkage effect. The calculations give a value of 0,04 for the newly employed whereas 0,08 - 0,16 was the range generally used by the DfEE before now. When the supplier effect is included this gives 0,17 in total.

Thus, for every 100 jobs created directly through this programme, a further 17 will be created indirectly. This value is far less than even the more conservative ones previously estimated - 0,4 (i.e. 40 indirect jobs for every 100 direct jobs) for the multiplier and linkage effects combined has been widely quoted previously (ERL 1983).

The first part of this study calculated a job creation total of 386 direct jobs. Using the figure of 0,17 for the multiplier, this gives a total of 452 jobs.

The cost per direct job was calculated to be 28.800 per installer job and 24.100 for marketing and scheme administration jobs. This is an average cost of 26.200. Including the multiplier effect this goes down to 22.400 per job created for a total of 452 jobs.

For a programme with more substantial funding concentrating on the more labour-intensive schemes, say 350 million (20 times the annual funding currently going into the SoP programme), the job creation impacts would be correspondingly larger. There may be some duplication of administrative jobs but this would be offset by a large step up in manufacturing which would almost certainly lead to some job creation⁵. Thus the economies of scale could be significant in larger programmes.

5. Negative Employment Effects

The likely kWh loss (1.525 GWh per year) to the supply industry is far less than the predicted growth in electricity use, therefore the question is not how many jobs would be lost, but whether any that would have been created from further growth are in fact prevented.

The loss in sales of kWhs to the electricity industries thorough the SoP programme is about 0.5% of total volume sold. Because only 50% of distribution costs and 25% of supply costs are related to volume of sales, the actual loss in profit is a very small proportion of the industrys turnover. The effect of the restructuring of the industry since privatisation has already led to huge job losses and the industry in the UK is now highly efficient in terms of number of people employed per unit of electricity sold. It is doubtful that any job losses will occur as the labour required in the supply industry has little to do with the number of kWhs supplied and it is thought that the figure is likely to be zero³.

There may also be savings in time for landlords of social housing, after the initial high work load arising from implementing the programme. The advantages are that the maintenance costs are reduced - such as the need for anti-condensation measures, the replacement of rotting windows and redecoration. Management costs are also reduced, including fewer complaints to deal with, fewer transfer requests and fewer empty properties. In the studies looked at, job losses did not occur, the free time was spent more productively on other activities and the stock holders reported higher job satisfaction and staff morale because the tenants were more satisfied(DoE 1993a, 1993b, 1995).

6. Free Riders and Other Economic Effects

There are some other factors to consider in the analysis of the programme, which may reduce the employment impacts, these are the natural rate of unemployment, free-riders, displacement effects and alternative programmes which could have been funded with the money raised.

6.1 Natural Rate of Unemployment

Firstly there has been some doubt expressed over whether any direct jobs are created from an investment programme such as this one. Due to the supply and demand mechanisms in the labour market, some economists think it is doubtful whether jobs can actually be created permanently without changing Government policy on inflation or tax rates for example².

If more jobs are created through a programme such as this, jobs in general become more secure and demands for wage increases start as workers exploit their scarcity (Begg 1994). When this happens, jobs are cut and people are made redundant as employers want to keep their costs down. This is the cause of the *natural unemployment rate*. When this level is attained all the unemployed are voluntarily so - all those who wish to have a job *at the going wage* do so.

As the UK is currently above the natural rate of unemployment⁴ the jobs that are created in this case are permanent in the sense that they will not result in the displacement of other workers.

If the long term unemployed (defined as those out of work for more than one year) are involved the natural unemployment level pressures can be ignored anyway. These people do not have an impact on the labour market as they are not in a position to wage bargain. Involving the long term unemployed in the programme also has benefits for the economy and the community in terms of reducing the social costs of unemployment (for example, by reducing the health effects associated with the stress of long-term unemployment).

6.2 Free Riders

The subsidisation of people who would have spent money on energy saving measures anyway (free riders) is generally quite high for programmes like this⁴.

48% of the measures carried out under SoP are given to people receiving passport benefits who could absolutely not have afforded the measures without subsidies. This means that the level of free-ridership will be far less than expected in similar programmes. Even in the higher income groups it is unlikely that many of the measures would have been undertaken due to the current lack of knowledge and understanding of energy efficiency matters. This can be illustrated by the fact that the level of uptake of cavity wall insulation in recent years has only increased by 1% per year in owner occupier homes (Building Research Establishment 1994) but in the one of the PESs schemes the level of uptake was between 14% and 18% in the same sector³, suggesting that the majority of these would not have been carried out were it not for the scheme.

6.3 Displacement Effects

Displacement effects are also a problem in programmes of this nature. These may occur when firms not participating in the programme fail to contracts they might otherwise have secured. Again this effect is lowered because of the fact that, in this particular programme, most of the measures implemented would not otherwise have been undertaken, so other work is not reduced as much as it may be expected.

Looking at the statistics for the industry it is hard to deduce which of these trends is stronger because of the many other factors involved (such as recovery from recession) but the general trend over the last two years has been an increase in the number of installations (Central Statistical Office 1994b).

6.4 Alternative Ways of Spending the Money

The question of what people would have done with the 1 originally levied is also a difficult one. The DfEEs view was that there may be net zero employment effect overall because the 1 would have been spent elsewhere². However, this does not take into account the fact that this programme has invested in a particularly labour-intensive sector of the economy (because of the high proportion of manual labour involved) and would probably create more jobs than elsewhere in the economy. Also the 1 is taken off many customers who may notice little differ-

ence and certainly will not change their spending habits greatly, and given to relatively few who benefit by saving on their fuel bill or by being employed, either of which will change their spending patterns.

There is also the question of what would otherwise have been done with the money put in by the local authority. In many cases 100% funding was provided by the PES for the social schemes, but others were only 50% funded. The local authorities money might have been spent on other schemes which may also have created jobs, although, as installation is one of the higher labour intensity sectors of the economy, it is unlikely that the same number of jobs would have been involved elsewhere. The jobs within the local authorities themselves were not included in this study because of the fact that the income to each authority is set and the number of jobs is not likely to vary, even if responsibility shifts around. For the same reason, the alternative options of how to spend money are equally unlikely to create extra jobs.

7. Comparison with Other Programmes

Thus we can conclude that the initial estimates of job creation remain unchanged once these factors have been considered. The results are therefore that one job is created for every 22.400 invested in labour, or 39.200 including materials (of which about 11.800 will be raised by third parties such as the customer).

These results compare well with current estimates of labour costs (for example, the Building Research Establishment suggest a figure of 30.000 per person year), which suggests that the estimates of the total work effort involved in the scheme are reasonable.

The Combined Heat and Power Association also use an estimate of 30.000 required investment per person year of labour resulting from new CHP schemes (New Economics Foundation 1995). This assumption appears reasonable in comparison with the results of the present study; the development of CHP is likely to require, on average, a higher skill level in the newly employed than the implementation of an insulation programme, and therefore the related employment costs are likely to be somewhat higher.

This also compares well to other job creation investments such as in the tourist industry, recently calculated at 30.000 per job created (BBC news 26th September 1996).

Thus, the demonstrated average cost per job created in the Standards of Performance programme seems to confirm the suggestion that this type of scheme is a good method of generating employment in sectors requiring a relatively low level of skills, and therefore suitable for many of the long-term unemployed.

The indirect job creation in this study has been calculated to be far lower than those figures used in previous studies. This has taken into account the latest thinking on multiplier effects, both inside Government Departments and amongst the academic community. Despite these assumptions the level of additional job creation calculated may be significant in some local economies, particularly if a larger Standards of Performance-style programme was developed.

8. Programmes for Employment

The results of the analysis of this programme show that there is a positive effect on employment with the SoP and other similar programmes. Qualitative aspects of this employment are at least equally as significant as the quantified benefits - the fact that the work is suitable for the long-term unemployed is important for consideration in local planning. There are social advantages of this type of employment and training - work on environmental schemes incorporates the important aspect of encouraging community development.

If future schemes can be designed to incorporate job opportunities for the long-term unemployed, the labour opportunities generated by the schemes is far more likely to have a permanent effect on employment levels; sup-

ply-side adjustments in the labour market which might act to offset initial employment gains are far less likely if the new jobs are taken by the long-term unemployed.

Employment is therefore a useful additional argument for funding energy efficiency schemes. As environmental benefits are infamously hard to quantify, monetary gains such as employment, health benefits and fuel savings need to be promoted strongly.

ACE has looked in some detail at the benefits resulting from a large programme of investment in energy efficiency. The benefits are divided into monetary savings to the health service (34%), to management and maintenance of public sector housing (49%) and to employment (17%) (ACE 1996). All these of course exclude the environmental benefits, which have not been quantified.

The benefits of employment can be calculated by the fact that the Treasury gains approximately 8.400 for each job created for a long term unemployed person (in terms of reduced unemployment benefits, social security costs and increased tax revenue) (ACE 1996).

As employment benefits provide a real economic payback to the public, would it be feasible to raise money from funding from a variety of sources set aside for employment creation schemes? One scheme which has been successful in doing this is in the UK is the Jobs and Energy project by the Heatwise group.

The Wise group runs the leading energy employment initiative in the UK. Its overall objective is to create an intermediate labour market. That is, to recruit and provide training and work experience for unemployed people so they can improve their own prospects by moving into a job or further education. The group is funded from a variety of sources, including UK local and national authorities and the European Commission, as well as from commercial sales of their services.

Heatwise is responsible for the Jobs and Energy Project and has the following aims (Wise Group, 1994):

- (1) To identify the extent of, and develop solutions to, the problems of cold, damp and expensive to heat housing.
- (2) To identify employment and training opportunities for local people through improving the heating and the insulation characteristics of the local housing stock.
- (3) To put together funding packages to initiate heating and insulation improvement projects.

The Heatwise group appears to be successful in terms of its employment figures. 58% of its trainees who finish the course go on to permanent employment or further education within three months of leaving, this compares with a national average figure of a 5% chance of a long term unemployed person finding permanent employment.

In 1994 the group employed a total of 795 people. 230 of these were permanent employees, and 565 trainees on their various programmes. The expenditure for 1994 was 12.8 million, implying a cost of 16.100 per employee.

Thus, it can be seen that this type of scheme can be incredibly successful. The matching funding idea has also been used by the Home Energy Conservation Act Action programme in the UK. This programme is the result of a new Act of Parliament and provides a mechanism for funding some of the programmes under this Act. The grants are given as a result of a competition style application procedure and on the condition that significant funding is leveraged from other sources.

The combined experience of the programmes discussed here can be used to develop programmes using money from a variety of sources. Government funding set aside for employment programmes maybe one source of money, as it appears that such use of money would result in an overall benefit to the economy, in addition to the social and environmental benefits. The programme would cost the Treasury nothing overall, and many individuals would gain both from improved housing conditions and better job prospects.

Acknowledgements

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¹ Kirkman, 1996, Personal Communication with Eleanor Kirkman, Energy Saving Trust.

² Melville D, 1996, Personal Communication with Duncan Melville, Department for Education and Employment.

³ Trumper G, 1996, Personal Communication with Glyn Trumper, NORWEB.

⁴ Williams M, 1996, Personal Communication with Matthew Williams, Institute for Employment Studies, Sussex University.

⁵ As discussed with members of the Association for the Conservation of Energy. It is estimated approximately a 25% increase in turnover is required before any further jobs could be created.

Abbreviations used in text

SoP	Standards of Performance
ACE	Association for the Conservation of Energy
PES	Public Electricity Supplier
EST	Energy Saving Trust
CFL	Compact Fluorescent Lamp
DfEE	Department for Education and Employment
DoE	Department of Environment
CHP	Combined Heat and Power

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