# Alleviation of Poverty Through the Provision of Local Energy Services

# APPLES

## Project no. EIE-04-168

## Deliverable No. 6:

## General monitoring and evaluation outline

**November 2007**

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## Abstract

The present report is deliverable no. 6 of the COOPENER project 'Alleviation of Poverty through the Provision of local Energy Services(APPLES)' and covers Work Package 7. The APPLES project commenced on 1 June 2005 and is implemented by ECN, The Netherlands, University of Oxford, UK, Risoe National Laboratory, Denmark, Parallax South Africa and the Energy Research Centre of the University of Cape Town.

In course of the COOPENER project Development and Energy in Africa (DEA), the European partners in the APPLES project, ECN and UNEP Risoe, developed and applied an assessment procedure for development impacts of energy interventions, in collaboration with six African project partners. This document draws heavily on the guideline compiled for that assessment procedure.

The intention of APPLES WP7 has been to monitor and evaluate the impacts of the APPLES project, both successes and short-comings. In general, the practical aspects of the DEA impact assessment approach can be summarized as:

- Develop indicators that allow an evaluation of the extent to which the desired impacts of APPLES has been achieved.
- Establish the baseline values of those indicators
- Evaluate the projects impacts based on the changes in the indicator values at the conclusion of the project.

A first step in that procedure is to identify and associate indicators with each of the energy intervention's "elements", that is with the "inputs" (into the energy intervention), "outputs", "outcomes" and "impacts". (In terms of distance from the causal trigger mechanism – inputs – each of the latter three elements are found further away as well as subject to increasing influence from time and outside factors.) Given the considerably reduced life span of the APPLES project, it is highly questionable whether any of its outcomes or impacts can be detected before the conclusion of the project. Quite naturally, this situation has implications for how best to utilize the project's M&E resources. This document proceeds to outline the general considerations that go into the design of our M&E work package, to highlight the need for location specific evaluation plans, and discuss what is feasible given the constraints to the project.

The APPLES project is supported by the Intelligent Energy Europe programme of the European Commission.

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# 1. Introduction

In course of the COOPENER project Development and Energy in Africa (DEA), the European partners in the APPLES project, ECN and UNEP Risoe, developed and applied an assessment procedure for development impacts of energy interventions, in collaboration with six African project partners.[1] This document draws heavily on the guideline compiled for that assessment procedure.[2]

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# 2. Initial considerations in project evaluation

According to DAC-OECD (2002), *project evaluation* is defined as "the systematic and objective *assessment* of an on-going or completed project, programme or policy, its design, implementation and results". The aim of an evaluation is to "determine the relevance and fulfilments of objectives, development efficiency, effectiveness, impact and sustainability". The information provided from an evaluation should be credible, useful and enable the incorporation of lessons learnt into decision–making processes. Furthermore, *assessment* and *monitoring* should be distinguished by the impact *assessment's* wider focus and once-off data collection occasion, while impact *monitoring* (IM) has a narrower focus and involves repeated collection of smaller amounts of data. In the latter case, data collection may be integrated into other routine field staff activities. In terms of providing sufficient information about sustainable impacts, an occasional "snapshot" obtained from IA is, hardly ever sufficient. IM, on the other hand, provides convenient, continuous information which can improve learning and understanding as well as ultimately, if properly designed, ensure that impacts are also managed, not just assessed (Simanovitz, 2001).

[1] The framework was developed in close cooperation also with an international group of experts assembled by the Global Village Energy Partnership, see GVEP(2006).

[2] The guideline is downloadable from http://deafrica.net

It is furthermore useful to conceive of a project evaluation exercise as undertaken in two stages; a design stage and an implantation stage. The design components of the study would encompass a conceptual framework, a research plan for the implementation stage and the selection of data collection methods. The implementation involves the actual collection of data, the analysis and drawing of conclusions from the data and, finally, the dissemination of results to stakeholders. The central factors that affect the general design of an evaluation study are therefore:

- The study’s objectives; its content and type of information compiled for a specific audience and purpose.
- The model of the intervention and its impacts.
- The data collection methods selected with consideration of the above and of the:
  - Cost and financial resources at hand.
  - Human resources available and respondents’ characteristics, motivation and representation.
  - Ambitions with respect to influencing policy and future practice.

The above considerations in turn translate into the DEA assessment procedure’s ten steps:

Design stage

1. Identify project stakeholders and their evaluation needs.
2. Define/delimit the intervention and your focus on the intervention.
3. Illustrate the project and model its conceivable impacts
4. Choose indicators for each element of the results chain.
5. Specify the appropriate data collection methods for each link.
6. Construct a research plan and present it for discussion withstakeholders.

Implementation stage

7. Collect data.
8. Analyze the data.
9. Draw conclusions and write report.
10. Present the results to stakeholders.

In light of the special constraints that apply to the APPLES project, we are however confined to commence the process, on the previous page, from behind by first considering feasible approaches to the M&E implementation stage. In the next section, typified approaches are presented in the context of the fundamental conceptual framework of evaluation studies and the circumstances specific to energy interventions.

# 3. Evaluating energy interventions – special circumstances, the basic framework, and typified approaches

At the core of an evaluation of project impacts lies the attribution of specific effects to specific causes, where the causes originate in the intervention and its results are the effects. The three approaches discussed below differ in the kinds of data collection methods used, the implied reliability of attempts to attribute causality, costs and time needed. The approaches all applied to empirically assess inferences from the same, basic conceptual framework introduced below. The framework should be perceived in the specific context of evaluating energy interventions, some aspects of which are first reviewed.

## 3.1 Evaluating impacts from energy interventions

The APPLES project aims to provide or facilitate access to local energy services for the alleviation of poverty. Hence, the impacts of interest would materialize on the user side (where poverty would be found). The user-side of energy services in developing countries, however, is complex and characterised by a high degree of diversity. The diversity originates in varying availabilities and costs of energy from various sources and manifests itself not only in differing end-uses, but also in differing mixes and levels of fuels consumption for similar purposes. Households would also differ in their abilities and willingness to invest in new technologies, as well as in energy-related preferences, traditions and behaviours. Consequently, energy demand (and supply) patterns are often specific to regions, districts, settlements within districts, and to users within settlements. Energy impacts on poverty and livelihoods must thus be considered within this total context (Leach and Gowen (1987), Hulme (2000)).

Furthermore, the identification and attribution of impacts of energy projects present a number of significant challenges as compared to projects in sectors such as water agriculture, health or education. If one accepts a wider view of poverty that extends beyond mere monetary income or expenditures levels, one must consider the following issues in assessing energy impacts on poverty:

- Energy does not in itself, for example, quench, feed, house, or clothe people. Rather, energy services facilitate and improve the provision of water, food, houses or clothing. Consequently, the hypothetical chain of causality leading from energy to poverty alleviation is often more complex than for other projects.
- Energy services often bring about improvements in many aspects of life. Electricity, for instance, can be applied in activities such as pumping water, refrigeration of vaccines and/or welding of metals. Thus, evaluation of energy projects faces the challenge of measuring improvements in more than one area.
- End-users' choices of energy sources for specific services are subject to many considerations, such as prices, traditions, the sustainability of provision and end user's income. Hence, the attribution of impacts to energy provision requires awareness of the factors that affect choices and how those factors may vary over time.
- The positive impacts of access to energy may often become manifest many years after the project ends. Thus, reliable evaluations for energy interventions would measure impacts beyond the project life cycle. This makes the documentation of conditions at the beginning of the project important, since it provides a both a picture of the baseline from which to measure progress as well as insight into how energy is or would be used among the project's potential beneficiaries.

Hence, any attempt to assess impacts on poverty on several locations requires frameworks that are tailor-made to location-specific circumstances. The complex and varied circumstances that we wish to study requires flexible research methodologies that can be adapted to the specific context at hand.

## 3.2 The basic conceptual framework

Behind virtually all development interventions lies an assumption, that the intervention will affect the behaviour among target "agents" towards an achievement of some objective (such as more efficient agricultural production or improved health statuses). Some agents will have been subject to – or experienced – the intervention in question, while other agents have not. We shall assume that some kind of "variables" exist which can be used to relate the agents to the intended project outcome. Such variables would be key characteristic of the agents, their behaviour, or their circumstances. The objective of impact evaluation is thus to capture difference in the values of those key characteristics, between the outcomes on agents that have experienced the intervention and those that have not. The impact chain is illustrated in Figure 1. I

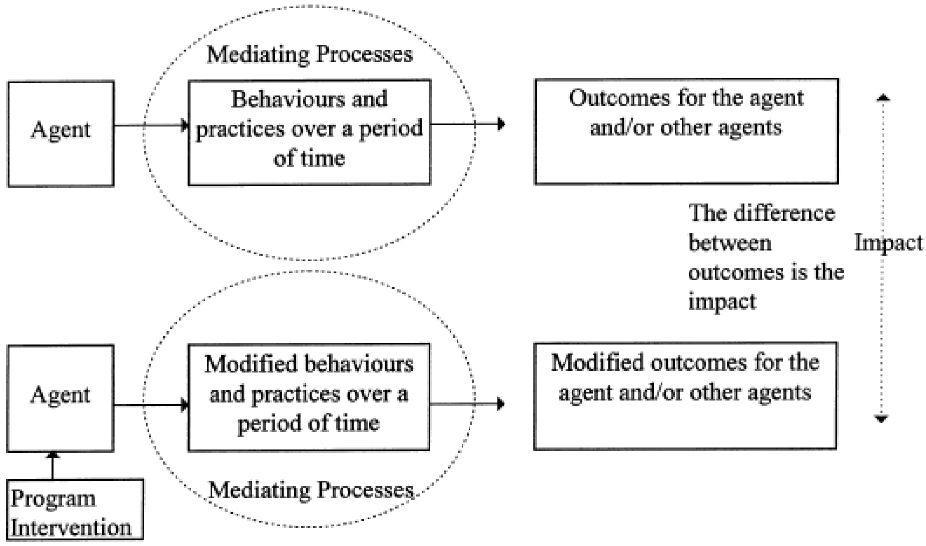


*Figure 1) The impact chain [source Hulme(2000)]*

Many reasons exist to believe that it becomes more difficult to attribute consequences of an intervention to energy factors, the further "downstream" these consequences are found (GTZ (2004)). By definition "downstream" implies greater prospects for influence also from characteristics of the agent and his or her specific economic, physical, social and political context. Hence, other factors enter the arena of causation. In Figure 1 these factors are represented by "mediating processes", the variations in which may affect both agents that experience an intervention and agents who do *not*.

## 3.3 Evaluation approaches

Drawing on Little (1997), Hulme (2000) considers evaluation exercises "as much an art as a science.". The scientific facets of evaluation pertain to standards of measurement, sampling, and analytical technique. With respect to the "art" aspect, there are three dimensions to any given impact assessment exercise:

1. the judgments about its design with respect to resources at hand, objectives and setting
2. the process of arriving at the most appropriate blend of assessment methods
3. the evaluators' insight into the ways in which results may influence policymakers and intervention managers

Quite naturally, all studies whether based on quantitative and/or qualitative methods must pursue rigor. However, the first point in the list above states parameters under which that rigor must pursued. Hulme (2000) proceeds to group methods which are likely to match common clusters of the above parameters into a "simple", a "moderate", and a "complex" approach. A brief review of each group follows.

**A simple approach:** The central methodological feature of this approach is the use of a variety of methods, usually involving a small-scale survey supplemented with information on a comparison group that could be rapidly identified. In the absence of a baseline study, recall methodology would be utilized. The ambition with this approach would be to provide timely information at relatively low cost about programme impacts directed to programme managers and "country-based" donor staff. Reliability is moderate, at best, and the major objective is to evaluate the current understanding of impacts and contribute to improvements in the operation.

**A moderate approach:** The moderate approach involves considerably higher costs and reliability in terms of statistical inference rather than triangulation, with longer delivery time. Focus is both on proving impact and improving programs, with policy-makers and senior programme managers as audience. A significant survey with at least two visits and an adequate control group would constitute the core of the methodological mix. Rapid appraisal techniques, participant observation and case studies would be used for context assessments and crosschecking materials

**A complex approach:** This approach aspires to high levels of reliability with regard to causality attribution and the focus is exclusively on the impact proving orientation, through the application of statistical and econometric data analysis. Delivery time of findings would be twice as long as for the moderate approach, with four to six years after its launch. A very carefully constructed, large-scale sample survey, capturing all key characteristics of the client population, with a rigorously selected control group would constitute the heart of the methodology. The number of households visited would be in the vicinity of one thousand, with at least three visits to each over two years. A set of related studies on institutional performance would be conducted .The budget this kind of approaches would typically exceed a million dollars, with considerable data collection, processing, and analysis costs.

## 3.4 Financial considerations

Drawing on verbal reports, Hulme (2000) provides the following guidelines for study costs. Impact assessments which utilize a scientific ("complex") approach method to prove impact may cost in the range of US$500,000 to US$5 million (presumably in running, year 2000 US$), depending on the number of sites studied. On the other end, high quality, rapid appraisals of impact on individual sites, by qualified investigators can yield useful findings for improvement purposes at costs in the interval between US$5,000 and US$10,000. Some useful points of observation from the author's scan of the microfinance literature are:

- The costs of studies intended to produce authoritative evidence exceed what most agencies can afford and the timescales involved would render results that are historical rather of operational relevance.
- The notion that qualitative and participatory methods are cheap appears somewhat misguided.
- The validity of findings from most studies would be best served by triangulation of sources and the utilization of a mix of survey, qualitative and participatory techniques. Attempts to achieve a representative sample survey on a limited budget are likely to have a negative effect on data quality and sample representativity.
- Project monitoring by programme staff make high-quality impact assessment feasible at moderate costs, since the need for primary data collection is relatively low.

# 4. Implications for M&E of the APPLES project

The APPLES project's remaining life time is eight months and very limited financial resources are available for the Monitoring and Evaluation work package. Hence, the "complex approach" must be ruled out for cost reasons and time will not allow a "moderate approach". Each location of the project should thus be approached with a "simple approach". Furthermore, one of the issues specific to energy interventions is the considerable time it can take for impacts to manifest themselves. It is therefore quite plausible that impacts will only become discernible after the project's lifetime. However, on at least three of the four sites current stakeholders in the APPLES project are likely to remain involved beyond the project's conclusion. With a forward looking perspective, a well justified aspiration for the work package is thus to concentrate resources on the assembly of baseline information, from which the stakeholders can gauge future impacts.

Furthermore, according to the evaluation strand known as “participatory learning and action” (PLA) , an important means of empowering poor communities is to allocate their members a leading position in identifying problems, analysis, and knowledge creation. Provided that local people become enabled to identify their own indicators, establish participatory baselines, monitor change, and evaluate causality, the impact assessments would thus become better. In addition, the intended beneficiaries would be empowered through the research process itself. (Hulme(2000) refers to Mayoux (1997) and Chambers(1997) for evidence, which shows that well-conducted, participatory methods can be more reliable than conventional surveys.) In identifying needs on the various locations, the APPLES teams have already consulted closely with the communities in question. It is therefore a natural ambition to equip community members with the means to assemble and analyse information for future use.

On page 5 of this document we list three considerations that should go into the choice of data collection methods. In terms of those considerations, the costs and financial resources at hand, together with very limited time available, form the foremost constraints to the project’s evaluation. Secondly, rather than relying on the results of the APPLES projects M&E package to influence future practice and policy, we aim to provide a foundation for future evaluation. Thirdly, as a means of jointly addressing human resources available and respondents’ characteristics, we propose build capacity in the target communities to monitor conceivable impacts on the same locations beyond the project’s lifetime.

The remaining considerations for the design of the projects location specific M&E plans – also on page 5 – are to (i) identify the evaluation study’s objective, content and type of information for its specific audience and purpose, and (ii) model the intervention and its impacts. Again, we face a situation where we cannot expect discernable impacts within the project’s life time. In order to provide as suitable as possible baseline information, we aim to consult with stakeholders regarding conceivable future evaluation objectives, content and required information. Finally, it is a futile exercise to provide detailed models of the interventions on the various project sites in terms of inputs, outputs, outcomes and impacts, before the exact inputs and expected outputs of the actions on each site have been identified and agreed upon. Preliminary models and the general modelling approach is therefore found in the Appendix below.

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# Appendix A Modelling interventions for evaluation

When attempting to conceive of causality running from energy to development, the term chain is often convenient to use. Below we will discuss two such chain metaphors. The first, the impact chain, illustrates the aim and fundamental assumptions of IA studies. The other chain, the results chain, is a device for systemizing and disentangling your hypotheses about linkages between energy and development. This chain is used in order to identify separable, observable "links" between factors brought in by (or to) the intervention and eventual, downstream effects on living standards. Below follows first a brief introduction to the elements of the chain. Thereafter follows a results chain for a hypothetical solar home project, followed by preliminary results chains with indicators for each APPLES project site (Due to the political instability in Khayelitsha, project actions on the site are currently put on hold.).

## A.1 The results-chain model

A results chain can be thought of as a set of hypotheses of the linkages between an energy intervention and its possible impacts. The chain makes our assumptions about those linkages explicit. It begins with 'inputs', moving through the other "strategic elements", 'activities' and 'outputs', and culminates in 'outcomes', 'impacts'. (In some agencies, 'feedback' and 'reach' is part of the results chain.) Related to a development intervention, the strategic elements of the results chain are individually defined as:

- *Inputs*: the financial, human, and material resources used.
- *Activities*: actions taken - or work performed for the mobilization of resources - in order to produce specific outputs.
- *Outputs*: resultant products, capital goods and services, as well as resultant changes relevant to the achievement of outcomes.
- *Outcome*: The likely or achieved short-term and medium-term effects of an intervention's outputs. Not a strategic element itself, an effect is a "change intended or unintended due directly or indirectly to an intervention".
- *Impacts*: produced long-term effects that may be positive and/or negative, primary and secondary, direct or indirect, intended or unintended.

The chain can conveniently be visualized with its "strategic elements" as a set of arrows arranged in a direction of causality from left to right. By deconstructing the chain into several levels and gathering proof of the linkages between each level, the plausibility can be assessed of a proposed link between energy interventions and observed social, economic and environmental changes ((GTZ (2004), Hulme (2000), DAC-OECD (2002)).

Outputs, outcomes, and impact are also jointly referred to as *results*, which give rise to the related term results monitoring. Such monitoring signifies "a continuing function that uses systematic collection of data on specified "indicators" to provide […] indications of the extent of progress and achievement of objectives and progress in the use of allocated funds." In Chapter 4 we will discuss the selection of indicators. For our current purposes, the formal definition of an indicator is "a quantitative or qualitative factor or variable that provides a simple and reliable means to (i) measure achievement, (ii) reflect the changes connected to an intervention, or to (iii) help assess the performance of a development actor" (DAC-OECD (2002)). In terms of the impact chain model above, an indicator would be a measurable key characteristic of the agents, their behaviour, or their circumstances, that can be related to the intervention's desired outcome. The operational objective of the assessment is thus to capture differences in indicator values between agents that have experienced the intervention and those that have not.

## A.2 Illustrating a results chain

It is useful to draw a visual diagram of the results chain leading to the expected effects of the intervention. As will be discussed in more detail below and in later sections, projects need not be very complex in order for a given link of the causal chain to give rise to several causal relationships. In addition to the aforementioned four levels, it has been suggest to “activities” - between input and output - which describes what a project does. Another commonly applicable level is the “Use of Outputs” which describes the usage of Outputs by target groups or intermediaries. An example of a simple results chain for a hypothetical solar home system project is illustrated in Figure 2 given for each link.

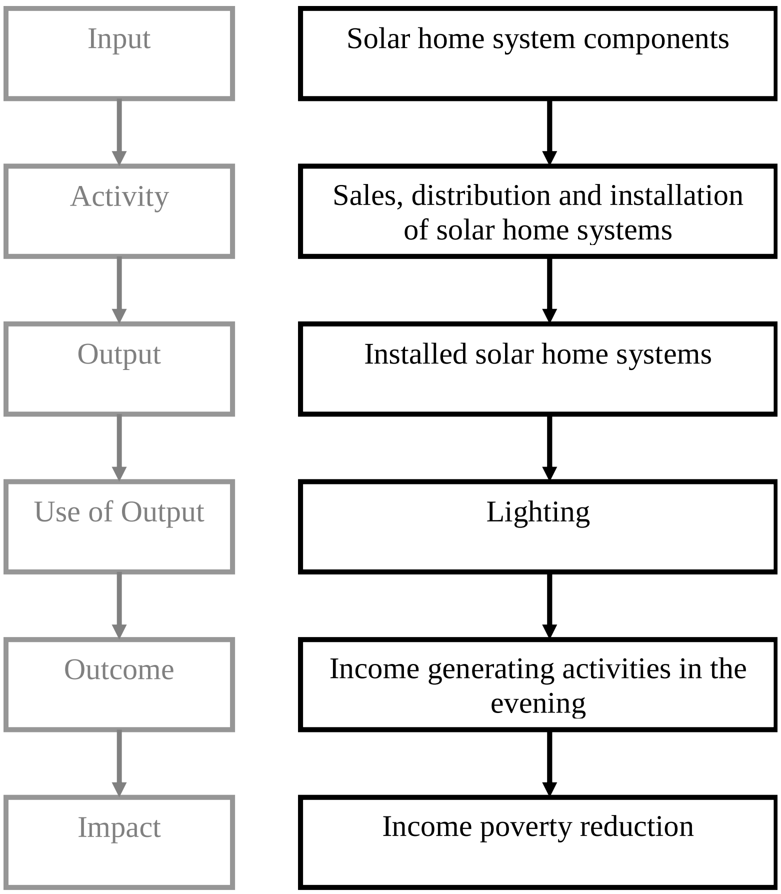


*Figure 2) A simple results chain for a solar home system project*

## A.3 Results chain for cooperative central paraffin purchasing point for spaza shop owners in Highflats

In the Highflats a potential project actions is the establishment of a central paraffin purchasing point for rural ”spaza ”(small, informal) shops. The rationale for the actions is the intention to reduce both the purchase and sales price of paraffin among the shops. The lower price should translate into reduced paraffin expenditures for consumers, generating room for increased purchases of other goods or services. A hypothetical results chain diagram with conceivable indicators is found in Figure 3.

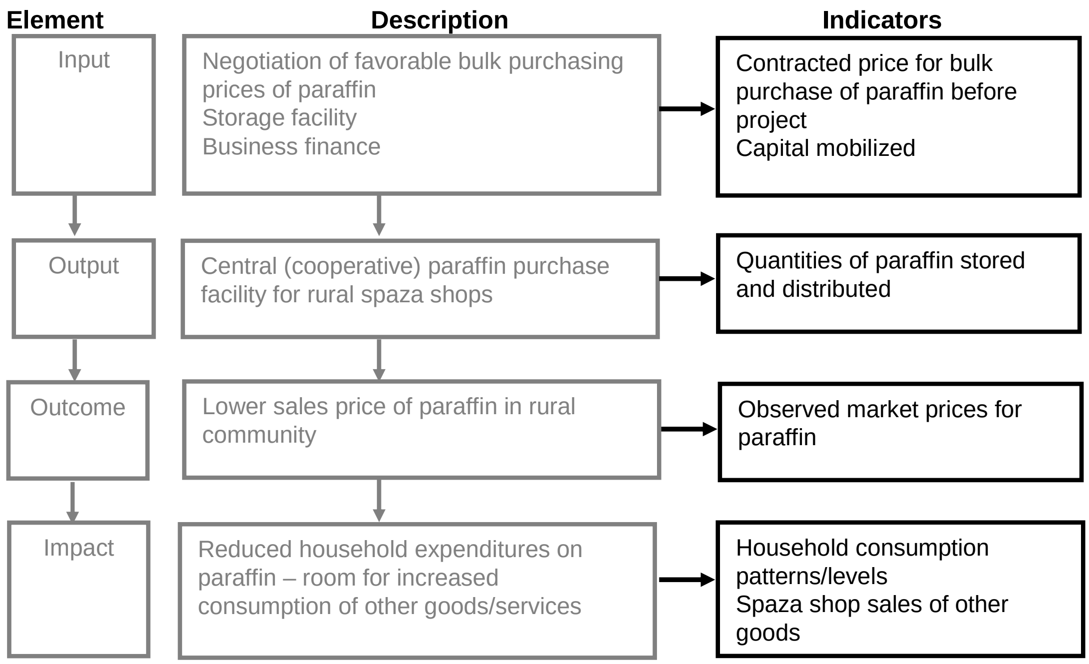


*Figure 3) A simple results chain for a central paraffin purchasing point for small, informal rural shops*

## A.4 Results chain for energy business capacity building project in Lucingweni

In Lucingweni one conceivable project actions is capacity building for energy business projects. The intention is that such business would materialize and become profitable. The rationale would be that the profits generate income for business owners and potential employees. A hypothetical results chain diagram with conceivable indicators is found in Figure 4.

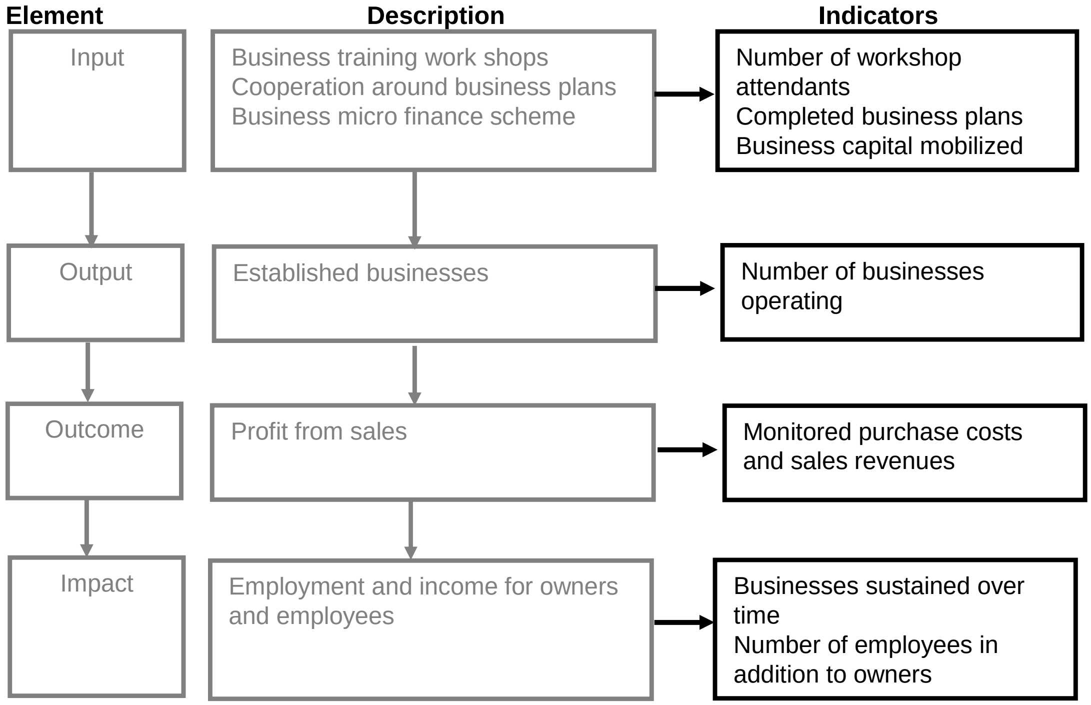


*Figure 4) A simple results chain for a rural energy business training project*

## A.5 Results chain for paraffin stove replacement program in Imizamo Yethu

In Imizamo Yethu the APPLES project may provide capacity building in connection with a paraffin stoves replacement program. (The program provides new, safer and more efficient paraffin stoves.) The intention is to reduce shack fire hazards and reduce paraffin quantities used for cooking. In addition to the generation of a safer environment, household expenditures on paraffin may be reduced. Figure 5 constitutes a hypothetical results chain diagram with conceivable indicators.

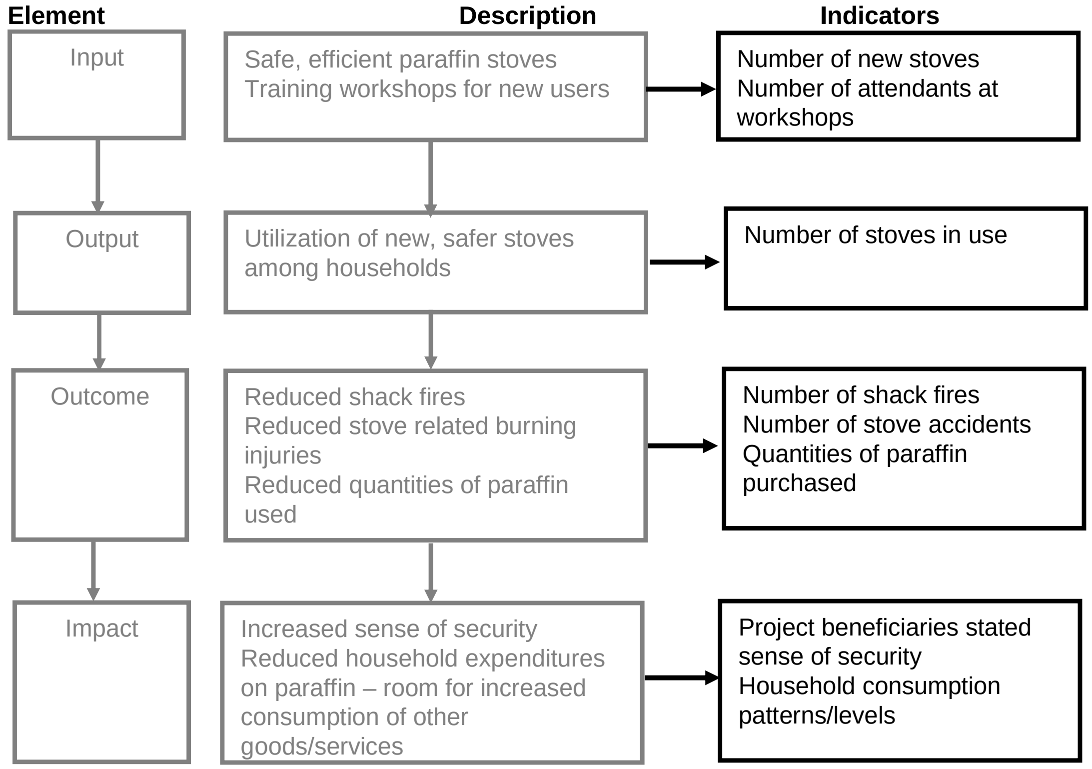


*Figure 5) A simple results chain for a peri-urban paraffin stoves replacement project*