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MONERGY: QUALIFYING IMPERFECT MEASURES OF PERFORMANCE

S.M. MACGILL AND B. SHELDRICK

School of Geography
University of Leeds
Leeds LS2 9JT

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S M Macgill and B Sheldrick
School of Geography, University of Leeds, Leeds LS2 9JT

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In this paper a recently developed framework designed to facilitate the expression, interpretation and communication of imperfect quantitative information* is adapted to elucidate the quality and significance of recently publicised measures of UK energy efficiency (MONERGY) performance. The analysis of the paper lays bare a considerable variability in the quality of publicised measures, this in turn providing crucial pointers to the way they should be interpreted, and in some cases indicating ground for possible improvement.

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* S O Funtowicz and J R Ravetz (1986) Numbers with fringes, Department of Philosophy, University of Leeds, Leeds LS2 9JT.

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Introduction

Quantitative indicators, or numerical measures of performance, are central elements in the monitoring and evaluation of many public policy activities. Their legitimate use requires recognition of the nature and extent of any inherent imperfections with which they may be laden, for numbers alone may lend an air of unwarranted definiteness, which belies their innately more ambiguous and imperfect character. It is important, then, to seek explicitly to establish the quality and significance of quantitative indicators, in order to avoid errant interpretations and comparisons. It is the aim of this paper to assemble and illustrate an evaluative framework through which the quality and significance of particular sorts of quantitative indicators of performance might be scrutinised. While the paper is developed in the specific context of publicised measures of official energy efficiency campaigns in the UK, the nature of the framework put forward should have wide applicability in other public policy contexts.

Since its establishment in October 1983 the Energy Efficiency Office (EEO) of the United Kingdom Department of Energy (DEn) has adopted a high profile culminating to date in the designation of 1986 as Energy Efficiency Year and the MONERGY campaign [1]. While applauding the EEO's public visibility, the Select Committee on Energy recently called for more substantive evidence of success, specifically, "the publication of statistically significant hard figures about the achievement of the EEO" [2]. The EEO's response, in conjunction with its MONERGY campaign, has

been to give wide publicity to various quantitative indicators of its performance.

The quality and significance of the EEO's MONERGY indicators is to be examined below, using a modified form of a recently developed evaluative scheme [3]. Imperfections and deficiencies, which may not be evident in the superficial appearance of the indicators, will be revealed. The intention is not to criticise the published indicators as such, but rather: to clarify their interpretation; to assess their quality - and their standing in relation to the call on the EEO for "statistically significant, hard figures"; and to point to ground for their improvement.

MONERGY - 'The Facts'

In launching its MONERGY campaign the EEO [4] published the following 'facts' (numerical indicators) as measures of need for greater energy efficiency and of progress in its pursuit of related objectives:

1. £7 Billion a year is wasted by Britain through the inefficient use of energy.

2. Over 1,850 jobs have been created in local energy projects.

3. Over 120,000 dwellings have been insulated by voluntary projects.

4. 2.5 million grants have been given out under the loft insulation scheme between 1978 and 1985.

5. More than 5,500 energy managers have been appointed across the country.

6. 6.1 million publications have been despatched by the EEO.

Before reading these (or any of EEO's more recently published updated figures which are of a similar type) as facts-which-speak-for-themselves, it is important to investigate their nature more closely.

Disclosing the quality and significance of numerical indicators

We propose and exemplify three measures - integrity, relevance and accomplishment - in terms of which the quality and significance of the EEO's performance indicators might be assessed. These measures are not necessarily the only ones that could be used, nor do they necessarily proffer a comprehensive assessment. Instead they are presented here simply to make explicit some crucial qualifying considerations.

What we refer to as the integrity of an indicator is founded within the rigour and discipline of the process by which it is produced. Following Funtowicz and Ravetz [5] a coding can be devised to disclose, briefly but systematically, aspects of the nature of this process. Three such aspects - 'definitions', 'data collection' and 'reliability' - are distinguished here according to the modes set out in the first three columns of Table 1. Through these modes it should be possible to reflect the confidence that can be placed in an indicator's numerical value. Moving to the fourth column of table 1, we take the relevance of an indicator to refer to its validity as a true measure of that which it purports to represent: at best 'direct', at worst 'unknown'. Finally, accomplishment refers to the

relative degree to which the value of a given indicator reflects fulfilment of its own performance potential.

The five columns in Table 1 thus correspond to five criteria against which the EEO's performance indicators will be assessed in this paper. Since the order of the modes given in each column is roughly normative, scores (or codes) from 4-0, in descending order of merit (column six in Table 1), can later be used to represent them. Before using this table as an evaluative framework, by identifying those scores which seem most fitting to the various EEO performance indicators, the different modes suggested for each criterion will be discussed more fully.

(i) Definitions. This column refers to the 'units of measurement' observed in the process of producing the indicators. Since compilers of data sources may have simply 'counted' or 'measured' what was obvious to their own common sense (but with no guarantee of uniformity between different compilers) then, without further qualification, no guarantee of quality should be assumed. Five possible modes of definitional practice are given in the first column of Table 1 - bespoke tailoring, standard, convenience, symbolism and inertia (adapting the suggestions of Funtowicz and Ravetz [6]). 'Bespoke tailoring' [7] refers to those cases where the definitions used are fully attuned to the context in hand - it arises much less than might casually be thought. 'Standard' [8] refers to those cases where the definitions used are those of some established practice (this can be a coarser approach than using individually tailored units). The mode 'convenience' is for cases when the definitions used are not necessarily the most appropriate but have been assumed to be convenient ones for the purpose (for example, on the grounds of ready availability, cost or manpower). While 'symbolism' could also be construed as a form of convenience, it is used here to denote cases where considerations of

institutional legitimacy or prestige have dominated the choice of units. The final mode, 'inertia', characterises the situation where particular definitions continue to be used for traditional or historical reasons, regardless of their validity or utility.

(ii) Data Collection. This column refers to the data gathering operation and follows the modes originally proposed by Funtowicz and Ravetz [9]. A task-force dedicated to the intensive study of a problem, with special care for characteristic pitfalls, may yield the best information about the phenomenon in all its complexity and variability. Alternatively, an indicator may be derived from a direct survey, as in a census, where various social and policy indicators are measured regularly. However, it may neither be possible, nor feasible, to measure directly, thus indirect estimates, derived from partial surveys or using surrogate data, may be employed. When no field data of any sort is available it may still be necessary to provide some information; for that, an educated guess, based on expert opinions, may be offered. Fiat (or an uneducated guess) is an inferior alternative, where some authority decrees the number which shall officially represent the phenomenon in question. There is again a normative ordering of the five categories.

(iii) Reliability. This column refers to the accuracy with which an indicator's numerical value represents what has been chosen to be measured. 'Reliability' may depend on 'definitional' or 'data collection' considerations, or on other qualities and circumstances inherent in the production of the indicator (for example, whether the numerical values given have been externally reviewed, the extent to which peer communities have accept their standing, or whether other data sources have provided different figures for ostensibly the same phenomenon).

(iv) Relevance. This phase represents the appropriateness of an indicator to that which it seeks to measure. Although the data from which an indicator is constructed may be rigorously collected and reported, (which would be reflected in high scores on previous criteria) the indicator may nevertheless be inherently irrelevant to the phenomenon under scrutiny. Five modes have been distinguished in Table 1 to allow for this and other possibilities. At best, the measure is directly relevant - no better choice could be wanted; alternatively it may be an indirect measure; or be adopted for the sake of convenience; or be symbolic; or worst of all, be spurious.

(v) Accomplishment. The final criterion proffers an evaluation of the achievement of the performance reflected by the indicator. This can run from outstanding (greater achievement could not be expected) through successively less commendable descriptions, to a position warranting some derision about the prevailing state of affairs. The five modes of outstanding, good, fair, poor and none are suggested accordingly in descending order of merit. More so than for other criteria, the performance indicators will need to be located within their broader policy context when being considered in relation to these modes.

In view of the ordinal scoring which can be used to represent the modes of each criterion, an overall summary of an indicator's quality can be given by a array of 5 digits. The array (4,4,4,3,4) for example, would depict an indicator of exceptional quality, scoring highly on all five criteria: scores of 4 in terms of 'definitions', 'data collection', 'reliability' and 'accomplishment' and 3 in terms of 'relevance'. The array (1,2,1,1,0), on the other hand, would depict a much poorer entity: a score of 1 for 'definitions', 2 for 'data collection', 1 for 'reliability', 1

for 'relevance' and 0 for 'accomplishment'. Such designations provide a guide to the interpretation of the performance indicator, and in some cases to the potential scope for improving its quality.

The MONERGY indicators: an assessment

£7 Billion a year is wasted through inefficient use of energy in the UK

With the establishment of the EEO in October 1983 came the official pronouncement that the UK could save 20% on its total annual fuel bill of £35 billion, ie £7 billion [10]. Since then the figure of £7 billion has been advanced regularly in the public debate on energy efficiency policy, and has been buttressed by the EEO's slogan:

'Get more from your energy
Get more for your money
Get more from your MONERGY' [11].

Definitions: The unit of measurement - billions of pounds - in which this indicator is given leaves little room for errant discretion on the part of those producing the indicator. (Score 3.)

Data collection: The actual process whereby the EEO produced the £7 billion figure is not known. Certainly, the EEO and its predecessors have been involved in various data collection exercises regarding energy consumption in the UK. However, the quality of these data collection exercises varies for different sectors of the economy. Some large scale, energy intensive industries have been studied in depth and the results well documented in the energy audit series published by the Department of Energy (a 'task force' approach). Local authorities have also come in for

examination, although the potential £100 million and £130 million financial savings identified respectively by two agencies [12] are derived by the extrapolation of results from surveys on a limited number of authorities (a combination of direct and indirect survey). The domestic sector has been problematic because of its size and diversity and the variability of occupant behaviour. General guidelines on potential financial savings or on reductions in energy consumption, for average size families undertaking average activities in average dwelling types, have been derived from computer model simulations and field studies [13], but the actual change in a particular individual's fuel consumption or expenditure is uncertain (educated guesswork?). Beyond these considerations it is possible that the £7 billion figure was chosen primarily for focusing media attention rather than reflecting the feasibility of realising potential national savings (in other words by fiat). Overall, then, the due score for the £7 billion indicator on the 'data collection' criterion may span the whole range between 0 and 4.

Reliability: The lack of knowledge about the assumptions underlying the £7 billion figure - the 20% of the nation's total expenditure on fuel - confounds assessment of its reliability. Leach et al [14] calculated a slightly higher potential of 22% assuming then existing technology and no reduction in living standards. Even greater potentials have been suggested if society were to alter its behavioural patterns [15]. It is also noteworthy that the £7 billion figure has been cited unchanged for three years. This begs the questions of whether or not any progress has been made since 1983, and whether or not the figure has been affected by the changes in fuel prices during 1986? Overall then, reservations, if not serious reservations, arise about the first indicator's reliability. (Score 1-2.)

Relevance: Since money is a direct measure of reductions in fuel expenditure, it is a direct indicator of energy (MONERGY) savings. (Score 4.)

Accomplishment: The figure of £7 Billion (20% saving on the nation's current annual fuel bill) does not represent a maximum theoretically derivable target. Much higher potentials could be sought, if changes in societal behaviour were contemplated or if more interventionist government policy initiatives were introduced. The government, in regulating the statutory framework, financial climate and policy context within which energy producers and consumers operate (with particular potential influence on those in the public sector), has been reluctant to impose energy efficiency obligations, and in some sectors has denied access to the resources to undertake the appropriate capital investment. In a sense it might be thought to have impeded the realisation of conservation potential: in relying on the market mechanism to provide appropriate signals, energy consumption can rise to whatever level consumers are willing to pay for, regardless of waste. A policy of more deliberate conservation could generate much more than £7 Billion in energy savings. Recalling also that the government has stated that the EEO would be judged on its promotion of the £7 Billion target, rather than its actual achievement [16], a relatively low score for 'accomplishment' seems fitting to describe the present state of affairs. (Score 1 - 2.)

1,850 Jobs Created in Local Energy Projects

The above 'Jobs created' figure was obtained through Neighbourhood Energy Action's (NEA) monitoring of local energy projects and represents a snapshot of the number of people employed in local energy projects as of

September 1985. Local energy projects have been operating in the UK since 1975, providing draught proofing, loft insulation, and energy advice services for low income consumers [17]. Although NEA is an independent national charity, promoting the establishment of local energy projects, it does receive central government funding, hence the appearance of this independent organisation's statistics among EEO's performance indicators. The EEO has declared its intention to increase the number of operating projects from about 80 in 1983 to 250 by 1986. To assist the realisation of this objective the EEO has increased its support for NEA, but with a concomitant pressure to justify this funding with reference to statistical data.

Definitions: A crucial reservation about the 'Jobs Created' figure is its failure to distinguish whether the 'people employed' are full or part time, and its failure to indicate the nature of their employment. The Community Programme (CP) regulations under which the vast majority of workers on local energy projects are employed require many workers to be employed on a part time basis, with great variations amongst individual projects in working practices and staffing levels. A study of factors affecting local energy project productivity found the ratio of administrative workers to on-site workers to vary between 0.2:1 to 1.4:1 [18]. A further reservation is that the figure also only reflects those employed on schemes registered with Neighbourhood Energy Action. It does not include those employed in private enterprise or in the manufacture of insulation materials. Overall then, a relatively low score (2) would seem appropriate for the 'jobs created' indicator on the first criterion.

Data Collection: Local energy projects established since October 1984 and receiving DEn financial assistance are obliged to supply NEA with quarterly returns, including statistics on employees. Despite this

obligation, not all projects return their survey forms to NEA. Additionally, projects established before October 1984 are not obliged to complete the NEA returns. Although attempts are made to obtain information from these projects, NEA are not always successful. Numbers are extrapolated when the information is not forthcoming. The information derived from this direct survey is collated and then passed to the DEn. (Score 2-3.)

Reliability: The assessment of local energy projects' productivity found discrepancies in the employee figures forwarded to NEA and the actual project staffing, reflecting uncertainty in the information NEA required [18]. Given the part-time nature of much of Community Programme (CP) employment, NEA generate a 'Full Time Equivalent Worker' figure, representing the number of 40-hour person weeks employed within a project. The EEO has proclaimed this figure to be the number of jobs created. The actual number employed is larger. It is also worth noting that the 'Jobs created' figure is very susceptible to changing government dictates. These are referred to more fully under the 'accomplishment' heading below. Overall, the reliability of this figure is open to doubt (Score 1 - 2.)

Relevance: The relevance of 'jobs created' as a MONERGY indicator depends on the actual relationship between the number of employees and the amount of draught proofing and loft insulation work undertaken. The relationship is not necessarily a proportional one: local energy projects have been found to vary quite dramatically in their productivity, including one project that had increased its operating size by a third without any increase in work flow [19]. As an indicator of reduced energy consumption or expenditure, the number of jobs created within local energy projects is therefore at best an indirect measure, with an element of convenience, as it is certainly more convenient to count employees than to undertake

detailed studies of fuel consumption or expenditure reductions for the households benefiting from the work. Whether net reductions in energy consumption occur as a result of an increase in the number of jobs created is also dependent on how householders spend any increased net incomes arising as a result of reduced fuel expenditures, and on how project employees spend their incomes (in other words on the relative net energy intensiveness of their various expenditures). (Score 2-3.)

Accomplishment: A single 'jobs created' figure masks great variability in what has been happening in local energy projects over the years. A number of energy projects folded in 1983 when the Community Programme replaced the Community Enterprise Programme with its more onerous conditions on salaries. Projects have been prevented from starting, or have been delayed, because of limits on the allotted number of CP places in a region, or because of objections from local authorities or trade unions, despite the EEO's objective of increasing the number of projects. Things have improved more recently: EEO grants to assist the commencement of projects; EEO financial support for NEA; the expansion of national CP places of 100,000 in 1985/6 and a further 50,000 in 1986/7; and agreement between NEA, EEO and the Manpower Services Commission for a national initiative to support the establishment of energy projects within the Community Project during 1986. However, while the labour costs of the projects are met by the Manpower Services Commission, the bulk of their work is financed through DHSS single payments, which are scheduled to be abolished in April 1988 as part of the Social Security Review [20]. This threatens the future of local energy projects at a time when they are being encouraged to expand. Moreover, as noted elsewhere,

> "if one were designing a national network of local energy conservation schemes from scratch one would not adopt the rules of the Community Programme or patch together the grants or other resources that make up Neighbourhood Energy Action" [21].

More generally, the number of people currently employed on local energy projects compares poorly with the estimate of 150,000 that could be created over 10 years by a national energy conservation programme [22]. Overall then, a relatively low accomplishment score would seem warranted. (Score 1-2.)

120,000 Dwellings Insulated by Local Energy Projects

A breakdown of the work undertaken by local energy projects is another example of the information provided by Neighbourhood Energy Action. As of June 1985, 'dwellings insulated' figures compiled from local energy projects statistical returns were:

loft insulation	16201
draught proofing	93205
hot water cylinder jackets	10386
miscellaneous	500

Aggregating these figures produces the 120,000 figure quoted by the EEO.

Definition: Definitional deficiencies in this indicator arise due to its failure to denote what comprises an insulated dwelling. NEA returns indicate that the above is a breakdown of 'jobs completed' [23]; the EEO has translated 'jobs completed' into 'dwellings insulated', so that within the given total, there is a degree of double counting - as when, for example, hot water cylinder jackets are fitted at the same time as the loft insulation or draught proofing. By installing various measures, the heat retention properties of a dwelling can be improved, but this does not mean that the dwelling has achieved some standard designated as 'insulated'. A further deficiency arises over what standard of insulation is being referred to. For example, the Building Regulations thermal

standards only set U-values for lofts and walls of new dwellings. The Home Insulation Scheme only makes available grants for loft insulation. Low income consumers can only receive special payments for draught-proofing and hot water cylinder jackets. In summary, proclaiming a dwelling to be insulated regardless of the degree of insulation is a matter of convenience or symbolism. (Score 1 - 2.)

Data Collection: As already indicated, NEA obtains information on the numbers and types of jobs undertaken by local energy projects, on a quarterly basis through its own survey, extrapolating over missing entries as appropriate. (Score 2 - 3.)

Reliability: An assessment of the reliability of the 'dwellings insulated' figure would be derived through considerations similar to those for the 'jobs created' figure, both deriving from the relationship of local energy projects to central government initiatives, and prone to similar definitional and data collection deficiencies. (Score 1-2.)

Relevance: Improving a dwelling's thermal efficiency will not necessarily result in fuel consumption or expenditure reductions, particularly if the dwelling had been inadequately heated before the insulation was installed, for potential reductions in consumption or expenditure may be taken up as improved thermal comfort. At this level, then, counting the number of dwellings insulated can be no more than an indirect measure of improved thermal efficiency (or MONERGY), albeit a more convenient measure than one based on a monitoring or calculation of actual changes in energy use patterns. (Score 2-3).

Accomplishment: The EEO figure does not indicate the time period over which the completed jobs were undertaken. NEA's statistics would indicate

that they encompass the full ten year existence of local energy projects. On this basis, the figure is less than impressive: local authorities managed to 'insulate' 685,000 dwellings under the Public Sector Programme in 1979/80 alone [24]. Even so, in the absence of any other significant initiative targeted on low income consumers, the local energy projects have provided a valuable service to the community. (Score 1 - 3).

2.5 Million Loft Insulation Grants Paid Out Up To April 1985

Typically, heat loss diagrams portray 25% of dwelling heat passing through an uninsulated loft. Since 1978, grants have been available under the Home Insulation Scheme from local authorities for the installation of loft insulation. The grant covers either 66% or 90% of the cost of insulating the loft, up to a set maximum amount (the higher rate is payable to the elderly and to the severely disabled on low income). To be eligible for a loft insulation grant certain conditions must be complied with, including installing a designated material to a set standard as laid out in the grant regulations. At present, the standard is to achieve a U-value of 0.4W C m (the equivalent of approximately 100 mm of fibre glass or rockwool). It is also noteworthy that while local authorities administer the scheme, its financing, the amount allocated to each authority, the percentage that can be paid, the designated materials, and the standards, are all determined by central government.

Definition: The grant criteria are explicitly laid down, as indicated above, the amount of insulation varying depending on the material used. A degree of ambiguity in the definitional aspect, hwoever, arises due to variations over the years: the scheme has operated since 1978, and has undergone various amendments, including an increase in the standard from

the equivalent of 80 mm to 100 mm of fibre glass and an extension of the scheme to dwellings with 30 mm of insulation or less where previously only uninsulated dwellings qualified. Dwellings that have received a grant thus range between those having the equivalent of 80 mm and those having 130 mm of fibre glass insulation. (Score 3.)

Data Collection: Quarterly returns are submitted by local authorities to the DOE on a number of Housing Investment Programme indicators, including the number of loft insulation grants paid out. These figures are published regularly by central government [25]. (Score 3.)

Reliability: Local authorities are under a statutory obligation not to overspend their capital allocation and therefore must monitor their expenditure. The actual amount allocated to the Loft Insulation grant scheme can be increased only by virement. The grant regulations also require the local authority to undertake a percentage of follow up visits to ensure compliance. The reliability of the figure can be assumed high. (Score 3.)

Relevance: The number of loft insulation grants paid out is more specific than the 'dwellings insulated' indicator of the previous section. However, as an indicator, it invokes the same indirect/convenience attributes - the greater ease of counting the number of grants paid out than determining the actual energy/cost benefits accruing in every individual instance. (Score 2 - 3.)

Accomplishment: While the figure itself seems quite robust (attaining high scores in terms of 'definitions' and 'data collection') debate has arisen regarding the Home Insulation Scheme's rather narrow domain. Calls to extend the Home Insulation Scheme to other energy conservation

measures (e.g. draught-proofing and wall insulation) have to date been rejected by the government on the grounds of concentrating scarce financial resources on what it deems to be the most cost-effective measures: the capital cost of loft insulation is typically low, the payback period is short, and undertaking follow-up checks is simple. However, take up amongst low income consumers has proved problematic for various reasons: awareness of the scheme; availability of capital; ability to fill in appropriate paperwork; short time horizons; low paybacks associated with inadequate heating. These problems are not necessarily overcome by possible modifications of the scheme. (Score 2 - 3.)

5500 Energy Managers

This indicator is orientated towards the industrial sector, and reflects what is generally considered to be one of the most successful government sponsored energy conservation initiatives; see for example [26]. Energy manager groups have been in existence since 1976 (the first in Avon/Somerset), after which the concept was picked up and promoted by the DEn through its regional offices. The promotion of energy manager groups (now numbering 74 across the nation) has become more formalised through the annual National Energy Manager's Conference, and the establishment of the National Energy Manager's Advisory Council. While the EEO cannot impose the appointment of an energy manager, it has gone to great lengths to encourage their designation, and to facilitate the existence of the energy manager groups.

Definition: What is an Energy Manager? A survey of 5000 companies undertaken by the EEO in September 1985 (though not the source of the 5500

figure given above) considered an energy manager as an "individual responsible for acting as a focus, co-ordinator, or manager of work aimed at improving energy efficiency" [27]. This attempt to provide a standard definition, however, did not distinguish between full and part-time positions, or extent of activity. A further survey, of UK local authorities, found that while 57% of respondents had designated an officer responsible for energy matters, only 32% of those appointments involved a full time responsibility [28]. Another survey of energy managers has found that only 18% of respondents spent over 50% of their time on energy matters, while 55% felt another title would be more appropriate [29]. The title energy manager, thus, may be more one of convenience than anything else. (Score 2.)

Data Collection: The figure of 5500 seems to be an indirect estimate, or more probably and educated guess, based on the EEO's knowledge of the membership of energy groups through its 'Breakfast Time Specials' and other meetings. A more recent EEO survey (1985) is the first formal attempt to quantify the existence of energy managers. It remains only a partial survey of the UK's industrial firms however, and it is not clear whether this survey will become a regular feature of the EEO's monitoring. (Score 1 - 3.)

Reliability: The SCOE's report on the EEO [30] illustrated various discrepancies in the number of energy managers appointed across the country, receiving widely different figures by different EEO representatives. The EEO's own survey of energy managers was undertaken after the publication of the MONERGY indicators. Some reservations are therefore in order about any figure published prior to this survey. (Score 1 - 2.)

Relevance: The appointment of an energy manager is presumably supposed to indicate that a company takes its energy costs seriously. A full time energy manager, operating with adequate manpower and financial resources may make a considerable impact on a firms fuel consumption and expenditure, and counting energy managers (as an indirect indicator) is certainly more convenient than attempting to measure changes in the fuel consumption or expenditure of individual companies. However, energy managers are not necessarily decision makers or controllers of budgets, a situation that can seriously reduce their potential to realise savings. The "Breakfast Time Specials" and the follow up meetings organised by the EEO were not necessarily targeted on energy managers, but on the senior management within local firms and local authorities for this very reason. The position of an energy manager may in some cases therefore be of crucial significance, but in others may be no more than symbolic within the organisation: the control of budgets, investments and opportunities often being in the hands of others. (Score 1 - 3.)

Accomplishment: With the unknown degree of convenience and symbolism embodied within the 'energy manager' indicator it might be suggested that the accomplishment reflected by this indicator cannot be sensibly assessed. However, it should be recognised that there were some 74 energy manager groups operating across the country in 1986, compared with 0 in 1976. They provide a forum within which information and experience can be exchanged, and a range of support services has grown around this network, providing further encouragement for energy managers. Indeed, in some areas, as already remarked, the growth in energy managers has been considered an outstanding success. (Score x - 4.)

6.1 Million Publications Have Been Despatched

Theoretically, the proper functioning of the market mechanism basis of government rhetoric on energy conservation requires consumers to have perfect information. The dissemination of DEn publications could contribute towards realising that state of affairs. The EEO has sponsored a travelling 'Energy Roadshow' to visit local shopping centres and exhibitions to distribute literature, advice and information. However, although the number of publications despatched may be reliably counted (earning a score of 3 on 'data collection'), their differing content makes for ambiguity over definitional considerations (score 1-2 on 'definitions') and on reliability (score 1-2). Moreover, as an indicator of energy efficiency (or MONERGY), a count of the number of publications distributed is but spurious (score 0), and the accomplishment it reflects cannot be known (score x).

Summary and conclusions

An attempt has been made to elucidate what lies behind the EEO's recently publicised MONERGY indicators, in order to re-couple the given quantities to due qualifying considerations. The scores assigned above in evaluating the indicators on the different criteria are shown in summary form in Table 2. A more aggregate summary of the extremes of quality and significance associated with a particular indicator can be obtained by combining the range of scores given on each criterion (see the final column in Table 2). The higher score represents the maximum quality potential for an indicator as it is presently constructed, the lower score reflects the appropriate quality assessment if all the worst features were present. For five of the six indicators, such a situation would invite their dismissal as serious statistics.

Looking at the (disaggregate) scores in more detail, there is clearly considerable variability amongst the different MONERGY indicators across the different criteria, revealing their varying strengths and weaknesses. Whilst some source of imperfection may be irremediable, being inherent in particular sorts of data collection and production processes, or in the MONERGY concept itself, it may be possible to develop refinements to the above indicators to avert needlessly low 'scoring' in terms of particular criteria, and this may be ground for future improvement. For example, finer disaggregation of definitional considerations for the indicators would reduce some of their inherent ambiguities: 'tasks completed' instead of 'dwellings insulated'; 'personnel employed', further broken down by full and part time employees, instead of 'jobs created'; potential energy and financial savings by different sectors of the economy instead of '£7 billion wasted'; full and part time energy managers instead of lumping them together. The strength of the 'loft insulation grants' figure is its relatively narrow defininition; there is little scope for misinterpretation. In contrast, the '£7 billion wasted' and the 'energy manager' indicators invite a wide range of interpretations. There may not be anything intrinsically wrong with these indicators if their sole purpose is to focus attention and galvanise action. However, as serious indicators (statistically significant hard figures?) of the national situation and potential, and yardsticks by which legitimately to measure progress in realising MONERGY objectives, greater rigour is needed in terms of identifying what is being referred to, in the collection of data, and in portraying achievements.

By way of improving the scores given for the 'jobs created' and 'dwellings insulated' figures associated with local energy projects, recommendations for improving the data collection and reporting methods of NEA in the

study on the productivity of local energy projects might be implemented [31]. More immediately, a simple expedient would be for the EEO to revert to the wording used by NEA when presenting their quarterly surveys. Such wording would also improve the aggregated range scores from 8 - 12 to 10 - 14 for the 'jobs created' indicator, and from 7 - 13 to 10 - 15 for the 'dwellings insulated' indicator. 'Full time equivalent worker' and 'Jobs completed' may be less eye catching than the wording used in the performance indicators, but would be more accurate.

More generally, while all indicators manifest variable quality against the given criteria, the modes 'data collection' and 'relevance' tend to score higher than do 'reliability' and 'accomplishment'. In other words, while the indicators on which the data is collected are relevant to improving the energy efficient characteristics of the UK, doubts arise about whether these are necessarily the most appropriate indicators or whether the nation is achieving its potential.

Beyond these immediate findings, the analyses of this paper are, in a sense, preliminary. There is much scope for future analysis of a related kind, including the possibilities of modifying the nature of the criteria against which indicators are to be evaluated or developing new indicators. There is scope within the energy efficiency domain for broadening the focus of study beyond the EEO's given performance indicators to those produced by other organisations, and within the energy field more generally for broadening the domain of interest beyond the concept of MONERGY to incoporate wider social and environmental aspects of energy conservation and energy planning. More broadly, there is a case for accelerating the development and refinement of suitable schemes for more adequate quality control of performance indicators in public policy fields right across the board [32].

The motivation for casting such evaluations within a formal framework, of which the phases and modes of the criteria put forward in the present paper was a particular case, is to enable and encourage the benefit of discipline in interpretation on those aspects which can be formally assessed. In an ideal world, one would like to be able to use indicators whose quality scores were implicitly high. Realistically this cannot be expected, and if implicitly low scoring indicators are all that are available, explicit knowledge of related quality ratings may be the only means through which they might legitimately count as better than nothing at all. Much future development and testing of improved 'quality revealing' schemes would seem well worthwhile, not least for the practical benefits to be derived from exposing undue concealment of dubious quality considerations, and from subsequent refinement of needlessly deficient indicators.

TABLE 1: CRITERIA AND MODES FOR EVALUATING MONERGY PERFORMANCE INDICATORS

	INTEGRITY		RELEVANCE	ACCOMPLISH-MENT	SCORE
Definitions	Data Collection	Reliability			
Bespoke Tailoring	Task Force	Absolute	Direct	Outstanding	4
Standard	Direct Survey/Census	High	Indirect	Good	3
Convenience	Indirect Estimate	Reservations	Convenience	Fair	2
Symbolic	Educated Guess	Serious Reservations	Symbolic	Poor	1
Inertia	Fiat	None	Spurious	None	0
Unknown	Unknown	Unknown	Unknown	Unknown	x

TABLE 2: ARRAY OF INDICATOR SCORES

Indicator Definition	Data Collection	Reliability	Relevance	Accomplishment	Aggregation
£7Bn wasted	3	0-4	1-2	4	1-2	9-15
1850 jobs created	2	2-3	1-2	2-3	1-2	8-12
120,000 dwellings insulated	1-2	2-3	1-2	2-3	1-3	7-13
2.5M Grants	3	3	3	2-3	2-3	13-15
5,500 Energy Managers	2	1-3	1-2	1-3	x-4	<5-14
6.1M Publications	1-2	3	1-2	0	x	<5-<7

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