Impact assessment of the UK's Energy Efficiency Best Practice Programme for buildings

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1. SYNOPSIS

Summary of recent developments and refinements of the Impact Assessment methods for the EEBPp for buildings and results for the year 2000.

2. ABSTRACT

The Energy Efficiency Best Practice Programme (EEBPp) is the United Kingdom's principal information dissemination Programme on energy efficiency and was established in 1989. The Programme is currently jointly managed on behalf of the UK Government by the Building Research Energy Conservation Support Unit (BRECSU) and the Energy Technology Support Unit (ETSU). BRECSU, part of the Building Research Establishment (BRE), is responsible for energy efficiency in buildings whilst ETSU is responsible for the programme's industrial component. The aim of the EEBPp is to advance and spread ways of improving the efficiency with which energy is used in the UK. Annual assessments were made of the UK's total energy savings and, in particular, the programme's influence in each of thirteen building sectors in which the Programme is active.

Each year BRE's Impact Assessment Unit conducted a survey to assess:

- Energy efficiency measures implemented in UK buildings during the previous year, split into two categories: (a) new buildings completed during that year and (b) existing buildings, i.e. those completed before the year in question.
- The extent to which those measures can be attributed to the EEBPp.

The surveys covered thirteen building sectors for both new and existing buildings targeted by the EEBPp (Social Housing, Multi Residential Housing, Private Housing (new buildings only), Health Care, Schools, Higher and Further Education, Sports and Recreation buildings, Public Sector Offices, Pubs, Retail, Commercial Offices, Hotels, Industrial buildings).

The 1999 survey was carried out by telephone interviews with owners and occupiers of new buildings and buildings completed before 1999. Using telephone interviews rather than written surveys increased the response rate from approximately 65% using written surveys to over 95%. Wherever possible appropriate further interviews were carried out with designers and others involved in making decisions about energy efficiency measures.

A random sample of buildings was taken in each of the thirteen sectors. In total, 2,811 questionnaires were completed for 1999: 2,111(excluding outliers) for existing buildings and 616 (excluding outliers) for new buildings. The response rate was over 98% - only 37 potential respondents refused to participate. Thus a non-response bias was likely to be minimal. In addition, about 600 further interviews were carried out with decision makers other than owners/occupiers of the buildings.

For each respondent with an existing building the following were obtained:

- The floor area of the total building stock (or a substitute measure such as the number of employees that allowed the floor area to be estimated using factors supplied by BRECSU), and,
- The proportion of the total floor area to which measures had been applied – if the respondent did not know an exact floor area the relevant floor area was estimated using a secondary indicator for the estimation.

For new buildings the floor area of the building (or an equivalent measure) was obtained and the proportion of that floor area to which energy efficiency measures had been applied.

The analysis method covered issues such as a complex treatment of multiple measures, hours of use of the building and attribution of net savings to the EEBPp (i.e. those above and beyond what would have occurred without the Programme). An important development in recent years has been the development of a methodology to account for persistence of energy savings. Persistence is defined as 'sustaining the level of energy savings produced by the energy conservation measures installed as a direct result of the EEBPp'. For most measures the efficiency falls or ceases completely over time, for instance Argon leaking from double glazing units or Compact Fluorescent Lightbulbs being replaced by tungsten lightbulbs. Following a study into persistence [Ref. 1] all savings were adjusted retrospectively to account for the persistence of energy savings. This was done by the use of persistence reduction factors assuming decay over 15 years for each measure in each sector given that 15 years is the average lifetime of measures. The persistence reduction factors reduced the calculated saving in each measure by the predicted amount in order that savings were not overestimated. Future 'lifetime' savings were not calculated for the Programme, but the savings achieved by all the measures introduced by the Programme since its inception to date were calculated.

The model essentially took the information provided by the respondents and grossed up the savings to UK levels based upon the floor areas given by the respondents and the U.K. sector floor areas. Analysis was undertaken using SPSS and the outputs were presented in Microsoft Excel. In the 1995 impact assessment of the EEBPp a series of complementary building audits and face to face interviews were carried out to assess the accuracy of the survey responses. In general the audits showed that respondents in most building sectors were accurate to within 10% of their responses for both floor area and measures implemented [Ref. 2].

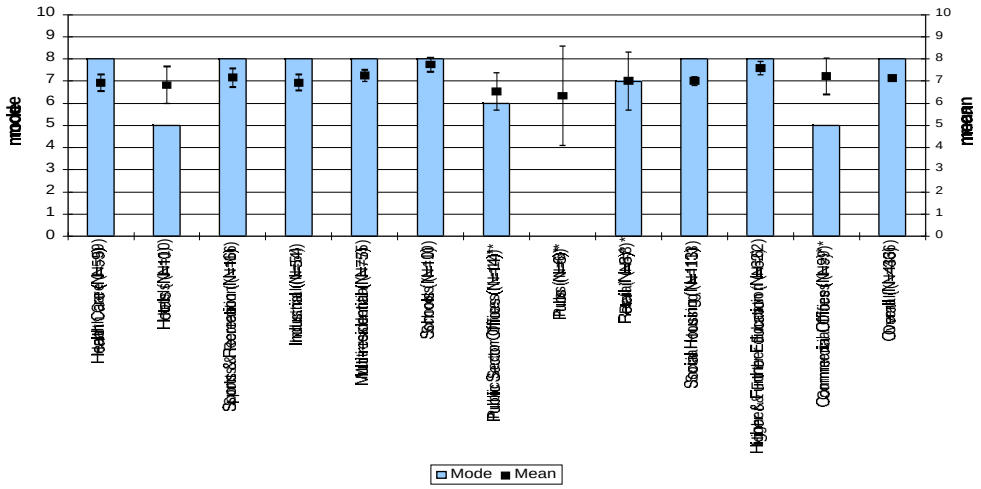
Quantitative and qualitative results were obtained both at the sector and national level. Tables 1 shows the attributed annual cumulative carbon savings respectively during each year since the Programme's inception. This data can be broken down into regional/sector savings and financial and energy savings produced also.

Table 1. Annual Cumulative EEBPp Savings (MtC/year)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Housing	0.031	0.082	0.110	0.141	0.179	0.201	0.256	0.288	0.314	0.356	0.369
Public	-	-	0.036	0.069	0.137	0.186	0.291	0.369	0.405	0.458	0.497
Commercial	0.019	0.049	0.056	0.115	0.172	0.188	0.247	0.329	0.384	0.419	0.432
Industrial	0.057	0.078	0.107	0.124	0.166	0.207	0.288	0.370	0.375	0.415	0.459
Total	**0.107**	**0.209**	**0.308**	**0.448**	**0.654**	**0.783**	**1.083**	**1.355**	**1.478**	**1.648**	**1.758**

Total cumulative savings [Ref. 1] since the Programme's inception are: 9.8MtC, 618PJ, £2953million.
Respondents were also asked to rate the usefulness of the Programme, results are grouped according to sector and are displayed in Graph 1 showing the mean, mode (most frequently occurring value) and 90% Confidence Intervals of the mean.

Graph 1. Usefulness of the Programme



*Indicate that more than one mode value was obtained. For Retail and Commercial Offices the other mode values were 7 and 8. For pubs, due to the small sample size, it was not possible to discriminate a mode value. For Public Sector Offices the other mode value was 7.

3. REFERENCES

[Ref. 1] Boyle S.P "Persistence of Energy Savings of the UK's Energy Efficiency Best Practice Programme for Buildings Publication". Presented at the 1998 World Building Congress.
[Ref. 2] Boyle S.P "Impact Evaluation of the UK's Energy Efficiency Best Practice Programme for Buildings". Presented at the 1997 ECE (European Council for an Energy Efficient Economy) Conference.