

A handbook in evaluation of energy saving activities

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Keywords

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Abstract

This paper discusses a new, practical handbook in evaluation of energy saving activities.

The aim of the handbook is to reduce the cost and time needed for evaluation of energy saving activities and to increase the outcome of future evaluations in relation to the effort invested. This in turn is expected to help increase the efficiency of future energy saving activities.

The unique feature of the handbook is a division of the ambition of the evaluations into three levels (ABC) depending on the purpose of the evaluation and the type of activity in question.

It operationalizes current knowledge on evaluation by categorising activities into five groups with common features that allow common recommendations for the activities in each group.

Examples are used to illustrate the ABC concept and its impacts on recommended use of the tools and checklists for the five categories. The underlying assumption is that 80% of the activities will be sufficiently addressed with this approach. The remaining 20% will still be able to use the toolbox part of the handbook, but the evaluator will have to choose the appropriate tools himself.

The handbook functions as a common language for evaluations in Denmark and will facilitate comparison of evaluation results irrespective of the type of activity or energy involved (gas, district heating, or electricity). The handbook

will be a living document. It will be gradually up-dated, as new experience is gained.

The handbook is the result of a joint effort by all the main actors in the energy efficiency sector in Denmark. A Test Group consisting of future users of the handbook was invited to comment on the work as it progressed. The comments of the Test Group have been important for the final result.

Structure of the Handbook

The handbook is constructed so that the users can choose between three alternative approaches to the subject "evaluation of energy saving activities":

1. **Get started – 9 pieces of advice** – A quick overview of how to avoid the most common pit falls, intended for the initiator of the evaluation as well as the evaluator.
2. **Planning the evaluation** – A methodological, step-by-step approach to the evaluation work consisting of checklists and recommendations. Careful planning is the corner stone in any evaluation. This chapter is particularly interesting for the initiators of evaluations.
3. **Collection of examples** – A collection of evaluations of fictive but realistic examples of energy savings activities. The presented evaluation approaches are intended to function as inspiration and therefore each evaluation focuses on a number of issues relevant for the type of activity in question.

It is thus not necessary for the users to read the handbook from one end to the other in order to benefit from it. In-

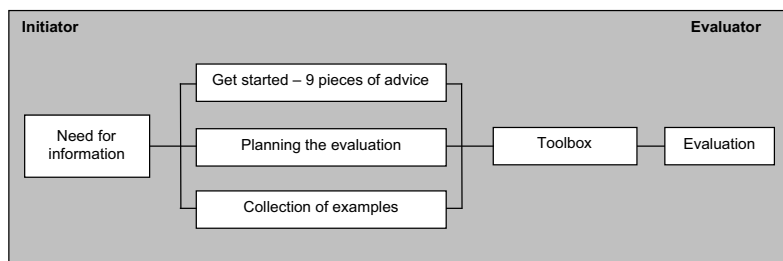


Figure 1. Sketch of the structure of the handbook.

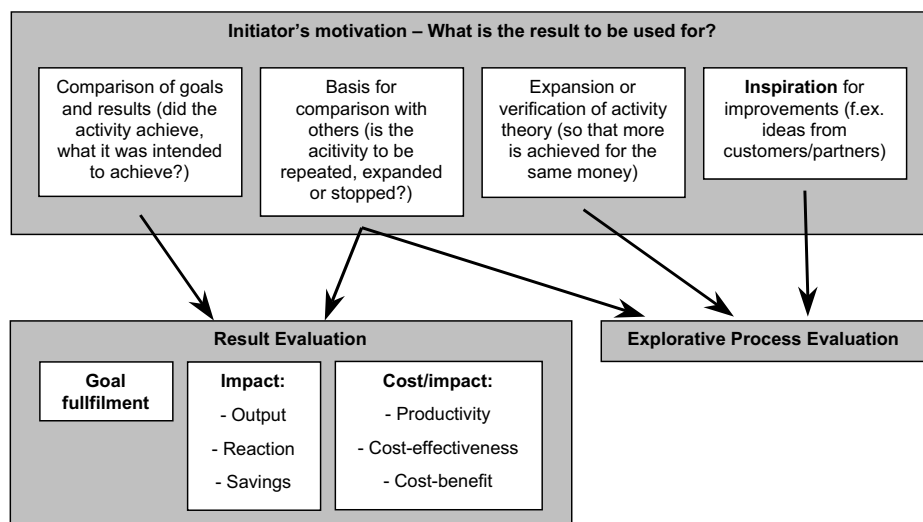


Figure 2. The starting point for the evaluation is the motivation of the initiator of the evaluation.

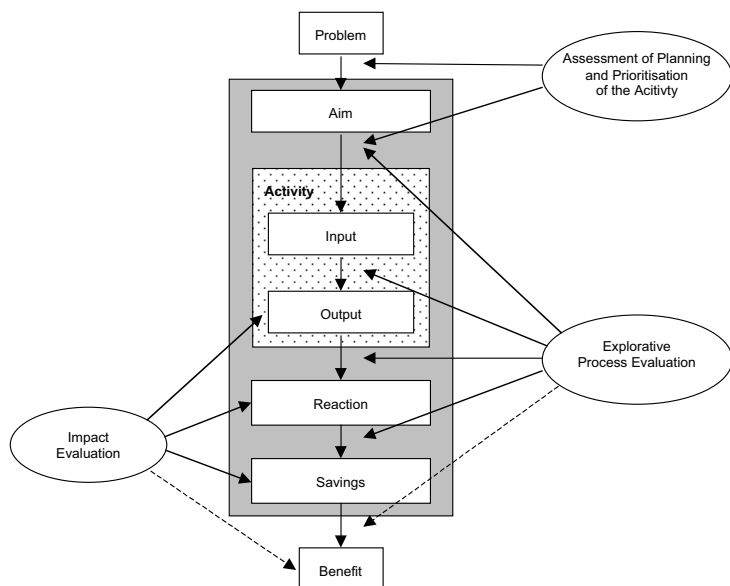


Figure 3. The orientation of the evaluation relative to the object of evaluation.

stead, the users may select those elements, which are particularly relevant to their situation.

The most important evaluation terms are explained in the Toolbox, which also presents how-to-approaches (“tools”) for the individual elements of evaluation. Furthermore, the Toolbox contains references to more in-depth evaluation literature. The individual sections of the Toolbox may be read independently and may be enclosed as part of tender documents.

It is the intention that the handbook should function as a “living document”, i.e. that it will be adjusted and expanded with more examples as experience is gained.

Currently, the handbook contains five examples, together representing all categories of energy saving activity. Energy saving activities have been divided into six categories depending on the level on contact and dialogue with the target group, since this influences the appropriate evaluation strategy. The categories are:

1. General information to promote a change in purchase behaviour (i.e. sales);
2. General information to promote a change in consumption behaviour;
3. Education;
4. Advice to small consumers;
5. Advice to industry and public institutions;
6. Grants (does most often also encompass information and advice).

The examples present ways to approach evaluation of an activity given a specific purpose for the evaluation, the choice of ambition level (see next section), and the constraints on time and budget. Each example also touches on the issue of what competences are needed and whether external evaluators are required (assuming that external evaluators are more neutral to the outcome). The examples briefly outline the relevant evaluation questions, the choice of evaluation design and methods for data collection, the cost elements of the evaluation, and the choice of analysis methods. They also suggest likely evaluation results but the focus remains on the structure of the evaluation.

Ambition Levels A, B and C

The direction of the evaluation is determined by the initiator's motivation for initiating the evaluation (see the figure above). The level of detail and the size of the evaluation are determined by initiator's need for accuracy in the evaluation result and the type of activity, which is being evaluated. A

large evaluation effort cannot always be justified. Evaluation expenses must be seen in relation to the value-added of the evaluation result. The handbook therefore proposes three different levels of ambition, A, B and C, for the evaluations depending on the need for accuracy and credibility.

The levels A, B and C do not necessarily reflect a certain level of expense in the evaluation.

Ambition levels are defined for three different orientations of the evaluation effort, namely *impact evaluation*, *explorative process evaluation* and *assessment of the planning and prioritisation of activities* (see Figure 3).

In the majority of impact evaluations of energy efficiency activities an *experiment design* will be the appropriate choice while those concerned with exploring the process will benefit from a *case study design*. The definition of the ABC ambition levels is based on this assumption. The underlying assumption is that 80% of the activities will be sufficiently addressed with this approach.

An overview of the definition of the ABC levels for each orientation is presented in Table 1.

Table 1. Ambition levels.

Level	Impact Evaluation	Explorative Process Evaluation	Planning and Prioritisation Assessment
C	Documentation of input and output . Possibly an investigation of the reaction of the target group to the activity, i.e. the assumed change in the purchase and consumption behaviour of the target group. The assumed change is found by examining the behaviour after the activity and comparing it to the assumed behaviour without the activity.	Identification of examples of barriers and motivators (critical elements). The implementation of the activity is described and its strong and weak points discussed on the basis of a general and simple knowledge of the activity (no field investigations).	Description – Check of whether all work steps have been completed and described in writing.
B	Documentation of input and output. Documentation of the "real" change in the activity environment and especially the target group behaviour (gross-change). The real change can be determined conducting a measurement of the behaviour of the target group before and after the activity. Alternatively it can be determined by measuring the behaviour of the target group and a comparison group after the activity. Possibly an investigation of the energy savings. The savings are expressed in energy units but more assumptions may be made than at level A, for example assumptions about how large energy savings a certain behavioural change causes.	Indication of important barriers and motivators of impact. May be based on the experience and understanding of the planners of the activity and its mode of operation. It is accepted that some important barriers and motivators may be overlooked.	Assessment of the strictness of the logic with focus on the activity – A critical assessment of the logic and whether elements of the work process have been omitted; Identification and collection of knowledge not included in the planning and project documents.
A	Documentation of input and output. Documentation of the real change in the environment and especially the target group behaviour as a direct result of the activity (net-change). In as far as possible both the behaviour of the target group and comparison group before and after the activity is investigated. Documentation of the net energy savings so that is possible to compare the socio-economic cost-effectiveness (and the cost-benefit) with that of other activities.	Documentation of barriers and motivators of impact and their relative importance. It can be said with a high degree of certainty that the most important barriers/motivators have been identified. This is achieved through development of a theory based model of the expected mode of operation of the activity and test of the model. Alternatives to the applied individual elements of the activity are discussed.	Assessment of correctness and contextual relevance of the activity – A critical assessment of cogency and whether elements of the work process have been omitted; Identification and collection of knowledge not included in the planning and project documents; Investigation of possible alternative choices and influences of other activities and mechanisms.

For impact evaluations the main difference between the three levels is how the baseline development is addressed. On level C focus is on input and output, i.e. the parameters within the control of the activity planner. At level B the gross change in target group behaviour is in focus while at level A an attempt is made to establish the net change in behaviour as well as the resulting energy savings.

The main difference for explorative process evaluations between the three levels is in the amount of data to be collected. At the lower level C a few cases are investigated with the aim to identify some strong and weak points. At level B more details are collected on each case and the number of cases may also be larger. A more complete understanding of the mode of operation of the activity is sought. At level A, the understanding of the activity is shaped into a theory (i.e. programme theory) and the theory is tested and the relative importance of the different barriers and motivators determined. As much as 10-20 cases may be investigated in detail at this level.

The difference in ambition level for assessment of the planning and prioritisation of the activities is characterised by the sources of information used and the level of detail. At level C only the written documents of the planning process are considered while on level A additional internal and external sources of information are consulted and the context in which the activity will operate is taken into account.