**PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Moldova Energy conservation and greenhouse gases emissions reduction
Version number of the PDD	7
Completion date of the PDD	07/04/2014
Project participant(s)	Carbon Finance Unit Moldova; International Bank for Reconstruction and Development (IBRD) as the Trustee of the Community Development Carbon Fund; (Listed under Bilateral and Multilateral Funds)Denmark: Aalborg Portland A/S; Danish Ministry of Climate, Energy and Building/Danish Energy Agency; DONG Naturgas A/S; Maersk Olie og Gas AS; Nordjysk Elhandel A/S; Austria: Kommunalkredit Public Consulting GmbH; Belgium: Brussels – Capital Region; Kingdom of Belgium – Walloon Region Ministry of the Environment; Netherlands: Netherlands' Ministry of Infrastructure and the Environment (IenM); EDP – Energias de Portugal, S.A.; Japan: FUJIFILM Corporation; Idemitsu Kosan Co., Ltd.; JX Nippon Oil & Energy Corporation; The Okinawa Electric Power Co., Inc.; Daiwa Securities Co. Ltd.; Spain: Endesa Generacion, S.A.; Gas Natural SDG, S.A.; Hidroelectrica del Cantabrico, S.A.; Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; Sweden: Goteborg Energi AB; Luxembourg: Government of Luxembourg - Ministry of the Environment; Finland: Ruukki Metals Oy; Norway: Statkraft Carbon Invest AS; Statoil ASA; Switzerland: Schweizerische Ruckversicherungsgesellschafts AG (Swiss RE); Italy: Italy - Ministry for the Environment, Land and Sea; Germany: KfW; BASF SE
Host Party(ies)	Republic of Moldova
Sectoral scope(s) and selected methodology(ies)	1 : Energy industries (renewable - / non renewable sources) 3 : Energy demand AMS-II.E. ver. 6 - Energy efficiency and fuel switching measures for buildings AMS-III.B. ver. 6 - Switching fossil fuels
Estimated amount of annual average GHG emission reductions	6,115

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Purpose of the project activities

This Moldovan project aims at GHG emission reduction as result of efficiency improvements and fuel switching measures for a series of public buildings (kindergartens, schools, vocational schools, hospitals, policlinics etc.) implemented via the WB Moldova Energy II Project.

The anthropogenic greenhouse gas (GHG) emission reductions in this project are to be achieved as a result of

- fuel switching from existing fossil fuels (coal, wood and mazut) to a cleaner fuel option (natural gas) and
- implementation of energy conservation measures in buildings (additional insulation of building envelops, windows and doors replacement).

Here, the supply side measures prevail over the demand side ones in terms of energy savings and emissions reduction contribution. Since building's retrofit measures yield to an insignificant ER, in the Moldovan project the emissions reduction effect produced by energy savings in buildings is neglected.

The total expected average annual GHG emissions reductions over the crediting period is about 6,115 tonnes of CO_2 per year.

In the absence of project activity, predominantly due to availability and price the operator would continue to use coal, wood and mazut as there are no national/sectoral policies that would require use of natural gas or other cleaner fuels. Also there are no policies that would give incentives to switch to cleaner fuels and without CDM the project would not have attracted investments.

Project background

This project has a special feature being completely based on the Heat supply and efficiency improvements component of the World Bank Moldova Energy-II Project , which nowadays is under implementation in the Republic of Moldova. The project refers to energy conservation measures in public buildings and consequently to GHG emission reduction.

According to the WB Moldova Energy II Project Implementation Plan, the heating component is to be implemented in three phases:

1) the first phase encompassed the already identified and appraised 20 public buildings, including the pilot project in municipality of Ungheni. A part of the investments (about US $700000) have been used due to the Project Preparation Funds provided by the World Bank. That Pilot Activity already implemented in Ungheni, included installation of 4 heating plants, connection pipes and individual heating substations for 3 kindergartens and a medical school. The capacity of the heating plants allows the connection of the neighboring residential buildings to the heating sources;

2) the second phase is being prepared (identified and appraised) with the assistance of the Swedish and local consultants; and

3) the third phase will be identified and appraised within 18-24 months from the start of the project (the end of 2005).

The WB Energy II Project investment decisions refer to least cost technical solutions, which have to satisfy the required heating standards at minimum costs.

Project activities contribution to sustainable development

The project shows the evident contribution to sustainable development. It is designed to address rehabilitation and upgrade of the deteriorated heating systems of public buildings. As the result of its implementation the project would provide a series of benefits that would address social issues.

The main benefits of the project will include:

(a) reducing fuel consumption through energy efficiency measures;

(b) decreasing payment burden for consumed energy resources;

(c) increasing of heating service quality;

(d) reducing the amount of GHG emissions and other pollutants.

Besides it, the project will increase the living and activity conditions within the considered public buildings:

- the room heating temperature;
- the duration of heating period;
- the heated areas;
- it will make available and affordable hot water in such buildings like hospitals and policlinics, schools and orphanages etc.

A.2. Location of project activity
A.2.1. Host Party(ies)
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Republic of Moldova

A.2.2. Region/State/Province etc.
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Rayons (First-tier Administrative Divisions) of Cantemir, Falesti, Floresti, Ialoveni, Leova, Nisporeni, Straseni, Ungheni

A.2.3. City/Town/Community etc.
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8 municipalities - Cantemir, Falesti, Floresti, Ialoveni, Leova, Nisporeni, Straseni, Ungheni

A.2.4. Physical/ Geographical location
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According to the project scenario, those 25 public buildings considered in the project, being part of 19 project activities (PA), activities which are independent, stand-alone, and spread out all over the country, are to be supplied from the sources of local heating systems. All PAs sources will be located either in the mentioned buildings or in the neighborhood of the group of considered public buildings.
Table 1. The list of public entities involved in the project activities and their locations

PA No.	Public facilities	PA address
PA1	Romanian school	10 Trandafirilor Str., Cantemir, Republic of Moldova
	Kindergarten nr.3	16 Basarabia Str., Cantemir, Republic of Moldova
PA2	Russian school	2 Mihai Eminescu Str., Cantemir, Republic of Moldova
	Kindergarten nr.1	8 Gagarin Str., Cantemir, Republic of Moldova
PA3	Gymnasium No.5	79 Ștefan cel Mare Str., Falesti, Republic of Moldova
PA4	Kindergarten No.5	23 Moldovei Str., Falesti, Republic of Moldova
	Library	7 Moldovei Str., Falesti, Republic of Moldova
	Center of arts	5 Moldovei Str., Falesti, Republic of Moldova

PA5	Kindergarten No.10	2 Bălţului Str., Falesti, Republic of Moldova
PA6	District hospital + CFD	7 Ştefan cel Mare Str., Falesti, Republic of Moldova
PA8	Cultural center	1 Speranţei Str., Floresti, Republic of Moldova
	City Museum	1 Speranţei Str., Floresti, Republic of Moldova
PA9	Center of arts	3 Libertăţii Str., Floresti, Republic of Moldova
PA10	Musical school	37 Mihai Eminescu Str., Straseni, Republic of Moldova
PA11	School nr.1	187 Mihai Eminescu Str., Straseni, Republic of Moldova
PA12	Kindergarten nr.1	1 Mihai Eminescu Str., Straseni, Republic of Moldova
PA17	District hospital	7 Alexandru cel Bun Str., Ialoveni, Republic of Moldova
PA18	District hospital	5 Toma Ciorbă Str., Nisporeni, Republic of Moldova
PA19	Lev Tolstoi lyceum	54 Stefan cel Mare Str., Leova, Republic of Moldova
PA20	District hospital	63 Stefan cel Mare Str., Leova, Republic of Moldova
PA24	Kindergarten nr.3 + Residential	9A Bernardazzi Str., Ungheni, Republic of Moldova
PA25	Kindergarten nr.4 + Residential	15A Boico Str., Ungheni, Republic of Moldova
PA26	Medical college + Residential	6 Vasile Lupu Str., Ungheni, Republic of Moldova
PA27	Kindergarten nr.2+School	161A Ştefan cel Mare Str., Ungheni, Republic of Moldova

A.3. Technologies and/or measures

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Technology to be employed by project activities

Most of public buildings included in the project are presently supplied with heat and hot water from physically old, technologically outdated boilers via an extremely deteriorated heat distribution network with a high level of losses, having an overall system efficiency less than 50%. The new technologies to be employed by project activities are aimed to increase the overall efficiency of the systems up to 90% and simultaneously considerably reduce the GHG emissions, by implementing energy efficiency and fuel switching measures at a single building or group of buildings. The state-of-the-art technologies will either replace the existing equipment or will be installed in new facilities. According to the project, Moldova will import most modern heat production equipment and materials.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Moldova (host country)	Carbon Finance Unit Moldova	No
Netherlands	International Bank for Reconstruction and Development (IBRD) as the Trustee of the Community Development Carbon Fund	Yes
Denmark	Aalborg Portland A/S	Yes
Denmark	Danish Ministry of Climate, Energy and Building/Danish Energy Agency	Yes

Denmark	DONG Naturgas A/S	Yes
Denmark	Maersk Olie og Gas AS	Yes
Denmark	Nordjysk Elhandel A/S	Yes
Austria	Kommunalkredit Public Consulting GmbH	Yes
Belgium	Brussels – Capital Region	Yes
Belgium	Kingdom of Belgium - Walloon Region Ministry of the Environment	Yes
Netherlands	Netherlands' Ministry of Infrastructure and the Environment (IenM)	Yes
Netherlands	EDP – Energias de Portugal, S.A.	Yes
Japan	FUJIFILM Corporation	No
Japan	Idemitsu Kosan Co., Ltd.	No
Japan	JX Nippon Oil & Energy Corporation	No
Japan	The Okinawa Electric Power Co., Inc.	No
Japan	Daiwa Securities Capital Markets Co. Ltd.	No
Spain	Endesa Generacion, S.A.	Yes
Spain	Gas Natural SDG, S.A.	Yes
Spain	Hidroelectrica del Cantabrico, S.A.	Yes
Spain	Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness	Yes
Sweden	Göteborg Energi AB	No
Luxembourg	Government of Luxembourg - Ministry of the Environment	Yes
Finland	Ruukki Metals Oy	No
Norway	Statkraft Carbon Invest AS	No
Norway	Statoil ASA	No
Switzerland	Schweizerische Rückversicherungsgesellschafts AG (Swiss RE)	No
Italy	Government of Italy - Ministry for the Environment, Land and Sea	Yes
Germany	KfW	No
Germany	BASF SE	No

In accordance with the use of the term *project participant* in the CDM M&P, a project participant is (a) a Party involved, and/or (b) a private and/or public entity authorized by a Party to participate in a CDM

project activity.

- ***Project-manager*** - the Carbon Finance Unit.
- ***PA-owner*** - the beneficiary of the World Bank Moldova Energy-II Project that nowadays is under implementation in the Republic of Moldova.
- ***PA-operator*** - the person legally designated by the PA-owner, responsible for PA local heating system operation and maintenance.
- ***Project monitor*** - the person designated by the Carbon Finance Unit, responsible for data collection, archiving and reporting.

Each out of 19 projects activities is represented by an owner, which is either the central Ministry of Education (in case of schools and orphanages) or Ministry of Health (in case of hospitals), or the municipality/local authorities (in case of public buildings), all referred as PA-owners. Taking into consideration the similarity of energy conservation measures implemented and transaction cost reduction for all considered PAs and the use of CDM *project participant* term[1], a Carbon Finance Unit (CFU) was created under the Ministry of Ecology and Natural Resources, for promoting the whole project (fig. 1). CFU has the status of an independent legal entity and is empowered to enter into the Emission Reduction Purchase Agreement (ERPA).

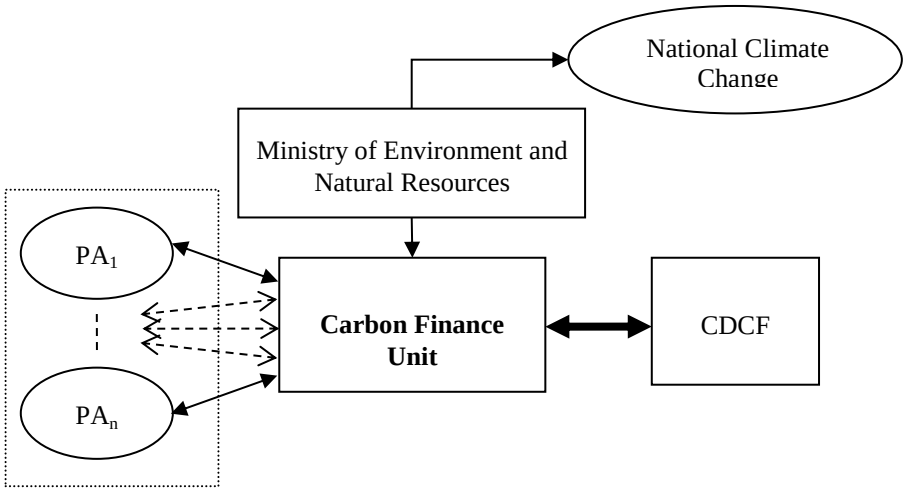

Figure 1. Principle of project bundling

The CFU will serve as the CDCF counterpart and provide support for the implementation. In this respect, the CFU will have the following main duties: (a) on behalf of the PAs negotiate with the CDCF the Emission Reduction Purchase Agreements (ERPA) and sign them; (b) sign the subsidiary agreement with PAs (Emissions Reduction Owners (EROs) for each of the CDCF Projects), that stipulates the CFU and PAs rights and responsibilities; (c) receive the carbon payments from the CDCF and transfer this money to the PAs, pro rata, according their actual ERs; and, (d) be responsible for the projects Monitoring Plans. CFU will as well provide technical assistance for institutional and human capacity building in the area of

[1] CDM Glossary

Kyoto Protocol and CDM activities, as well as the financial assistance to the potential project beneficiaries. CFU serves as counterpart for other CDCF projects in the country.

A.5. Public funding of project activity

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The project will be financed through the IDA credit. The total Energy II project financing will be US$ 39.93 million, of which US$35 million would be financed from the IDA credit, US$4.33 million from internal cash generation and municipal contributions and US$0.6 million from the Swedish International Development Agency (SIDA). The project has several components, including the heating component, for which only US $ 9.16 will be allocated. The Ministry of Finance would on lend the relevant portions of the IDA credit financing improvements in heating of public buildings to the municipalities participating in the project, either through direct loans with a guarantee from the local rayons, or through a loan to the rayons which would then be on-lent to the municipality. Because of the limited financial capacity of the municipalities, and the significant social impacts of the proposed investments, the Ministry of Finance would pass most of the subsidies implicit in the IDA terms to the local governments/project beneficiaries. Funds would be on-lent for a period of not less than 15 years and not more than 40 years, including a grace period of not less than 3 years and not more than 10 years, at an interest rate of 1.5 percent.

A.6. Debundling for project activity

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The current project represents a bundle of small-scale project activities, technologically fully independent and geographically spread out all over the country. The minimal distance between two PAs boundaries is more than one kilometre, while the maximal distance is about 400 km.

Each project activity, included in this project, is represented by an owner/beneficiary of the World Bank Moldova Energy-II Project that nowadays is under implementation in the Republic of Moldova, which is either the central Ministry of Education or Ministry of Health, or the municipality/local authorities.

Debundling is defined as the fragmentation of a large project activity into smaller parts. According to Appendix C (paragraph 2) of the Simplified M&P for Small-Scale CDM project activities, the current project cannot be deemed to be a debundled component of a larger project activity because by the moment of registration of this project proposal there is none registered small-scale CDM project activity or an application to register another small-scale CDM project activity with the same project participants; in the same project category and technology/measure; and registered within the previous 2 years; and whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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Type of the project activity:
Type II – Energy efficiency improvement projects;
Type III – Other project activities.

Selected Methodologies:
AMS-II.E "Energy efficiency and fuel switching measures for buildings" (Version 6)
AMS-III.B "Switching fossil fuels".(Version 6)

B.2. Project activity eligibility

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Project type and category

Following all mentioned-above and referring to (i) the project purpose and (ii) the technology/measures to

be employed and taking into account the recommendations of the *Simplified M&P for small-scale CDM project activities*, all considered PAs fall into two predefined categories –

II.E Energy efficiency and fuel switching measures for buildings[2] - includes PAs which primarily aims at reducing emissions through energy efficiency measures (Type II – Energy efficiency improvement projects; PA8, PA9, PA10, PA17 and PA26). For the selected category the aggregate energy savings may not exceed the equivalent of 15 GWh per year;

III.B Switching fossil fuels[3] that includes PAs which primarily aim at reducing emissions through fuel switching (Type III – Other project activities, PA1, PA2,PA3, PA4, PA5, PA6, PA11, PA12, PA18, PA19, PA20, PA24, PA25 and PA27). For this category the project measures shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

Description of project categories relevant to the considered activities

(EXCERPT from Appendix B to the Simplified Modalities and Procedures for small-scale CDM Project Activities)

II.E. Energy efficiency and fuel switching measures for buildings
Para. 64. This category comprises any energy efficiency and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B. Examples include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas).

III. B. Switching fossil fuels
Para. 72. This category comprises fossil fuel switching in existing industrial, residential, commercial, institutional or electricity generation applications. Fuel switching may change efficiency as well. If the project activity primarily aims at reducing emissions through fuel switching, it falls into this category. If fuel switching is part of a project activity focused primarily on energy efficiency, the project activity falls in category II.D or II.E.

PAs distribution per categories:

Category II.E	- PA8, PA9, PA10, PA17, PA26
Category III.B	- PA1, PA2, PA3, PA4, PA5, PA6, PA11, PA12, PA18, PA19, PA20, PA24, PA25, PA27.

The carried out analysis has shown that all 19 PAs, considered in this project meet their threshold requirements, thus, belonging to small scale project activities. It is confirmed that these bundle of PAs meet the eligibility criteria, thus qualifying for a small-scale CDM project.

The installed capacity of the project does not exceed than 15 kilo-tonnes of carbon dioxide equivalent annually. In the event the total amount of installed capacity exceeds 15 kilo-tonnes , CERs will only be

[2] Para 64, Appendix B of the simplified modalities and procedures for small-scale CDM project activities, 2004.

[3] Para 72, Appendix B of the simplified modalities and procedures for small-scale CDM project activities: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, 2004.

issued up to the maximum value.

All 19 PAs considered in this project, are distributed per two project categories as shown in table 2. The carried out numerical analysis, based on the elaborated Excel model, demonstrates that those two project categories meet their threshold requirements, thus qualifying for a small-scale CDM project.

Table 2. PAs distribution per categories and verification of the small-scale project eligibility

CDM small-scale project categories	Threshold	Expected Maximum Project contribution (10^{th} crediting year)	No. of PAs
II.E Energy efficiency and fuel switching measures for buildings For this category the aggregate energy savings may not exceed the equivalent of 15 GWh per year.	15 GWh	**9.8 GWh**	5
III.B Switching fossil fuels For all PAs of this category the project measures shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.	15 ktonnes	**5.86 ktonnes**	14

B.3. Project boundary

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For the Moldovan project, which aims at retrofitting of heating systems for a large number of selected public buildings spread out all over the country, the project boundaries were established as those which represent the physical boundaries of the rehabilitated local heating systems (LHS). For each project activity comprised in the project, it is being foreseen to install a new heating source (GHG emission source), located either in the project building or in the neighborhood of the group of buildings.

In this context all PAs fall into two groups –

Group 1	PA1, PA2, PA3, PA4, PA5, PA6, PA11, PA12, PA18, PA19, PA20, PA24, PA25, PA27
Group 2	PA8, PA9, PA10, PA17, PA26

Group 1 includes PAs for which the emission source for both baseline and project scenarios are within the established project boundaries (fig. 4);

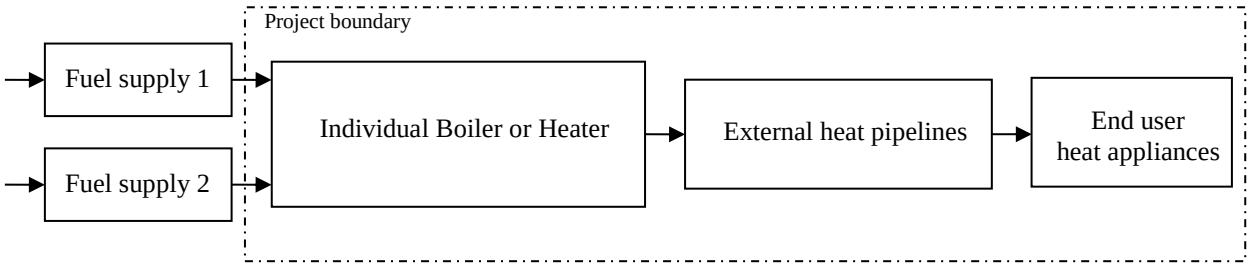
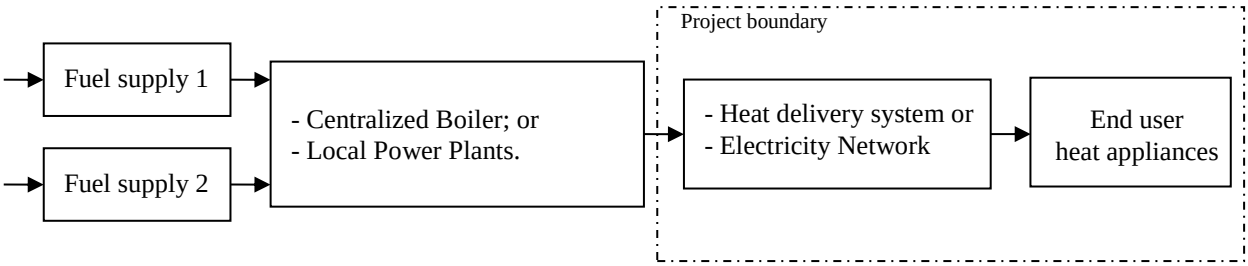


Figure 4. Energy chart and project boundary for PAs (group 1)

Group 2 - PAs for which the emission source for project scenario will be located within the established project boundaries, but for baseline scenario are located outside (fig. 5). Such a situation is related to project sites where the considered public buildings have been heated from the district heating system (DHS) or by electricity, while the current project foresees the installation of local boilers.

Figure 5. Energy chart and project boundary for PAs (group 2)



For PAs, belonging to group 1, the project participants will fully control the local heating systems, inclusively their sources; all GHG emissions are encompassed by the project boundary and will be determined and attributed to the project; such a situation complies with the Marrakesh Accords definition of the *principle of control*.

In contrast to the mentioned above, for PAs of the group 2, sources are located outside the project boundary and project participants have not a total control on them, but *it was found reasonable to attribute the GHG emissions to the relevant CDM project activities because of related fuel consumptions and GHG emissions significance and measurability*.

B.4. Establishment and description of baseline scenario
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The selected baseline methodology is based on the known fuel consumption for given reference year (t_0) and annual consumption growth rate. The year 2003 was chosen as the reference year, for which there are most complete and reliable data regarding the operation heating systems.

The project activities encompassed in this project are similar, aiming at local heating systems installation for all considered public buildings. Therefore the baseline methodology application for all PAs is similar and includes the following steps (fig. 3):

1. Reference year (t_0) choice.
2. Public building's heat consumption calculation for the reference year.
3. Heat consumption ($Q_{csm,t}$) forecast for the study period (t_0+1, ..., t_0+T_{cred}).
4. Fuel type choice for the study period.
5. Fuel embedded heat ($Q_{fuel,BSL,t}$) calculation for the years of the study period.
6. Fuel consumption ($V_{fuel,BSL,t}$) calculation for the years of the study period.
7. CO_2 emissions ($Em_{BSL,t}$) calculation for the years of the study period.

In the autumn of the 2004 a series of visits to all project sites were conducted, which allowed to collect information and data regarding the considered public buildings (total spaces, heated areas and their current share etc.) and the respective existing heating systems (types of heating sources, their location and installed capacity, used fuel structure, fuel volumes, peak heat demand, heating period duration, building's retrospective heat consumption etc.). During these visits, the project participants presented their view and expectations regarding the possible heating service evolution in the absence of the proposed project. This information was laid down to the foundation of the baseline scenario development.

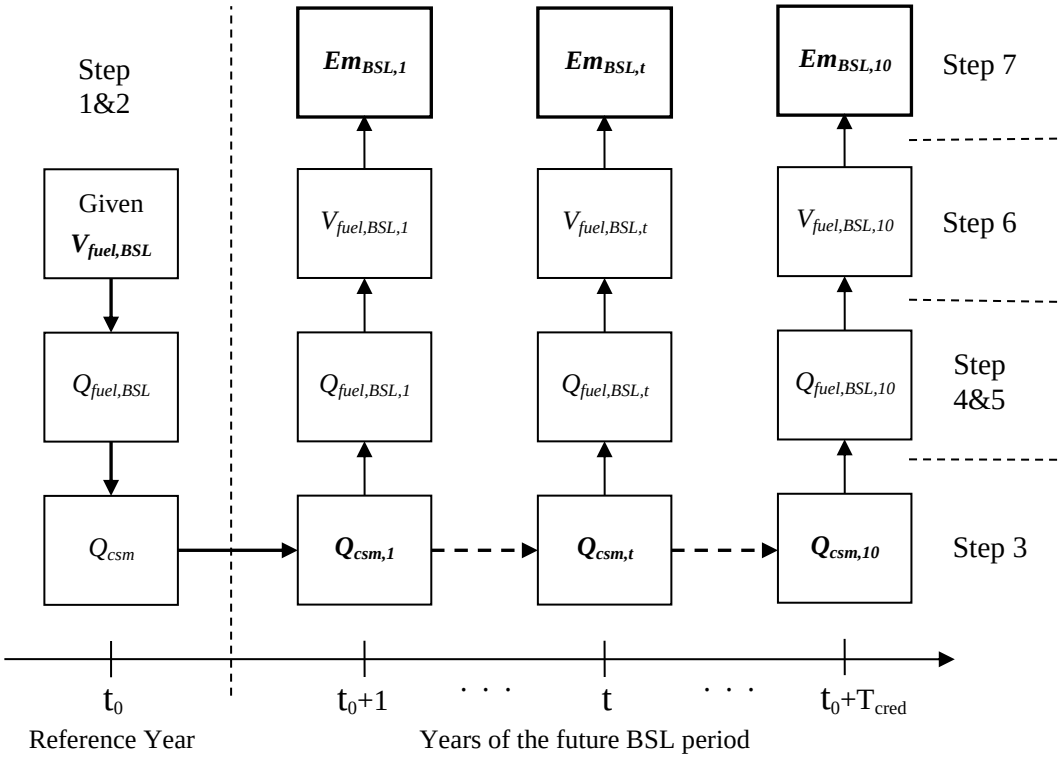

Figure 3. Basic steps for baseline methodology application

The heat demand and annual heat consumption are key factors determining the baseline. It is worth mentioning that heat consumption was determined not on the basis of the given heated areas, but first on the basis of the real fuel consumption resulting from the budgetary allocations for public building's heating.

For the purpose of this project the appropriate parameters of the existing heating systems equipment were determined according to the relevant handbooks. All initial parameters used in this project are summarized in the sheet "Initial Data" of the Excel file "Moldova Energy conservation and ER.xls".

Information regarding the climate in Moldova and parameters used for heating system design: ***The climate*** of the Republic of Moldova is temperate continental. Winters are mild and short, summers are hot and long. The average annual air temperature throughout the territory of the Republic is above zero (+8°C in the north, +9°C in the central parts of the country, and +10°C in the south). The length of the heating

season is 158 days in the south, 166 days in the central parts (around Chisinau) and 177 days in the north of the country. The minimum temperature used for calculations in sizing of heating equipment is –18°C. Maximum and minimum temperatures in Moldova range between +40°C in the summer and –32°C in the winter, with temperatures during the coldest month (January) averaging around –5°C in central Moldova.

Basic assumptions made in elaborating the baseline for all project activities:

1. The public building's heat demand and annual heat consumption are not constant, because of undergoing recovery process of heating services in the country and still existing limitation of the budgetary allocations for public buildings.
2. The increase in the annual heat consumption is not proportional to the increase in heat demand, because of the gradual extension of the annual heating period duration.
3. The existent fuel structure for each PA will remain unchanged during the future period.
4. Heating system efficiency will remain unchanged during the future period.
5. The existent PA sources will remain the same over the crediting period.
6. At the local power plants only the natural gas is used.

B.5. Demonstration of additionality

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For each PA of this project can be identified a multitude of baseline scenarios which differ by the annual heat consumption growth rate over the crediting period. The analysis of public buildings included in the project has shown that the annual growth rate during the coming decade can vary from four (4) to ten (10) percent. Following the principle of the most conservative scenario selection, eventually as the baseline has been chosen the scenario corresponding to five (5) percent annual heat consumption growth rate (see fig. 6).

In accordance with the Art. 12 of the Annex II to Decision 21/CP.8, *to use simplified modalities and procedures for small-scale CDM project activities, a proposed project activity shall*:

(a) Meet the eligibility criteria for small-scale CDM project activities set out in paragraph 6 (c) of decision 17/CP.7;
(b) Conform to one of the project categories in appendix B to this annex;
(c) Not be a debundled component of a larger project activity, as determined through appendix C to this annex.

The proposed CDM small-scale project complies with all mentioned-above requirements.

For the selected type and category (Type III – Other project activities, category III.B Switching fossil fuels, and Type II- Energy efficiency improvement projects, category II.E Energy efficiency and fuel switching measures for building) the *Appendix B of the Simplified Modalities and Procedures for small-scale CDM project activities* offers an indicative baseline methodology adapted to the Moldovan project circumstances.

Additionality of the project activity

In regard to small-scale CDM projects the Simplified modalities and procedures for small-scale CDM project activities (Appendix B, Attachment A)[4] require from the project participants to demonstrate that

[4] Annex II to *Decision 21/CP.8 "Guidance to the Executive Board of the clean development mechanism"*, 2002.

the project activity would otherwise not be implemented due to the existence of one or more of the barriers listed below:

a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher'.

The Moldova Energy II Project has been approved and is currently under implementation. It contains four components: electricity systems upgrade; heating supply and efficiency improvements; technical assistance and project management. The amount of funding allocated to heating supply and efficiency improvements is $9.1 million dollars. However, the IDA credit is sub-loaned to project beneficiaries (municipalities and ministries) by the MOF, who are required to repay the loan used to implement the PAs. Repaying the loans assumed by the project beneficiaries represents a financial burden for the project beneficiaries, as it ties up limited financial resources which may otherwise be used for social or environmental programs undertaken by the project beneficiaries. The repayment obligations act as a disincentive, discouraging project beneficiaries from assuming loans to implement PAs. Without the revenue generated by selling the emission reductions, the PAs have an NPV (net present value) of minus -582,546 US$ USD.

The World Bank project implementation team started explaining the opportunity to sell emission reductions to potential project beneficiaries in early 2004. In October 2004, the World Bank's environment, energy, and carbon finance teams held a large workshop with the representatives of all interested potential project beneficiaries. After the workshop arrangements setting out how the potential project beneficiaries could become eligible and obtain carbon revenues were agreed upon. [The World Bank's official mission reports which document these discussions are filed in the World Bank archives].

The project beneficiaries subsequently entered into subsidiary loan agreements with the MOF to implement the PAs, on the understanding that they will receive additional revenue from selling the emission reductions generated by the PAs. The NPV for all PAs with the revenue from emission reductions improves significantly but is still negative $400,644. The money received from selling the emission reductions to the CDCF will be used for social and environmental purposes, thereby freeing up resources to enable the project beneficiaries both repay the loans and undertake much needed community development projects.

The purchase of emission reductions by the CDCF is therefore acting as catalyst for investments in energy efficiency projects. The PAs would not have been implemented without the revenue generated by the sale of emission reductions. The Emissions Reduction Study predicts the implementation of the PAs will halve the emissions generated.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Basic assumptions regarding heat consumption by public buildings

Assumptions and arguments regarding heat and respectively fuel consumption for public buildings included in the project:

1. Evolution of the fuel consumption over the past years can't serve as basis for the future period forecast because tendencies were significantly changed. In this study *future annual heat demand and consumption are determined on the basis of the given reference year (2003) level of consumption and expected annual growth rate (5%).*

2. The heat consumption growth rate over the transition period is mainly determined by the payment capacity of the consumers. The carried out analysis and on-site visits show that in spite of huge need for heating, at the current quite low consumption level (of about 20-40% of the 1990 level) the annual consumption *growth rate cannot exceed 5-10%* because of existing financial constrains.

3. The objectives included in the project are public buildings financed from local or central budgets. According to official estimations, the economic growth in the country and respectively the budget allocations towards project institutions during the next decade will not exceed an annual rate of 4-10%[5]**.** Therefore, *the payments for fuel consumption will not exceed the budget allocations.*

4. Some deviations from the above-mentioned assumption, referred to fuel consumption growth can occur but these *deviations are not decisive for the whole evolution of the situation*. In some buildings where the heating system, for example, has been frozen and deteriorated, the electrical heating is being used, but at a lower consumption level (whether because of limited capacity of electricity supply system or financial constraints) and in case of project implementation an important growth in jump could be registered.

5. *The duration of the heating period* during the last decade has been reduced from 4008 hours (5.5 months), as per national standard, to 1200-1800 hours per year and has the tendency to recover by the end of the year 2014.

6. It's worth to be mentioned that large building spaces are not being heated yet (especially it refers to professional schools with total areas of circa 15-20 thousand square meters) and probably will never be heated as being redundant for nowadays needs. The energy consumption forecast done for such objectives only on the bases of heated spaces could result in significant errors, as there is a high probability that a part of those areas will be abolished.

Approach chosen for heat consumption forecast

Until 1993-94 in the Republic of Moldova the heating service provided was corresponding to national standards. Later because of upcoming financial difficulties the quality of service was decreasing substantially. Fuel consumption was cut, heated spaces were reduced, the heating period duration has been drastically shrunk and in some cases for whole public buildings (schools, kindergartens) the heating service was fully stopped. Many public buildings over the transition years were abandoned, but still remaining in the ownership of the relevant public institutions as areas expected to be heated and used. Perhaps some of them never will be returned into the service circuit.

By 1998-99 the heat consumption has got the lowest level of 10-30 % of the standard values. After about 10 years of recession, since 2003-2004 a tendency for heat supply recovery was identified (fig. 6). Budget allocations towards public institutions started to increase and respectively the payments for heating services and fuel supply got the same tendency.

[5] Economic Growth and Poverty Reduction Strategy Paper, The Government of the Republic of Moldova**,** May 2004, Chisinau, Moldova. Moldova's Economic Transition: Slow and Contradictory. Stuart Hensel and Anatol Gudim, CIRS - Center for Strategic Studies and Reforms, Chisinau, 2004, published as well in: The EU & Moldova. On a Fault-line of Europe. Edited by Ann Lewis. Federal Trust, London)

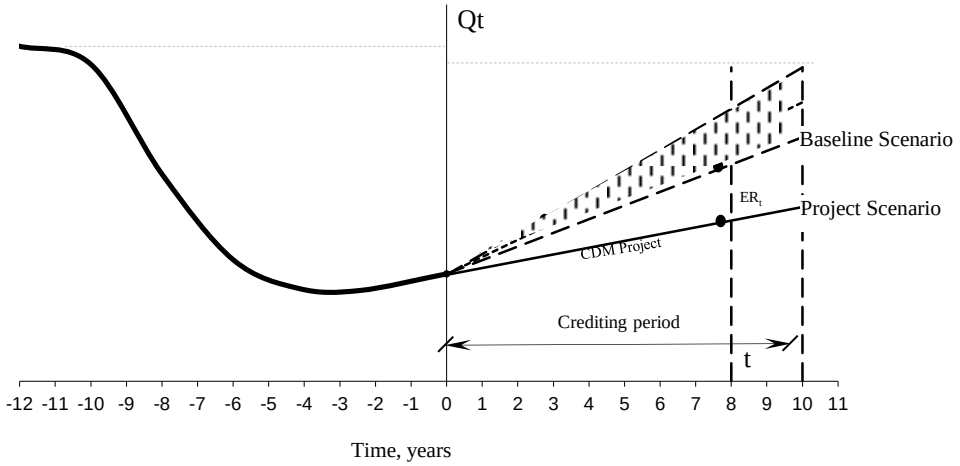


Figure 6. A multitude of possible evolutions of the situation existing before the proposed CDM project (baseline scenarios)

The collected data, regarding the heat consumption in the project considered buildings over the last decade, allowed to identify the general historical trend. But in this project for determining the future heat consumption the approach based on the given consumption for the reference year and annual rate of growth was applied. In this study as reference was accepted the year 2003, because of most trusted data and being the origin of the recovering process, foreseen to take place according to an exponential growth-

$$Q_t = Q_0 \cdot (1+r)^{t-t_0} \quad , \qquad (1)$$

where Q_t represents the heat consumption for year *t* of the future period,

Q_0 - the consumption for the reference year t_0;

r - the annual consumption growth rate.

The analysis done by project buildings has shown that in order to achieve the national heating standard over the coming ten years, which also represent the crediting period, it would require a substantial annual heat consumption growth, of about 100-130% in some cases. Such a energy consumption growth implies a similar growth of service payments. But since the public institutions considered in the project are financed from the local and central budgets, the payments growth cannot exceed the annual budgetary allocations growth, which is estimated at the level of 4-10% annually. That's why a common conservative annual growth rate of 5% for all public buildings included in the project has been chosen in this study. It is worth to be mentioned that the accepted growth rate will bring the heat consumption by the end of the crediting period to a level still below the national heating standard (fig. 7).

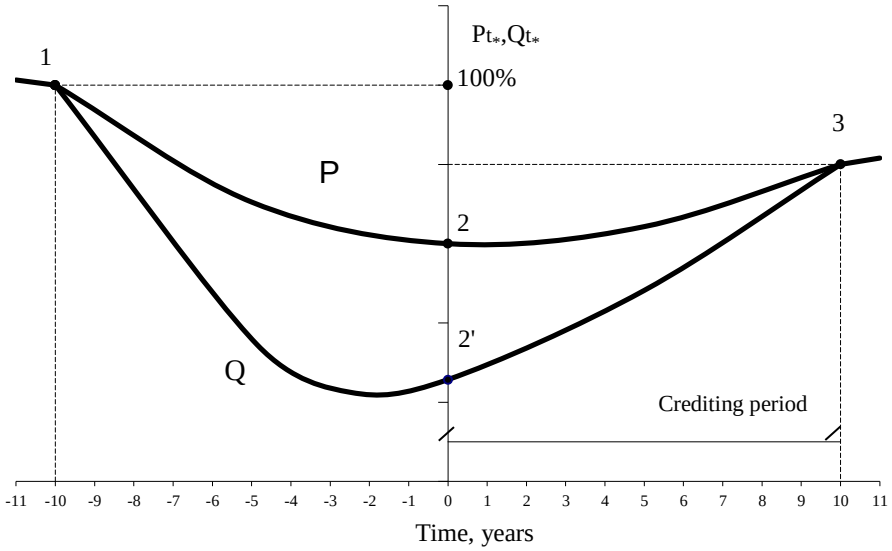


Figure 7. Evolution of heat demand (P) and heat consumption (Q) over the study period

The discrepancy between the relative heat demand (Pt_*, $Pt_* = Pt / P1$) and the annual heat consumption (Qt_*, $Qt_* = Qt / Q1$) is determined by the variation of the annual heating period duration. During the most economically difficult transition years the heating period had been reduced up to four times.

Determination of building's heat consumption for the reference year Q_0

This variable is being determined through the given fuel consumption for the reference year[6]. According to technological chain (Fig. 7,a) for building's heat consumption can be written:

$$Q_{csm,BSL} = Q_{fuel,BSL} - Loss_{Boiler,BSL} - Loss_{net,BSL} \quad (2)$$

or

$$Q_{csm,BSL} = Q_{fuel,BSL} - Q_{fuel,BSL} \cdot (1 - \eta_{BSL}) - Q_{fuel,BSL} \cdot \eta_{BSL} \cdot k_{net,BSL} \quad (3)$$

getting finally the following simplified formula -

$$Q_{csm,BSL} = Q_{fuel,BSL} \cdot E_{BSL} \ , \quad (4)$$

where $Q_{fuel,BSL} = V_{fuel,BSL} \cdot LHV_{BSL}$,

$$E_{BSL} = \eta_{boiler,BSL} \cdot \eta_{net,BSL} \quad \text{and} \quad (5)$$

$Q_{csm,BSL}$ represents the building's heat consumption for baseline, MWh;

$Q_{fuel,BSL}$ - embedded heat for fuels used in the baseline scenario, MWh;

E_{BSL} - overall efficiency of the EHS (boiler and external network);

$Loss_{Boiler,BSL}$ - heat losses for existing boiler, MWh;

$Loss_{net,BSL}$ - heat losses for existing external network, MWh;

$\eta_{boiler,BSL}$ - efficiency of existing boiler;

$\eta_{net,BSL}$ - efficiency of existing external network, $\eta_{net,BSL} = 1 - k_{net,BSL}$;

$k_{net,BSL}$ - heat losses rate for external network (divided to its inlet heat);

LHV_{BSL} - given Low Heat Value of baseline fuels, kWh/kg or kWh/m^3.

[6] Except for buildings with electrical heating, for which the final heat consumption is determined on the basis of given electricity consumption.

There are four types of fuels burnt at the selected sources for baseline scenario in Moldova - coal, mazut, natural gas and wood, for which the LHV values are given in table 4.

Heat consumption determined by project activities for the reference year (2003) is presented in the Baseline Study, Annex 2, tab. A1.

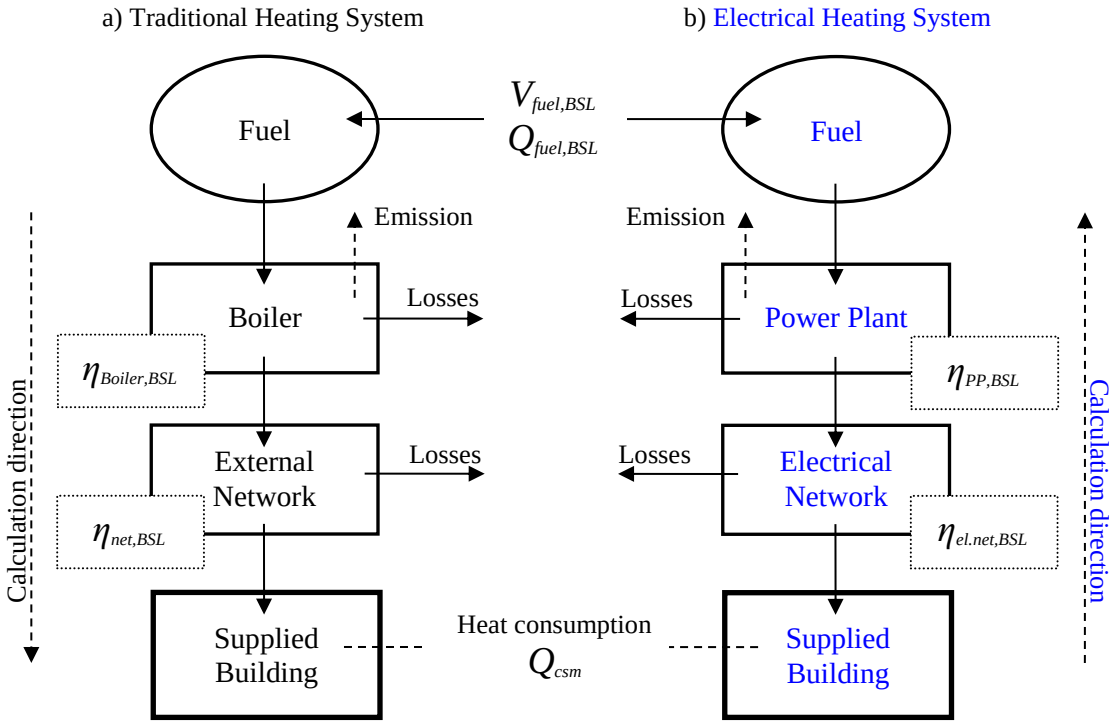


Figure 8. BSL Heat flow chart for local heating system

It is worth mentioning, since the efficiency of the existing boilers ranges between 40-60 % and external network heat losses are about 10 %, for overall efficiency E_{BSL} results -

$$E_{BSL} = \{0.4...0.6\} \cdot 0.9 = \{0.36...0.54\} \approx 0.45 . \quad (6)$$

This means that because of outdated heating installations the baseline heat consumption amounts to less than 50 % of the embedded fuel heat -

$$Q_{csm,BSL} \approx 0.45 \cdot Q_{fuel,BSL} . \quad (7)$$

Table 4. Fuel types used at the PA's sources and considered in BSL Study

	Type of fuel	LOW HEAT VALUE			EMISSION FACTOR	
		Used in calculations	Recorded in Moldova	IPCC TJ / k t	Used in calculations tCO2 / TJ , [1]	IPCC tCO2 / TJ
1.	**Coal**	**20** TJ / k t	**14 - 26** TJ / k t , [2]	**15.9-28.7** Tab. 1-24, pag. 1.62	**94.6**	**94.6**
2.	**Mazut**	**39.5** TJ / kt	[2] , Tab 2.8, Pag. 35	**39...44**	**77.3**	**77.3**
3.	**Nat Gas**	**33.5** MJ/Nm3		**52.3** Tab. 1-24, pag. 1.62	**56.1**	**56.1**

4.	**Wood**	**14.49** TJ / k t		**10.9 - 20.0** Tab. 1-13, pag. 1.45	**0**	**109.6**

References top table 4:

1. Analiza situatiei din complexul energetic al Republicii Moldova si asigurarea securitatii energetice, Chisinau 2001, Institutul de Energetica al ASM, 170pp.
2. Роддатис К.Ф., Полтарецкий А. Н. *Справочник по котельным установкам малой производительностию*, Энергоатомиздат, 1989.

Heat consumption determination for the future period

The heat consumption for the years of the future period, by project activities, are calculated according to formula (1) on the basis of the reference year known consumption and justified annual growth rate. The general calculation scheme of the main baseline parameters ($Q_{csm,t}$, $Q_{fuel,BSL,t}$ and $V_{fuel,BSL,t}$) for the years of the future period is presented in fig. 9.

The resulted values for heat consumption for the future period are presented in Baseline Study, Annex 2, tab. A1.

Fuel structure and fuel consumption for baseline scenario

Types of fuels to be used in the future for baseline were determined on the basis of visits done at public institutions owning the relevant buildings included in the project.

It has to be mentioned that among the fuels used in the baseline scenario the wood is present. Emissions factor for the wood is considered zero.

Traditional local heating systems

As far as fuel consumption $V_{fuel,BSL}$ is concerned for baseline scenario, it is determined knowing the final heat consumption Q_{csm} for the given year *t*, applying the following formulae -

$$V_{fuel,BSL} = Q_{fuel,BSL} / LHV_{BSL} \quad , \qquad (8)$$

where $Q_{fuel,BSL} = Q_{csm} / E_{BSL}$.

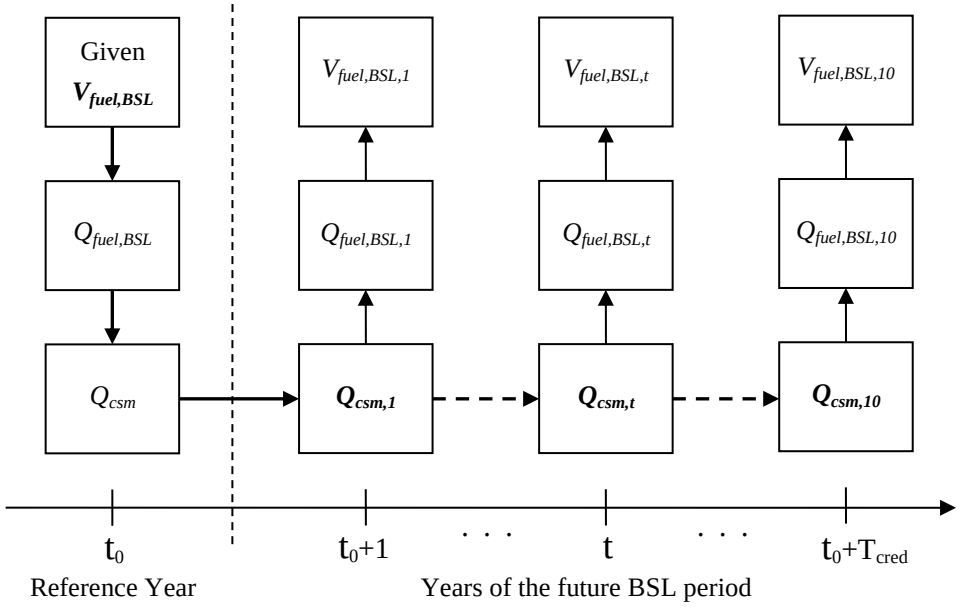


Figure 9. Calculation sequence chart for baseline basic parameters

Electrical heating PAs (II.E category)

Referring to baseline calculation for buildings with electrical heating, one has to consider a technological chain (fig. 8,b), which is different from the mentioned above (fig. 8,a). The new chain includes the distribution and transmission electrical networks, and the power plants.

Once an additional PA category (II.E) was applied, the relevant baseline methodology has been used to determine the baseline emissions occurred at electricity generation plants. The simplified baseline methodology for category II.E (AMS-II.E) requires that "for the electricity displaced, the emission coefficient is calculated in accordance with provisions of paragraphs 6 or 7 for category I.D projects. For fossil fuels, the IPCC default values for emission coefficients may be used".

According to AMS-I.D, paragraphs 7, point b - as the relevant option for Moldova's conditions, the emission coefficient (measured in kg CO2e/kWh) is to be calculated in a transparent and conservative manner as the weighted average emissions (in kg CO2e/kWh) of the current generation mix.

Thus, for PAs of II.E category the baseline calculation would include the following steps:

a) For each PA the building's electricity consumption is adjusted to take into consideration losses into electrical grid –

$$W_{power\ system} = Qcsm \cdot (1+\Delta Wd + \Delta Wd),$$

where $W_{power\ system}$ represents the electricity produced at the local power plants to meet the building's demand; Qcsm - building's electricity consumption for heating purpose; ΔWd and ΔWd normative values of the technological losses in distribution and transmission electrical networks.

The normative level of electricity losses in Moldova represents 4.5% for the transportation network (see Technology needs and Development Priorities. Report elaborated under the United Nations Framework Convention on Climate Change. UNDP Moldova, Chisinau 2002. Table 1.9, page. 37) and 15.5% for distribution network, according to National Agency for Energy Regulation (www.anre.md, Methodologies[7]).

b) Calculation of the weighted average emission factor (in kg CO2e/kWh) of the current generation mix in the country ($EF_{power\ system}$) is done according to formula –

$$EF_{power\ system} = \sum_{i=1}^{n} FF_i \cdot \alpha_i \ ,$$

where EF_i represents the emission factor for i-power plant, in kg CO2equ/kWh; α_i - the share of the power plant i in the total electricity production in the country (tab.4.1).

Table 4.1. Electricity production structure in Moldova

#	Local Power Plants	Year 2003		Year 2000	Electricity production efficiency (2000) η_{PP}, %
		Electricity produced, MWh	Share (α_i), %	Share (α_i), %	
1	Moldovan Thermal Power Plant	2 551 817	76.86%	75.81%	32.8
2	CHP-2	621 803	18.73%	20.25%	37.1
3	CHP-1	107 757	3.25%	3.10%	34.3
4	CHP-North	38 754	1.17%	0.84%	18.4
	Total	**3 320 131**	**100.00%**	**100.00%**	-

Note: The figures are obtained from the State Enterprise Moldelectrica - the National Electricity Transmission Operator.

c) The CO2 emissions at the local generating plants, caused by electricity consumption for heating purpose, are determined as the electricity produced to meet the building's demand times the weighted average emission factor for the current generation mix in the country.

[7] See the document "Metodologia determinarii, aprobarii si aplicarii tarifelor la energia electrica livrata de intreprinderile de distributie "Red Nord" S.A. si "RED Nord-Vest" S.A.")

* * *

The above presented procedure for baseline calculation for PAs of II.E category ***is absolutely identical*** to that corresponding to formulae (8) and (9) - for PAs of III.B category. The only difference is that in case of II.E PAs in formula (8) the E_{BSL} represents the overall efficiency of the electrical networks and power plants -

$$E_{BSL} = \eta_{PP,BSL} \cdot \eta_{el.net,BSL} \quad , \qquad (9)$$

where $\eta_{PP,BSL}$ - the ***weighted average efficiency*** of the local power plants (33%);

$\eta_{net,BSL}$ - the overall efficiency of the local electrical distribution and transmission networks (80 %).

Additionally, taking into consideration the fact that all local (Moldovan) power plants are natural gas fired and the fact of non-availability of CO2 emissions per kWh at these power plants, the above mentioned issue converges to determination of the weighted average efficiency for the actual generation mix.

The weighted average efficiency of the local power plants $\eta_{PP,BSL}$ is calculated on the basis of information provided in Table 4.1, regarding the structure of electricity generation per local power plants (year 2000) and their efficiencies (available only for the year 2000) as follows:

$\eta_{PP,BSL}$ = 0.7581 · 0.328 + 0.2025 · 0.371 + 0.0310 · 0.343 + 0.0084 · 0.184 = 0.3359 or 33%.

Similarity of the baseline methodologies of both PAs categories - II.E and III.B category, allows us to use the same software for baseline emission calculations.
For all project activities and considered years of the crediting period the values Q_{csm} are given in Baseline Study, Annex 2, tab. A1. The structure of fuels used in the baseline and fuel consumption quantities are summarized in Baseline Study, Annex 2, tab. A3.

In this project, the supply side prevail over the demand side measures in terms of energy savings and emissions reduction contribution. Building's retrofit measures yield to an insignificant ER, that's why in the Moldovan project *the emissions reduction effect produced by energy savings in buildings is neglected.* By this, *all PAs, representing the mentioned above one category, become very similar, and consequently a common monitoring methodology can be applied to them.*

Under the above assumptions results that *the emissions reduction monitoring is fully focused on the supply side, i.e. on boiler and external network of the local heating system*.

All PAs, considered in this project, are very similar and consequently a common monitoring methodology can be applied to them. The developed project specific methodology, is illustrated in figure 10. The notations applied on the figure 10 are common for all studies related to Moldovan project:

Em_{PR} - annual project emissions, tCO_2;

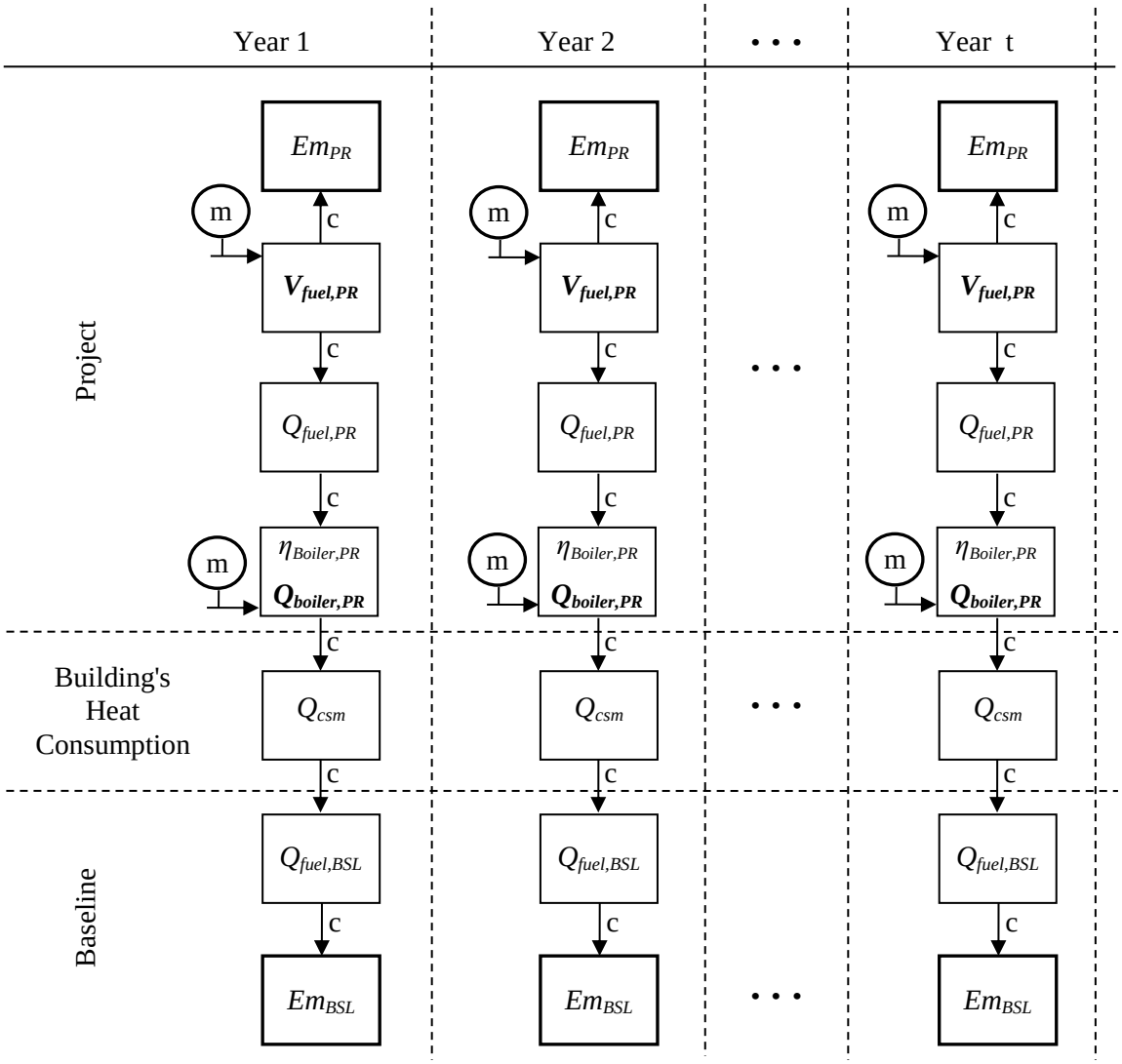


Figure 10. Emissions Monitoring: Basic info chart

$V_{fuel,PR}$ - annual fuel volume used in the project scenario, m^3 or tonnes (measured);
$Q_{fuel,PR}$ - embedded heat for fuels used in the project scenario for a given year, MWh;
$\eta_{boiler,PR}$ - efficiency of boiler used in project scenario(fixed based on one ex-post measurement campaign using sampling);
$Q_{boiler,PR}$ - boiler heat output in the project scenario for a given year, MWh ~~(measured)~~ (calculated);
Q_{csm} - building's annual heat consumption, MWh;
$Q_{fuel,BSL}$ - embedded heat for fuels used in the baseline scenario for a given year, MWh;
Em_{BSL} - annual baseline emissions, tCO_2 .

In order to calculate the emissions reduction in a reliable manner, there was chosen a project specific monitoring methodology, which is based on the need for -

- the *boiler fuel use* monitoring via periodic measurements;

- the *boiler energy efficiency* monitoring via one ex-post measurement campaign of boiler efficiency using sampling;

The proposed monitoring procedure is common for all considered small-scale PAs and does not require the monitoring of project emissions occurring outside the project boundaries.

The present monitoring methodology implies a real measurement of the project fuel volumes and determination of boiler efficiencies via a one-time sampling campaign of efficiency measurements, which will lead, via calculations, to emissions reduction values determination.

During the project implementation this monitoring plan can be reviewed (through DOE approvement), when necessary, in order to address properly all project aspects deemed necessary to monitor and report reliable emission reductions.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

Data / Parameter	LHV_{PR}
Unit	MJ/Nm3
Description	Natural gas net calorific value
Source of data	National Statistics Bureau; Energy Balance Annual Report, Form 1-BE, approved by order nr. 123, 24.10.2007,Chisinau, MOLDOVA, http://www.statistica.md/public/files/Formulare_statistice_2008 /Industria_si_energia_electrica/1_BE_anual.pdf
Value(s) applied	33.5
Choice of data or Measurement methods and procedures	Official source
Purpose of data	Calculation of project emissions
Additional comment	Former ID 2

Data / Parameter	EF_{PR}
Unit	tCO2/TJ
Description	Natural gas emission factor
Source of data	Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	56.1
Choice of data or Measurement methods and procedures	IPCC
Purpose of data	Calculation of project emissions
Additional comment	Former ID 3

Data / Parameter	$EF_{BSL,\,coal}$
Unit	tCO2/TJ
Description	Coal emission factor

Source of data	Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	94.6
Choice of data or Measurement methods and procedures	The coal emission factor is taken from IPCC default values since analysis or data are not available from the coal suppliers.
Purpose of data	Calculation of baseline emissions
Additional comment	Former ID 9

Data / Parameter	$EF_{BSL,\,mazut}$
Unit	tCO2/TJ
Description	Mazut emission factor
Source of data	Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	77.3
Choice of data or Measurement methods and procedures	IPCC
Purpose of data	Calculation of baseline emissions
Additional comment	Former ID 10

Data / Parameter	$\eta_{boiler,BSL,coal}$
Unit	-
Description	efficiency of existing coal boiler
Source of data	Expert judgement
Value(s) applied	60%
Choice of data or Measurement methods and procedures	Value as determined by Prof. Dr. Valentin Arion, Technical University of Moldova
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

Data / Parameter	$\eta_{boiler,BSL,mazut}$
Unit	-
Description	efficiency of existing mazut boiler
Source of data	Expert judgement
Value(s) applied	76%
Choice of data or Measurement methods and procedures	Value as determined by Prof. Dr. Valentin Arion, Technical University of Moldova
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

Data / Parameter	$\eta_{net,BSL}$
Unit	-
Description	Efficiency of existing external heat network
Source of data	Expert judgement
Value(s) applied	90%
Choice of data or Measurement methods and procedures	Value as determined by Prof. Dr. Valentin Arion, Technical University of Moldova
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

Data / Parameter	$\eta_{stove,BSL,coal}$
Unit	-
Description	efficiency of existing coal stove
Source of data	Expert judgement
Value(s) applied	40%
Choice of data or Measurement methods and procedures	Value as determined by Prof. Dr. Valentin Arion, Technical University of Moldova
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version No external network in the case of coal stove

Data / Parameter	$\eta_{PP,BSL}$
Unit	-
Description	the weighted average efficiency of the local power plants
Source of data	State Enterprise Moldelectrica - the National Electricity Transmission Operator
Value(s) applied	33%
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version All Moldovan power plants are natural gas fired

Data / Parameter	$\eta_{net,BSL}$
Unit	-
Description	the overall efficiency of the local electrical distribution and transmission networks
Source of data	National Agency for Energy Regulation and UNDP Moldova

Value(s) applied	80%
Choice of data or Measurement methods and procedures	80% = 100% - 15.5% - 4.5% The normative level of electricity losses in Moldova represents 4.5% for the transportation network (*Technology needs and Development Priorities Report*, UNDP Moldova, Chisinau 2002. Table 1.9, page. 37) and 15.5% for distribution network, according to National Agency for Energy Regulation (www.anre.md, Methodologies)
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

Data / Parameter	$\eta_{net,PR}$
Unit	-
Description	Efficiency of project external heat network
Source of data	Expert judgement
Value(s) applied	98%
Choice of data or Measurement methods and procedures	Value as determined by Prof. Dr. Valentin Arion, Technical University of Moldova
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

Data / Parameter	p_f
Unit	-
Description	Proportion of annual heat embedded in the *f*-type of fuel burnt to meet the heat demand of the PA
Source of data	PA records
Value(s) applied	

PA	p_{coal}	p_{mazut}	$p_{natural\text{-}gas}$	p_{wood}
PA1	0.54	0.00	0.00	0.46
PA2	0.76	0.00	0.00	0.24
PA3	0.96	0.00	0.00	0.04
PA4	0.69	0.00	0.00	0.31
PA5	0.72	0.00	0.00	0.28
PA6	1.00	0.00	0.00	0.00
PA8	0.00	0.00	1.00	0.00
PA9	0.00	0.00	1.00	0.00
PA10	0.00	0.00	1.00	0.00
PA11	0.32	0.00	0.66	0.02
PA12	0.93	0.00	0.00	0.07
PA17	0.00	0.00	1.00	0.00
PA18	0.00	1.00	0.00	0.00
PA19	1.00	0.00	0.00	0.00
PA20	1.00	0.00	0.00	0.00
PA24	0.00	1.00	0.00	0.00
PA25	0.00	0.00	1.00	0.00
PA26	0.00	0.00	1.00	0.00
PA27	0.00	1.00	0.00	0.00

Choice of data or Measurement methods and procedures	Proportions are based on three years historical data, or all available historical data where less than three years were recorded, of fuel consumption at each PA. For PAs where the baseline was electric heating, natural gas is considered as the fuel type, as explained in section B.6.1
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter not explicitly listed in previous version

B.6.3. Ex-ante calculation of emission reductions

>>

The anthropogenic emissions for all PAs comprised in this project, can be determined by applying the following general algorithm.

For a given year t the total project emissions $Em_{PR,t}$ are calculated as the sum of emissions by sources (j) within the project boundary and type of used fuel f (f = natural gas or mazut) -

$$Em_{PR,t} = \sum_j Em_j \ . \quad (10)$$

Since for project scenario at each heating source j is burned only one type of fuel, the CO_2 annual emission calculation is done as follows:

$$Em_j = Q_{fuel,PR} \cdot EF_f \ , \quad (11)$$

where $Q_{fuel,PR}$ represents the annual heat embedded in the f-type of fuel to be burned to meet the heat demand of the selected public buildings belonging to source j, in MWh (calculated and presented in Baseline Study, para 3.4) and EF_f is the emission factor for the combustion of fuel f, in tCO_2/MWh.

For known $Q_{fuel,PR}$ and given EF_f CO_2 emissions are easily determined the by sources and years for project scenario.

According to project boundary and leakage definitions there is no leakage due to project activities.

The baseline scenario emissions can be determined in the same way as the project emissions.

Total baseline emissions for a given year t $Em_{BSL,t}$ are calculated as the sum of emissions by sources (j) within the project boundary and type of used fuel f (f = coal, mazut, natural gas or wood) -

$$Em_{BSL,t} = \sum_j Em_j \ . \quad (12)$$

Since for a source j different types of fuel can be used -

$$Em_j = \sum_f Q_{fuel,BSL} \times EF_f \times p_f \ , \quad (13)$$

where p_f represents the proportion of annual heat embedded in the f-type of fuel burnt to meet the heat demand of the selected public buildings, belonging to source j, in MWh (see Baseline Study, Para 3.3) and EF_f is the emission factor for the combustion of fuel f, in tCO_2/MWh.

Since formula (13) implies the parameter $Q_{fuel,BSL}$, which takes into account the type of energy source, type of used fuel and overall efficiency of the considered heating systems (LHS, DHS, Electrical heating), there is no difference in emission calculation for project activities of the mentioned above groups 1 and 2.

$Q_{fuel,BSL}$ will be calculated as follows:

$$Q_{fuel,BSL} = Q_{csm} / E_{BSL}$$

$$Q_{csm} = Q_{boiler,PR} * \eta_{net,PR} = V_{fuel,PR} * LHV_{PR} * \eta_{boiler,PR} / 1000 * \eta_{net,PR}$$

$$E_{BSL} = \eta_{boiler,BSL} \cdot \eta_{net,BSL}$$ (boiler), or

$$E_{BSL} = \eta_{PP,BSL} \cdot \eta_{el.net,BSL}$$ (electricity), or

$$E_{BSL} = \eta_{stove,BSL,coal}$$ (stove)

There are four types of fuels burnt at the Moldovan sources, referring to the baseline scenario, namely - coal, mazut, natural gas and wood, for which the emission factor values, used in Baseline Study, are given in table 2:

Thus, for known $Q_{fuel,BSLf}$ and given EF_f the baseline CO_2 emissions are easily determined by sources and years, according to formulae (12) and (13).

For each project activity the total annual emission reduction ER [tCO_2] for a given year t is determined as the difference between baseline emissions $Em_{BSL,t}$ and project emissions $Em_{PR,t}$.

Table 6. Total annual project emission reduction for the crediting period, in tonnes of CO_2

		Crediting Period									
Location	**PA No.**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Cantemir	**PA1**	41	43	46	48	49	52	54	57	60	64
	PA2	46	48	51	53	55	58	61	64	67	72
Făleşti	**PA3**	70	72	76	80	84	88	92	97	102	108
	PA4	19	20	21	22	23	24	25	26	28	30
	PA5	18	19	19	20	21	23	24	25	26	28
	PA6	0	847	890	934	981	1,030	1,082	1,136	1,193	1,252
Floreşti	**PA8**	25	26	28	29	31	32	34	35	37	39
	PA9	126	132	139	146	153	161	169	177	186	195
Străşeni	**PA10**	151	158	166	175	183	193	202	212	223	234
	PA11	117	123	129	136	143	150	157	165	173	183
	PA12	52	55	57	60	63	66	70	73	77	81
Ialoveni	**PA17**	541	568	596	626	657	690	725	761	799	839
Nisporeni	**PA18**	523	549	577	606	636	668	701	736	773	811
Leova	**PA19**	153	161	169	177	186	195	205	215	226	237
	PA20	637	669	703	738	775	813	854	897	941	989
Ungheni	**PA24**	23	24	25	27	28	29	31	32	34	36
	PA25	1,121	1,177	1,235	1,297	1,362	1,430	1,502	1,577	1,656	1,738
	PA26	414	434	456	479	503	528	554	582	611	642
	PA27	45	47	49	52	54	57	60	63	66	69
Total annual ER, tonnes		**4,121**	**5,173**	**5,432**	**5,703**	**5,987**	**6,286**	**6,601**	**6,931**	**7,277**	**7,647**

B.6.4. Summary of ex-ante estimates of emission reductions

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
29/01/2006 - 28/01/2007	6,616	2,495	0	4,121
29/01/2007 - 28/01/2008	8,263	3,090	0	5,173
29/01/2008 - 28/01/2009	8,676	3,245	0	5,431
29/01/2009 - 28/01/2010	9,110	3,407	0	5,703
29/01/2010 - 28/01/2011	9,566	3,579	0	5,987
29/01/2011 - 28/01/2012	10,044	3,758	0	6,286
29/01/2012 - 28/01/2013	10,546	3,946	0	6,600
29/01/2013 - 28/01/2014	11,074	4,143	0	6,931
29/01/2014 - 28/01/2015	11,627	4,350	0	7,277
29/01/2015 - 28/01/2016	12,215	4,568	0	7,647
Total	97,737	36,581	0	61,156

Total number of crediting years	10			
Annual average over the crediting period	9,774	3,658	0	6,115

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

Data / Parameter	$V_{fuel,PR}$
Unit	Nm^3
Description	Natural gas consumption
Source of data	Measured
Value(s) applied	As shown in NPV spreadsheet
Measurement methods and procedures	Recorded from fuel meters
Monitoring frequency	Monthly
QA/QC procedures	Fuel meters calibrated in line with national regulation Checked against fuel purchasing invoices, where possible
Purpose of data	Calculation of project emissions
Additional comment	Former ID 1 In the real life, there could be situations when fuel meter readings are not available. In such cases estimated values will be applied. However CFU reserves the right to argue and come up with its own estimation on the basis of other existing cases. If calibration is delayed or a calibration certificate is not available, the following conservative approach will be adopted in the calculation of emission reductions, to adjust the project emissions up: (a) Applying the maximum permissible error of the instrument to the measured values, if the results of a later calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or (b) Applying the error identified in the later calibration test, if the error is beyond the maximum permissible error of the measuring equipment.

Data / Parameter	$Q_{boiler,PR}$
Unit	MWh or other energy unit
Description	Boiler heat output
Source of data	Calculated
Value(s) applied	As shown in NPV spreadsheet

Measurement methods and procedures	Calculated from $V_{fuel,PR}$, LHV_{PR} and $\eta_{boiler,PR}$ as follows: $Q_{boiler,PR} = V_{fuel,PR} * LHV_{PR} * \eta_{boiler,PR} / 1000$
Monitoring frequency	Monthly
QA/QC procedures	N/A
Purpose of data	Calculation of baseline emissions
Additional comment	Former ID 7

Data / Parameter	$\eta_{boiler,PR}$
Unit	-
Description	Boiler efficiency
Source of data	Measured
Value(s) applied	90%
Measurement methods and procedures	One ex-post sampling campaign of efficiency measurements was utilized to define the boiler efficiency. The heat losses was deducted from the boiler campaign results, and therefore gained a mean value of 91.32%, for which the precision at the 90% confidence level is 0.96%, less than 10%. Hence it is considered reasonable and conservative to apply the efficiency value at the lower limit of the 90% confidence interval of the mean value determined by sampling, 90.44%, which is 90% when applied as a rounded number.
Monitoring frequency	Once ex-post
QA/QC procedures	Results must conform to a 90 / 10 accuracy / precision standard
Purpose of data	Calculation of baseline emissions
Additional comment	Former ID 8

B.7.2. Sampling plan

>>

Procedures for one-time *ex-post* measurement campaign of boiler efficiency [Sampling Plan]

Project boiler efficiency will be defined, and fixed, *ex-post* based on one measurement campaign in a sample of project boilers.

Sampling design

Objectives and Reliability

The objective of the sampling effort is to define the average project boiler efficiency for boilers of each fuel type used by project boilers, parameter $\eta_{boiler,PR}$; in the case of the project, the relevant fuel type is natural gas. The measurement campaign will take place once *ex-post* and is expected to be finished within the space of one to two heating seasons. The project boilers are expected to have efficiencies of 92%. The boiler efficiency will aim to meet reliability requirements of 90/10 confidence/precision.

Target population

The target population is the project boilers, grouped by fuel type. Each group of project boilers utilizing the same fuel represents a target population. In the project, natural gas is the only fuel. The total number of boilers involved in this project activity is 38.

Sampling method

Simple random sampling is used to identify the sampled boilers.

Sample size

The sample size is calculated to meet 90% confidence with 10% error margin. Using the "Best practice examples focusing on sample size and reliability calculations" (EB67), the determination of the sample size (n) is based on the following formula:

$$n = \frac{1.645^2 NV}{(N-1)\times 0.1^2 + 1.645^2 V}$$

Where

$$V = \left(\frac{SD}{mean}\right)^2$$

n	Sample size
mean	Expected mean value of boiler efficiency (92%)
SD	Expected standard deviation of boiler efficiency (10%)
1.645	Represents the 90% confidence required
0.1	Represents the 10% precision
N	Target population (38 boilers)

$$V = \frac{0.1^2}{0.92^2} = 0.0118$$

$$n \geq \frac{1.645^2 \times 38 \times 0.0118}{(38-1)\times 0.1^2 + 1.645^2 \times 0.0118} = 3.02$$

The result gives a sample of 3. According to the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* (Version 03.0), "If the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen." Hence a sample size of at least 30 is selected.

Sampling frame
The sample frame is the list of project boilers pertaining to these PAs involved in the project activity.

Data

Field measurements
The variable to be measured is "boiler efficiency" for individual boilers, which will be used to make an average to be applied for emission reduction calculations, $\eta_{boiler,PR}$. Boiler efficiency will be measured via a flue gas composition test at full load as per the local standard. As required by the local regulation, the testing is conducted using a measurement device and method certified and approved by the relevant national authority.

Quality Assurance/Quality Control

The measurements are undertaken using duly calibrated and certified flue gas analyzer(s) by qualified technical personnel. The measurement of boiler efficiency are done according to a methodology recommended and approved by the supplier of the equipment following either national or international relevant standards.

Identification of outliers follows the three-sigma rule. Identified outliers will be excluded from the calculation of the mean boiler efficiency.

Analysis
The collected measurements will be used to calculate an average (mean) boiler efficiency to be applied in emission reduction calculations. The average will be calculated at full load and/or at other representative load regimes.

Implementation

The sampling plan is implemented after registration of the project activity and after project activity boilers have begun operation. Local technical experts are engaged to undertake the boiler efficiency measurements.

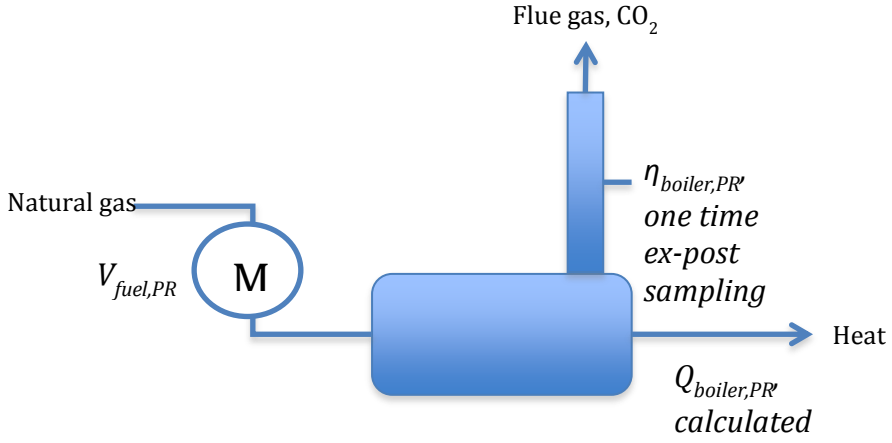
Assumptions and Justifications
There are two important assumptions inherent in this sampling approach.

[1] that the efficiency of the boilers selected for sampling will be similar to that of the population of boilers.
[2] that the efficiency measured in one campaign provides a reasonable and conservative result for the efficiency during the whole crediting period.

Assumption 1 is justified because the boiler population is quite homogenous. The boilers were all installed around the start of the project activity, and hence are of a similar age, they all burn the same fuel, natural gas, and they are all of relatively similar size, having installed capacities less than or equal to 2000 kW with an average of 568 kW.

With respect to assumption 2, the project boiler efficiency will be used to calculate project heat output, which is then combined with the *ex-ante* defined baseline efficiencies to calculate baseline emissions. When the project boiler efficiency is lower, than the baseline emissions calculation result is lower (more conservative). The sampling campaign is carried out in year 7 of the 10 year crediting period, when the boilers have undergone years of efficiency loss due to aging. Hence the efficiency measured by the campaign is expected to be lower than what would have been measured the first 6 years of the crediting period, providing an overall conservative result.

B.7.3. Other elements of monitoring plan
>>
Schematic Diagram of monitoring points
Each of the project sites (PAs) has the same approximate configuration of monitoring points, as depicted in the following schematic diagram.



Calibration of monitoring equipment
The volume of natural gas consumption will be registered by gas meter installed for all project activities. This monitoring equipment must be periodically verified and tested. According to the Moldovan

regulations, the meters should be periodically verified and tested[8]. After meters verification and testing, for each meter, the authorized laboratory will submit a certificate of: (a) acceptance for operation, or (b) refusal for operation. In case any meter will be refused for operation, such one should be repaired and a certificate of reparation and calibration being submitted by an authorized entity. If the meter could not be repaired, a new meter should be purchased, receipt and technical passport being needed.

Procedures for monitoring, measurements and reporting

For most PAs activities with natural gas consumption, monitoring frequency should be in line with meter readings. Usually, natural gas meter readings will be taken by local gas supplier on a monthly basis. The reporting documents for this meter will be the monthly invoices, where metering period and meter registration are printed..
At the beginning of next reporting year the annual project emissions report should be worked out.

The annual emission reductions report should be printed and signed by the Project-monitor and Project-manager, as final responsible person. The presented report will be archived to make it available for external audit and verification purposes.

The annual report should include: overall project performance, emissions reduction and comparison with Baseline Study estimations, comments concerning monitoring plan indicators, information on monitoring plan main assumptions, calculation methods and changes in the monitoring plan.

On the basis of elaborated annual reports the Project-manager may organize annual PA-owners meetings, with Minutes of Meeting issuance and their archiving.

Procedures for possible monitoring data adjustments and uncertainties

The key parameter laid down to the project emissions calculation is the monthly metered/documented fuel consumption. In the real life, there could be situations when fuel meter readings are not available. In such cases estimated values will be applied. However CFU reserves the right to argue and come up with its own estimation on the basis of other existing cases.

Procedures for internal audits of GHG

Upon request of any PA-owner can be conducted an internal audit. For this reason the Project-manager will create a working team out of three members including the representative of the respective PA-owner.

All ERs generated by the Sub-Project until the Contracted ERs have been delivered, shall be subject to a periodic verification by an Independent Third Party selected in accordance with the ERPA ("Periodic Verification"). The CFU and the CDCF has the right to arrange for a Start-up Verification of the Sub-Project. It shall instruct the Designated Operational Entity to provide a copy of the Start-up Verification Report to the CDCF, CFU and the Sub-Project Entity.

PA-owners in conformity with the signed subsidiary agreements with CFU shall install, operate and maintain the facilities and equipment (data measurement and collection systems), and employ staff, necessary for gathering all such data as may be required by the Monitoring Plan (as it may be amended from time to time);
The CFU is responsible for data collection, archiving and reporting. Its specific responsibilities are to:

a) Contact Sub-Project entity and collect metered data as required by the monitoring methodology (the data collection is foreseen via e-mail, fax, phone or on site visiting);
b) Verify the collected data quality and integrity, enter the collected data in the emissions calculation workbook, including through regular on-site inspections;

[8] Moldovan State Department of Standardization and Metrology Decision # 1445-M from January 4, 2004: The official list of the measuring equipment to be compulsory verified and tested. Official Journal, # 35-38/81 from February 27, 2004, Chisinau, Republic of Moldova.

c) Check that calculation of emission reductions are in line with the monitoring methodology requirements and assumptions and keep for each year of the crediting period a separate emissions calculation workbook;

Description of the authority and responsibility of project management

Each project activity, to be included in this project, shall be represented by an owner/beneficiary of the SIF II Project, which is the local authority or responsible regional division of Ministry of Health and Ministry of Education (hereinafter referred to as *PA-owner*).

PA-owner's specific responsibilities:

- handles project performances;
- insures the endowment of the monitoring points with appropriate measurement devices (natural gas meter) by the starting date of the project implementation;
- keeps the bills for fuel consumption or invoices for fuel purchase;
- annually provides copies of fuel bills or invoices for fuel purchase to Project-monitor;
- appoints the PA-operator.
- arranges for calibration of the natural gas meter and retains evidence of calibration

PA-owner legally designates a person responsible for PA local heating system operation and maintenance (hereinafter referred to as *PA-operator*).

PA-operator's specific responsibilities:

- reads meters offering the relevant data to PA-owner.

Taking into consideration the similarity of energy conservation measures implemented for all considered PAs, the number of PAs, their geographical dispersion and the use of CDM *project participant* term, there will be established a *Carbon Finance Unit* for promoting the whole project to the investor.

In accordance with Appendix D of the CDM modalities and procedures, the decision on the distribution of CERs from a CDM project activity will be taken by project participants represented by the Carbon Finance Unit, which will communicate with the Executive Board, through the secretariat, in writing in accordance with the "modalities of communication" submitted together with the registration form. Thus, the project management will be under the responsibility of the Head of Carbon Finance Unit (hereinafter referred to as *Project manager*).

Project manager's specific responsibilities:

- represents PA-owners for the purposes of this project;
- appoints the Project-monitor;
- assures that the Project monitor is duly trained;
- submits annual monitoring report to DOE;
- takes decisions on the distribution of CERs per PAs.

The Project manager shall designate a person responsible for data collection, archiving and reporting (hereinafter referred to as *Project-monitor*).

Project-monitor's specific responsibilities:

- contacts local PA-owners and monthly collects fuel consumption metered and documented data as required by the monitoring methodology (the data collection is foreseen via e-mail, fax, phone or on site visit);
- verifies the collected data quality and integrity, enters the collected data in the emissions calculation workbook;

- checks that calculation of emissions reduction are in line with the monitoring methodology requirements and assumptions;
- assures that data are stored and relevant measures are taken to avoid loss of information;
- elaborates annual monitoring report;
- informs PA-owners about their emissions reduction performances;
- submits annual monitoring report to Project-manager;
- keeps collected data and elaborated reports available for external audit and verification purposes at least for two years;
- annually, if required to make corrections on estimated parameters (table 1) in the emissions calculation workbook;
- keeps for each year of the crediting period a separate emissions calculation workbook;
- stores the saved files with annual emissions workbooks and annual reports on a local computer and CD;
- keeps e-mails and faxes concerning monitored data on printed paper;
- keeps good records of all mentioned files, reports and original reporting information for a period of two (2) years.

- ***Project manager*** – the Head of the Carbon Finance Unit.
- ***PA-owner*** - the beneficiary of the SIF II Project.
- ***PA-operator*** - the person legally designated by the PA-owner, responsible for PA local heating system operation and maintenance.
- ***Project monitor*** - the person designated by the Carbon Finance Unit, responsible for data collection, archiving and reporting.

Emergency preparedness
All reasonable measures towards emergency preparedness are foreseen under the responsibilities of the Project-monitor and the Project-manager.

Leakage effects
There are no leakage effects foreseen under the project.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity
>>
Starting date of the current CDM project: 15 January , 2006.

C.1.2. Expected operational lifetime of project activity
>>
Expected operational lifetime of the project activities - 15 years.

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
For every project activity installation of a new local heating system is foreseen, which include boiler and local network with an expected operational lifetime from 10 to 15 years. For the already installed boilers

the lifetime is specified as 10 years. For example, the heating plants built in Ungheni are endowed with KCB-type boilers with the specified lifetime of 10 years.
According to Article 49, Decision 17/CP.7 M&P for a CDM, for this project a fixed crediting period of ten (10) years was selected for the proposed project activities with no option of renewal.

C.2.2. Start date of crediting period
>>
29/01/2006

C.2.3. Length of crediting period
>>
10 years

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
Because of the progressive collapse of the district heating systems throughout the country in the beginning of 1990s, and recovering process, which started at the end of the last decade of the previous century, the heat consumption nowadays increase and consequently decrease the electricity used for heating purposes. In spite the fact that generally the energy consumption increases, the project will lead to a substantial environmental pollution reduction.

Due to the implemented measures under the Moldova Energy II Project, the efficiency of heat production increases, thus reducing the fuel consumption and consequently the environmental pollution.

Above it, for the most installed boilers fuel switching is foreseen - instead of coal and mazut (heavy oil) a more environmentally-benign fuel (natural gas/liquid fuel) will be used. By this, a substantial diminution of GHG emissions will occur along with a significant reduction of NOx, SOx and other pollutants.

One more environmental benefit of the project represents the avoidance of asbestos and CFC HCFC insulation extensively earlier used in Moldova. The procurement documentation will prohibit the use of such materials.

For the mentioned above purposes an Environmental Monitoring Plan was elaborated under Moldova Energy II Project and approved by the national authorities.

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders
>>
In order to get local stakeholders comments on the project and their support in the project implementation, the PIU of the Energy II project together with the WB team has organized a special workshop. The workshop was held on October 15, 2004 with the main scope to present to the participating municipalities and District Councils the project's scope and objectives and to agree on the implementing arrangements. The workshop was attended by about 30 participants, mostly representatives of the project beneficiaries, as well as from the Ministries of Ecology and Natural Resources and Energy, from Environmental NGOs and media. The representatives from the WB and PCF made presentations of the current trends and developments of the carbon market, as well as the opportunities were outlined for Moldova. The local consultants hired for the project preparation informed the audience on the projected emission reduction and about the possible implementing arrangements.

The National Commission of Moldova on CDM consisting of all representatives of stakeholders from government agencies, NGO's and academia during June-July 2005 has reviewed the proposed project

activities approved the approach and methodology. The whole review and approval process has taken 30 days, enough to study the project activities. The Decision of Commission taken on July 22, 2005 was favourable and welcoming, all members of the Commission have supported the project activities.

E.2. Summary of comments received

>>

Among the most important received comments are the following:

- The project is very welcomed and will provide additional benefits to the involved communities;
- The additional revenues from the CDCF as the result of emissions reduction sale would serve a good incentive in convincing local councils to implement projects with a emissions reduction potential;
- It would be advisable to use the possible CDCF revenues for similar activities that would generate new emissions reduction;
- Local authorities as well as thermal heating utilities do not have relevant capacity to implement Monitoring Plans and to do emissions reduction studies for what special training would be needed;
- As the CDCF revenues for the emissions reductions are supposed to be at the level of only several US$ thousand, the most preferable way to implement the project is as a bundle all subprojects and to identify an intermediary body, responsible for project implementation;
- As an implementing institution might be a special unit that could be created either under the auspice of Ministry of Energy or under the auspice of the Ministry of Ecology and Natural Resources (MENR). The most preferable solution is to have it under the Ministry of Ecology, as this institution might promote new Carbon Financed Projects not only in the energy sector, but also in other sectors, as forestry, waste water treatment, waste management, etc.

E.3. Report on consideration of comments received

>>

Most important comments, received from the local stakeholders were related to the capacity to implement the project monitoring plan as well as regarding the implementing arrangements. In this regard the project team and mentioned stakeholders agreed on the creation of a special unit to assume a consolidated management of this and of forthcoming new CDCF projects. The consolidation of the implementation mechanism for both projects would provide for synergy, economic and financial efficiencies. Furthermore, such a consolidated unit would also coordinate and promote other future carbon finance activities in the country, especially of small scale, and act as a knowledge bank for carbon finance related activities in general. It was also decided that such entity is best to be created under the MENR, a focal point for Kyoto Protocol related activities.

In order to establish and strengthen the capacity of a special unit that would manage the CDCF projects the MENR requested the WB to provide relevant assistance. The World Bank responded positively to this request and provides a PHRD grant in order to support creation of Carbon Finance Unit (CFU) within the Ministry. The main objectives of the grant (signed in January, 2005) will build the capacity of the CDM CFU staff to implement carbon finance projects, to organize preparation of relevant baseline and monitoring/verification methodologies and legal/contracting issues and dissemination of best practice in this area. The CFU will serve simultaneously as the CDCF counterpart for the two on-going projects and provide support for their implementation. In this respect, the CFU has the following main duties: (a) be responsible for the projects Monitoring Plans; (b) sign the subsidiary agreement with the project participants (Emissions Reduction Owners (EROs) for each of the CDCF Projects), that stipulates the CFU and EROs rights and responsibilities; (c) on behalf of the EROs negotiate with the CDCF the Emission Reduction Purchase Agreements (ERPA) and sign them; and, (d) receive the carbon payments from the CDCF and transfer this money to the EROs, pro rata, according their actual ERs. The CFU also will provide relevant training to the project participants in conducting all

measuring activities that are stipulated in the Monitoring plans for scopes, - emissions reduction studies and Community Benefits Plans.

SECTION F. Approval and authorization

>>

Appropriate letters of approval have been provided.

- - - - -

Appendix 1: Contact information of project participants

Organization	International Bank for Reconstruction and Development as the Trustee of the Community Development Carbon Fund (CDCF)
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Middle name	-
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Mobile	-
Direct fax	
Direct tel.	
Personal e-mail	

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Appendix 2: Affirmation regarding public funding

INFORMATION REGARDING PUBLIC FUNDING

The total Energy II project financing will be US$ 39.93 million, of which US$35 million would be financed from an IDA credit, US$4.33 million from internal cash generation and municipal contributions and US$0.6 million from the Swedish International Development Agency (SIDA). None of these public funds committed to the underlying finance of the Energy II project, and none of the public funds contributed to the Community Development Carbon Fund to purchase emission reductions from the project, result in a diversion of official development assistance. All public funds are separate from and do not count towards financial obligations [in that respect][under the UNFCCC and Kyoto Protocol].

Appendix 3: Applicability of selected methodology

No further information

Appendix 4: Further background information on ex ante calculation of emission reductions

No further information

Appendix 5: Further background information on monitoring plan

No further information

Appendix 6: Summary of post registration changes

A post-registration change was accepted on 16 Mar 2011, in which the main change was that the number of PAs was reduced to 19.

27 Jun 2013: PDD updated to new format. Text was copied directly from most recent approved PDD with minor editorial updates.

21 Jun 2013: The methodology required heat output of the boilers to be monitored using heat meters. It was not possible to install heat meters, or where heat meters were installed, to provide proper maintainance of meters at the boiler locations, because of the cost and the many actors involved. The monitoring plan revision mainly provides a method to calculate heat output of the project boilers utilizing ex-post sampling of boiler efficiency, and clarifications.

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		