Methodology for reporting conversions to an improved top-down ignition method

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1 Purpose and scope of this document

This document describes a method to monitor the results of projects that promote the adoption of an improved ignition technique for coal fires[1]. Currently no such standard procedure exists for calculation of the impacts of such projects with the result that it is very difficult to compare results of different methods of implementation or to verify the claims made by various parties engaging in such projects. Past suggestions for the standardisation of reporting on such projects (e.g. Pauw and Coetzee (2001)) have never been widely implemented.

The purpose of this document is to describe the requirements for a method of accounting for the effects of such projects in a transparent and accurate manner. A number of different approaches to the promotion of the improved top-down ignition technique has emerged since the first project way implemented by the Nova Institute in 1999. The aim of the methodology is to be applicable to all methods of promoting conversion to the improved ignition technique. This would facilitate better understanding of the impacts of each implementation method and would also enable an objective comparison of the cost-efficiency of each approach.

2 Calculation method

The calculation of the impact of a project to promote the adoption of an improved ignition technique is valid for a certain geographical area and timeframe. It should take into account the situation and trends within that geographic area at the start of the project so as to avoid attributing use of the improved technique present within the project boundary before the start of the project to the project activity. The increase in the number of households that use the improved ignition technique and the resultant savings of time and money by households as well as the reduction in emission of pollutants and greenhouse gasses that can be attributed to the project is the difference between the baseline situation and the post-project situations taking into account baseline trends. These aspects are described in detail in the paragraphs that follow.

[1] Henceforth referred to as *a project, such a project* or *the project*

2.1 Setting the project boundary

When a party claims to be responsible for the conversion of coal users to the improved ignition technique it is based on the assumption that that party has carried out a certain activity or activities (the *project activity*) in a certain place and that the effects of that activity will continue to be discernible for a certain period. The calculation of the impact of a project is thus valid for a specific geographical area and time-frame.

2.1.1 Definition of the project activity

In order to claim that a certain project has resulted in an increase in users of the improved ignition technique, the activity that leads to the change in status quo scenario has to be defined. The party claiming to effect the change in the status quo should show there is a reasonable expectation that the activity will lead to a change in the number of coal users who use the improved ignition technique and that this activity is either owned or controlled by the party. Proof of ownership or operational control of the project activity will establish the party owning or controlling such activity as the *project owner*.

In defining the project activity the project owner should state the way in which contact is made with coal users and the mechanisms used to facilitate change to the improved technique.

2.1.2 Temporal boundary

Project start date The start date of validity of the estimation of increase in users of the improved technique cannot pre-date the start of the project activity within the geographic boundary. The project owner should show at which time the project activity will start to result in the conversion of coal users using the conventional ignition technique to the improved ignition technique. The project owner should further show at what rate this conversions continued throughout the course of the project and what the total number of users of the improved ignition technique was either at the end of the project activity, or (in cases where the activity is still continuing) at the time of reporting.

Example

A project owner implemented a project to demonstrate the improved ignition technique to households in a certain geographical area through the course of a year. It is later established that each coal using household who have converted to the technique saved on average of one bag of coal per month. At the end of the year it is established that 5000 households have converted to the improved ignition technique whereas at the start of project there were no users of the improved technique present in the town. The project owner cannot claim to have facilitated the saving of 5000×12 bags of coal since not all the new users have been using the improved technique for the duration of the year. The correct estimation of coal savings must make account for the rate of conversion throughout the course of the project.

Duration of the validity of an estimation In the same way as there is an initial temporal boundary for the validity of a certain estimation there must also be a final temporal boundary beyond which the estimation of the impact of the project will not be valid unless new data is presented to prove the contrary. The duration of the validity of an estimation will depend on the tempo of change in the demographic and energy use patterns within the project boundary and also on seasonal energy use patterns. Because it is very likely that there will be a seasonal difference in households energy use patterns an estimation of the baseline situation and the project impact should be presented per season. Because the energy use and demographic patterns in developing countries is generally fluid, an estimation of the impact of a project will be valid for one year only.

An *ex post* estimation of the impact of a project can however be done for all years for which reliable data is available

2.1.3 Geographic project boundary

The geographic boundary within which an estimation of the impact of a project is valid is the smaller of the geographic extend of the intended impact of the project activity or of the actual impact of the project activity.

2.2 Baseline and post-project situation and trends

In order to correctly determine the impact of the project the situation within the geographic project boundary before the start of the project activity has to be known. It is also necessary to understand the trends that may influence variables used in the estimation of the project impact.

Initial values for all the variables used in the estimation of the final impact of the project is needed. It is necessary to measure these values in the same units and with the same accuracy as that of the post-project situation in order to facilitate a valid calculation of the project impact.

It is possible that there may be a trend of increasing use of the improved ignition technique within a certain geographic area. In such a case the possibility exists that the change in the number of users of the improved technique that would have happened without the project activity is attributed to the project. To avoid ascribing improvements that would have happened without the project activity to the project, the project owner must present a projection indicating the expected values of the variables used to estimate the project impact at the end of the temporal range of validity in the absence of the project activity. This can be done either by extrapolation of historic trends or by reference to an area similar to the project area located outside the project boundary. If such a reference area is used, the project owner should present evidence on the similarity of the reference area with the project area in terms of the variables used for estimating the project impact.

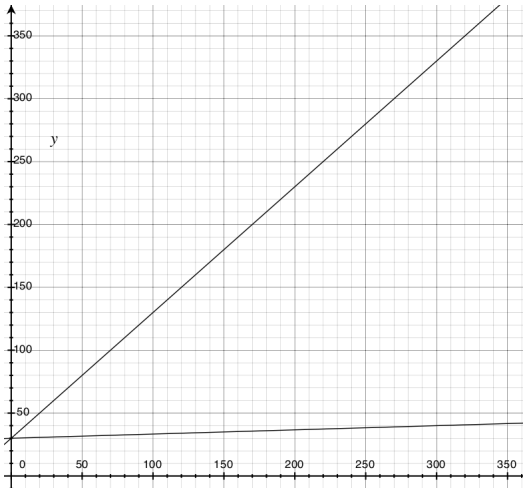
Exactly which variables are reported will depend on what impacts the project owner intends to prove. In all cases the number of households who use the improved ignition technique who are present within the geographic project boundary during the reporting time-frame must be stated both as an absolute number as a percentage of the coal using population.

2.3 Conversions attributable to the project

The conversions to the improved ignition technique attributable to the project is the difference between the baseline situation and the post-implementation situation. To describe the baseline situation, the project owner should state at least the values of variables used in the calculation of the project impact before the start of the project activity and the expected levels of these variables at the end of the validity period in the absence of the project activity. To describe the project scenario, the rate of change of the monitored variables as well as the levels at the end of the reporting period has to be stated.

Example

A project is implemented in an area where there are 30 users of the improved technique (y-axis below) present in the area before the start of the project. A baseline survey has determined that it can be expected that one new user per month is added (bottom line). The expected number of users of the improved technique at the end of the 12 month period (x-axis) is thus 42. When the project starts, an average of one user per day converts to the new technique, giving 365 new users at the end on the period because of the project activity. In total there are 407 users at the end of the period.



3 Sources of information

An estimation of the impact of a project may make use of a variety of information sources. The different categories of information sources that can be used for such an estimation is presented below.

3.1 Official statistics

Official statistics such as data from the census can be used for estimations of the number of households in the project area. The census also contains data on energy use that may be used to describe the historical energy use patterns in the project area and identify trends. The project owner should

take note of the definitions of variables in the census and use and report the data in a way that is consistent with the original definition.

Example

The 2001 national census reports the energy source mainly used for cooking, heating and lighting (Sta 2003). It is important to note that the question allows only one energy source for cooking, one for heating and one for lighting, thus only the *main* source for each. It is thus possible that very likely that there are more households who use a certain energy carrier as a secondary source of cooking, heating or lighting energy than is reported in the census.

Census data is published approximately once per decade which means that care should be taken with the use of such data especially as the period between the present and the census date grows larger. Household surveys are published more often and contain much of the same information as the national census. National trends since the time of the census can be derived by comparing the census with the household surveys.

Municipalities keep record of the formal and informal houses within their municipal boundaries and sometimes undertake studies to determine the number of households in the area. The quality of this information varies between municipalities. Project owners should disclose the source of such information, the date of publication and the assumptions on which calculations are based.

3.2 Survey of households

Any estimation of the impact of a project that promotes the improved ignition technique must include as its main component primary information from households within the project boundary. This information has to come from either a census of all households or a sample of representative households within the project boundary.

3.2.1 Sampling approach

Obtaining primary information from households can be done by of way a survey based on a representative sample of households within the project boundary. The project owner should present a sampling plan that shows

how sampling is done to ensure appropriate representation. After the realisation of the survey, the project owner should show that the sample plan was executed accurately and discuss the effects of deviations that did occur.

The project owner should, either as part of the sample plan or as part of the data analysis, indicate the accuracy and significance level of the sample.

Where the estimation of the number of households within the project boundary is also based on information from the survey the project owner should show that the sampling method provides a suitable basis for such an estimation.

3.2.2 Census approach

It is also possible to obtain primary information from households within the project boundary from a census of all households. This method may be time-consuming or expensive but may be suitable where the survey forms part of outreach activities where each household is visited in any case.

Another approach for cases where the project activity is based on direct interaction between the staff of the project owner and the public, is to keep a complete record of all interactions between households and the project. Such a census of all project participants could yield valid information about project participants but not about the general population and could therefore not be used in isolation.

3.3 Laboratory tests and air quality monitoring

A project owner may wish to quantify the results of the project in terms of the reduction of certain pollutants or in terms of a certain increase in energy efficiency, and may wish to use laboratory tests or air quality monitoring. As is the case of variables from other data sources the project owner has to determine the baseline situation and the situation after the implementation of the project activity.

Using these kind of measurement presents the problem of how to contextualise the measurements. A laboratory test may yield very accurate information on, for example, the heat output of a certain coal burning device ignited using a specific technique but the difficulty remains on how to relate the laboratory results to the actual usage of households. The project owner must prove the applicability of laboratory data to households within the project

boundary preferably by comparison with *ex post* reports by real users. In-use evaluations may be preferable to laboratory tests but the effect of the researcher on the behaviour of the household must be controlled for.

Air quality is influenced by a complex range of factors of which not all are under control of households or of the project owner (e.g. atmospheric conditions). For this reason the project owner should present a model that defines and quantifies as far as possible factors other than domestic coal burning that influence the measurements and present the results within that context.

3.4 Other published data

Where a project owner wishes to make use of published data it should be shown that the data used is indeed relevant to the project. The population described by the data, date of the research, manner of data collection, the expertise and track record of the institution that published the data and the variance in the data itself must all be taken into account in establishing relevance.

3.5 Other data sources

Other sources of data include information from coal merchants and possibly coal mines. Where such information is collected its relevance to the estimation of the impact must be shown. This means that the results must pertain to the geographic project boundary and the reporting time-frame. The relative contribution of the data source to the extent of the phenomenon studied within the total project boundary must be established. For example if price information is obtained from a merchant it must be shown that the price reflects the general price. This may be done by referring to the market share of the merchant or by using well established economic theory on the functioning of prices in markets such as the one present within the project boundary.

4 Variables to be monitored

In this section, the minimum information that has to be monitored to prove the impact of a project to promote conversion to the improved ignition technique is given. A project owner may wish to demonstrate and quantify

a range of economic, environmental and health benefits resulting from the project. Requirements for monitoring such benefits are not given here. In such cases the project owner must demonstrate that the variables monitored are relevant to the conclusions that the project owner intends to draw from the data.

As a minimum it is needed to establish for the baseline and project scenario for the whole geographic and temporal boundary:

- the number of households within the project boundary
- the number of coal users
- the number of users of the improved ignition technique

The source, unit, monitoring frequency and proportion of data to be monitored is given in Table 1.

In order to determine values for these variables in a transparent way it is needed to store additional data about respondents from which data was obtained. This will be discussed below.

4.1 Household identification

It is important to be able to identify individual data sources (i.e. the individual household and respondent from which data was obtained) throughout the calculation process. No interviews that cannot be traced to a household and respondent may be used as these cannot be verified. Where data was obtained from a respondent on more than one occasion or from more than one respondent belonging to the same household, it must be possible to uniquely identify each occasion or member with the respective data obtained.

4.2 Household location

The project owner must demonstrate that the sample or census of households from which data is obtained represent the project boundary in it's geographic and temporal aspects. It is therefore necessary to capture geographic information about each household from which data is obtained in order to demonstrate that the data is relevant to the geographic project boundary.

The same principle is also valid for the temporal project boundary. It should be demonstrated that the data refers to the reporting period by capturing the date at which data was obtained from a respondent.

4.3 Coal use

The project owner should unambiguously determine whether a household uses coal for domestic purposes. It may be needed to capture information about the coal burning device and frequency and format of coal use to verify this determination.

4.4 Ignition technique

The project owner should unambiguously determine which ignition technique is used by a household. Consistency with coal use data must be demonstrated.

4.5 Exposure to the project activity

The project owner must determine the number of households who were exposed to the project activity as well as the extent of the exposure in order to demonstrate that the project is the cause of the conversion from the conventional ignition technique to the improved technique.

5 Applicability

These requirements and guidelines should be adhered to by project owners wishing to make claims about the effect of a project to convert coal users to the improved ignition technique for coal fires.

Table 1: Minimum monitoring variables

ID number	**Data variable**	**Source of data**	**Data unit**	**Measured (m), calculated (c) or estimated (e)**	**Recording frequency**	**Proportion of data to be monitored**	**How will the data be archived? (electronic/ paper)**
1	Total population within project boundary	Survey or official statistics	number	e	every 3 years	Statistically significant sample	electronic
2	Household coal use	Households within the project boundary	number	e	annual	Statistically significant sample at accuracy of <5% at 95% level of significance	electronic
3	Coal ignition technique	Households within the project boundary	number	e	annual	Statistically significant sample at accuracy of <5% at 95% level of significance	electronic

References

C. J. Pauw and J. Coetzee. Tembisa basa njengo magogo retenrion study. Technical report, Business Enterprises at Universit of Pretoria and the Nova Institute for the Depatment of Minerals and Energy, 2001.

Census 2001: Metadata. Statistics South Africa, 2003. URL `http://www.statssa.gov.za/census01/html/households.pdf`.