Introduction and explanation to the benefit matrix

(Excel file "Benefitmatrix")

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Abbreviations

CBA	cost-benefit analysis
CEA	cost-effectiveness analysis
CH_4	methane
cICS	improved charcoal cooking stoves
CO_2	carbon dioxide
EnDEV	Energising Development
EUA	EU allowance
EUR	Euro
ha	hectares
HH	household(s)
ICS	improved cooking stoves (wood-burning stoves)
kg	kilograms
LPG	liquefied petroleum gas
p. a.	per annum
SME	small and medium size enterprises
SI	social infrastructure
t	metric tons

1 Introduction and explanation to the benefit matrix

1.1 Purpose and aim of the benefit matrix

The benefit matrix is a tool for improved stove dissemination projects to quantify the positive results of their intervention in an easy, systematic and comprehensive way. It was designed for projects that disseminate improved firewood and/or charcoal saving stoves used both by households and/or in the SME and SI sector.

The benefit matrix calculates automatically the annual benefits derived from the use of the disseminated improved stoves in natural units and assigns a monetary value to these quantified results, i.e. assesses the economic benefits.

Quantifiable result indicators in natural and monetary units were defined for the main outcomes und impacts of stove dissemination projects. Based on simple formulas, each row of the benefit matrix calculates one result indicator. Each result indicator is a reliable efficiency criterion on its own for the stove dissemination project.
The benefit matrix classified the result indicators by themes (result groups), namely fuel savings, health and environmental impacts as well as income-generating effects.

A spreadsheet was designed for each result group:
1. Results of firewood savings
2. Results of charcoal savings
3. Job creation and income generation
4. Health impacts
5. Environmental regional and global impacts

The spreadsheets are linked and make it possible to deduce quantified benefits from the number of disseminated stoves in use.

The benefit matrix file is linked with economy calculation spreadsheets comprising the CBA, the CEA and efficiency calculations for the households using the improved stove. It provides all base data for these economy calculations, with the exception of the projects costs as well as the costs and life spans of the improved stoves. (The latter data are included in the cost matrix, a separate spreadsheet in the economy calculation file.)

The benefit matrix also provides figures that can be used for the EnDEV monitoring, such as the "total number of people served with access to modern energy for cooking" on household, SME and SI level.

Furthermore, the benefit matrix is a compact data collection that gives a good and quick overview on average values and factors determining the outcomes and impacts of the improved stove dissemination projects.

1.2 Data and information required

The project has to enter the requested data in the white and green cells of the benefit matrix.

The white cells indicate that the base data must be collected by the project. They appear only in the spreadsheets "1. Results of firewood savings" and "2. Results of charcoal savings".

The required data for the SME and SI sector should only be collected and entered in the respective cells if the number of disseminated improved stoves is important, and when the outcomes and impacts derived from them should be included in the economic evaluation of the improved stove dissemination project. It is also possible to open a separate benefit matrix and to enter only the data for the SME and SI sector in this matrix; in this case, the project will only obtain result indicators for the stove dissemination in these two sectors.

The spreadsheet "Results of charcoal savings" only has to be filled out if there is also an improved charcoal stove dissemination project that should be considered in the economic evaluation. The same applies to the cells requesting data for the SME and SI sector.

All the other spreadsheets (3.-5.) comprise only base data that are desirable to have in order to calculate convincing result indicators as well as the economic benefits of the stove dissemination project. It would be nice to have them or to get general estimates for them.

The last column in each spreadsheet ("method of deriving the data, sources, assumptions, remarks") has to be filled out, too. It should be used for a brief description of how the requested data entered were derived, whether they are estimates or calculated average values. The publishing year of the reference source or the investigation period should also be noted here.

A large number of data required are average values. They are arrived at by statistical methods or estimates and should reflect the socio-economic and energy-related conditions observed in most of the households or stove users under consideration. When compiling data, it is generally sound practice to make use of current data.

The average values and data to be filled in the benefit matrix should in particular be based on results of socio-economic, household energy, and health surveys, impact studies or baseline reports as well

as field tests on fuelwood and/or charcoal consumption. Very few data from the forestry administration and/or forest resource management studies are also required.

Statistical documentation from public-sector institutions, statistical offices as well as monitoring reports and other data collections will also be used to derive the requested data. Results of evaluation studies by international, national or non-governmental organizations on energy, health, forestry and stove dissemination projects may also be available.

However, the stove dissemination projects' own estimates and data based on practical experience, to the extent that such can be derived from unpublished studies, systematic observations and a general knowledge of socio-economic and energy-related conditions, will be included as inputs by deriving the data required for the benefit matrix.

The following chapters (2 and 3) present a list of the data that must be collected and a list of the data that would be nice to have. (The commentaries to the corresponding cells in the Excel file "Benefitmatrix" contain notes with a short explanation of how the required data could be obtained.)

Chapter 4 presents the data that are applied as base data in the efficiency calculations for the households using firewood saving stoves.

2 List of data that must be collected

All costs and prices are required in EURO. The exchange rate should be noted.

2.1 For the firewood saving stoves used by the households:

- number of ICS disseminated and replacing a traditional stove (row 1.1)
- percentage of households using two ICS (row 1.4)
- average household size (row 1.4)
- daily amount of firewood per HH using the traditional stove (row 1.5)
- saving rate of the ICS (row 1.5)
- utilization rate of the ICS (row 1.5)
- part of firewood collected (row 1.6)
- amount of firewood collected per hour (row 1.6)
- shadow wage for labour per hour (row 1.6)
- average price of firewood per kg (row 1.7)
- total population of the regions concerned (row 1.14)
- percentage of HH not using firewood for cooking in the region concerned (row1.14)

2.2 For the charcoal saving stoves used by the households:

- number of cICS disseminated and replacing a traditional stove (row 2.1)
- percentage of households using two cICS (row 2.4)
- average household size (row 2.4)
- daily amount of firewood per HH using the traditional stove (row 2.5)
- saving rate of thec ICS (row 2.5)
- utilization rate of the cICS (row 2.5)
- average price of charcoal per kg (row 2.6)
- average amount of firewood needed to produce one t of charcoal (row 2.11)

3 List of data that would be nice to have

All costs and prices are required in EURO. The exchange rate should be noted.

3.1 For the firewood saving stoves used by the households:

Job creation and income generation:
- number of ICS used for additional commercial issues (row 3.1)
- average income generated through commercial ICS use per stove and month (row 3.1)
- firewood consumed through additional commercial use of ICS per stove p.a. in kg (row 3.1)
- income in stove business per stove producer and month (row 3.3)
- number of individual stove producers operating (row 3.3)
- number of production centres operating (row 3.3)
- number of producers per production centre (row 3.3)
- time saved in cooking per HH/day, considering additional time needed for maintenance of ICS and improved HH techniques (row 3.4)
- reduced cooking time, i.e. being in the kitchen, near stove; this period is longer than the time period "time saved in cooking per HH/day" (row 3.4)

Health impacts:
- specific reduction of CO when using ICS (not yet specified) (row 4.1)
- specific reduction of PM 2.5 when using ICS (not yet specified) (row 4.1)
- specific reduction of PM 10.0 when using ICS (not yet specified) (row 4.1)
- number of burns caused by using the traditional stove p.a. (row 4.2)
- number of burns caused by using the ICS (row 4.2)
- percentage of HH with injuries due to collecting firewood (row 4.2)
- reduction of the frequency of firewood collection trips (row 4.2)

- percentage of HH with members suffering from acute respiratory diseases when using the traditional stove (row 4.3)
- percentage of HH with members suffering from respiratory diseases when using ICS (row 4.3)
- percentage of HH with members suffering from eye diseases when using the traditional stove (row 4.4)
- percentage of HH with members suffering from eye diseases when using ICS (row 4.4)
- hours lost due to burns per HH (row 4.5)
- hours lost due to acute respiratory diseases per HH (row 4.5)
- hours lost due to eye diseases per HH) (row 4.5)
- EURO spent on health per HH and year when using the traditional stove (row 4.6)
- EURO spent on health per household and year when using ICS (row 4.6)
- percentage of HH not able to pay for health care) (row 4.6)
- EURO spent by the health system per HH and year when using the traditional stove (row 4.7)
- EURO spent by the health system per HH and year when using ICS (row 4.7)
- percentage of HH treated by public health centers (row 4.7)

Environmental regional and global impacts:
- local market price of LPG per kg (row 5.2)

(to be determined by the GTZ head office:)
- price of EUA per one ton CO_2 (row 5.7)

Forestry data:
- average stock density per ha of forest cover (row 5.1)
- average wood weight per solid cubic metre (row 5.1)
- regional afforestation costs per 1 kg firewood (row 5.3)
- percentage of firewood consumption coming from the felling of forest cover – in the region concerned (row 5.4)
- annual felling of forest cover in the region concerned in ha (row 5.5)

Agricultural data:
- kg fuelwood of woodland reserves protecting 1 ha of farmland (row 5.6)
- increase in agricultural output by better protection in per cent (row 5.6)
- average annual income from agricultural production per ha (row 5.6)
- percentage of fuelwood savings resulting in benefits due to higher soil fertility (row 5.6)

3.2 For the charcoal saving stoves used by the households:

Job creation and income generation:
- number of cICS used for additional commercial issues (row 3.1)
- average income generated through commercial cICS use per stove and month (row 3.1)

- firewood consumed through additional commercial use of cICS per stove p.a. in kg (row 3.1)

3.3 For the firewood saving stoves used by SME:

- number of ICS disseminated in the respective years and used by SME (row 1.2)
- average annual fuelwood consumption by using one traditional stove per SME (row 1.8)
- saving rate of the ICS for SME (row 1.8)
- number of SME using ICS (row 1.8)
- number of people served by one SME (row 1.8)
- average fuelwood price for SME per kg (row 1.10)

Job creation and income generation:
- number of ICS used for additional commercial issues (row 3.2)
- average income generated through commercial ICS use per stove and month (row 3.2)
- firewood consumed through additional commercial use of ICS per stove p.a. in kg (row 3.2)

3.4 For the charcoal saving stove used by SME:

- number of cICS disseminated in the respective years and used by SME (row .2.2)
- average annual charcoal consumption by using one traditional stove per SME (row 2.7)
- saving rate of the cICS for SME (row 2.7)
- number of SME using cICS (row 2.7)
- number of people served by one SME (row 2.7)
- average charcoal price for SME per kg (row 2.9)
- average amount of firewood needed to produce one t of charcoal (row 2.11)

Job creation and income generation:
- number of cICS used for additional commercial issues (row 3.2)
- average income generated through commercial cICS use per stove and month (row 3.2)
- firewood consumed through additional commercial use of cICS per stove p.a. in kg (row 3.2)

3.5 For the firewood saving stoves used by SI:

- number of ICS disseminated in the respective years and used by SI (row 1.3)
- average annual fuelwood consumption by using one traditional stove per SI (row 1.9)
- saving rate of the ICS for SI (row 1.9)
- number of SI using ICS (row 1.9)
- number of people served by one SI (row 1.9)
- average fuelwood price for SI per kg (row 1.10)

3.6 For the charcoal saving stove used by SI:

- number of cICS disseminated in the respective years and used by SI (row .2.3)
- average annual charcoal consumption by using one traditional stove per SI (row 2.8)
- saving rate of the cICS for SI (row 2.8)
- number of SI using cICS (row 2.8)
- number of people served by one SI (row 2.8)
- average charcoal price for SI per kg (row 2.9)
- average amount of firewood needed to produce one t of charcoal (row 2.11)

4 List of data that are applied as base data in the efficiency calculations for the households using firewood saving stoves

All base data applied in the efficiency calculations for the households using firewood saving stoves, and coming from the benefit matrix are only a part of the data that must be collected (see Chapter 2.1). They are enumerated in the following:

- daily amount of firewood per HH using the traditional stove
- saving rate of the ICS
- daily amount of firewood per HH using the ICS
- amount of firewood collected per hour
- shadow wage for labour per hour
- average price of firewood per kg

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