JI Programme of activities

Programme of Activity Design Document (PoA-DD)

for the programme

EmSAG

*(**E**missionsverkauf durch **S**chornsteinfeger zur energetischen Verbesserung in **A**nlagentechnik und **G**ebäudehülle)*

Generation of Emission Certificates through Chimney Sweepers for energy-efficiency improvements of technical installations and building envelope

submitted by

Landesinnungsverband Schornsteinfegerhandwerk Hessen (LIV-Hessen)

Am Sportplatz 1a

36251 Bebra

compiled by

FutureCamp Climate GmbH

Aschauer Str. 30

81549 Munich

6 April, 2011

JOINT IMPLEMENTATION PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
Version 01 - in effect as of: 01 November 2009[1]

CONTENTS

A. General description of the JI programme of activities (JI PoA)

B. Duration of the JI PoA

C. Environmental impacts

D. Stakeholders' comments

E. Application of a baseline and monitoring plan for each technology and/or measure under each type of joint implementation programme activity (JPA)

Annexes

Annex 1: Contact information on coordinating entity and participants of the JI PoA

Annex 2: JPA's information table.

Annex 3: Baseline information

Annex 4: Monitoring plan

Annex 5: Participation Agreement

Annex 6: Questionnaire for Energy Certificates

[1] This form is in effect provisionally until it has been formally adopted by the COP

SECTION A. General description of the JI PoA

A.1. Title of the JI PoA:

"EmSAG - Generation of Emission Certificates through Chimney Sweepers for energy-efficiencyimprovements of technical installations and building envelope"

PDD Version 01

Date: 06/04/2011

Table 1: Revision history of the PDD

Version	Date	Comments
Version 01	06/03/2011	PoA-DD Draft prepared for AIE

The sectoral scope of the JI PoA is Energy demand (scope 3) and fuel switch (scope 1).

A.2. Description of the JI PoA:

With the programme at hand the Landesinnungsverband Schornsteinfegerhandwerk Hessen (LIV Hessen) (regional association of chimney sweepers profession in Hesse) aims at providing incentives for energy efficiency measures to reduce primary energy consumption in **residential buildings and similar buildings (public buildings, offices, hotels etc.)** countrywide in Germany. The supporting effects of this JI PoA are focused on a specific target group, which do not benefit from existing funding. Main focus is the **private household sector,** but also other sectors, where buildings are usually not sufficiently insulated, boilers are operated as long as they are technically operational and the application of solar water heaters is very limited. The aim is to create an incentive for the target group in order to bring them about to the energy efficiency measures and emission reductions as potential sources of income.

In Germany all buildings are visited by chimneysweepers with a broad overview and experience about energy efficiency of buildings, its components and installations. Since 2007, when the energy pass *("Energieausweis")* has been regulated by the *EnEV act* (*Energy saving act – "Energieeinsparverordnung"*) many chimneysweepers studied further as energy consultant for buildings. With this training they can offer consultancy services to building owners and housing enterprises regarding energy-efficiency options and are allowed to issue the energy pass.

The main idea is to pool the emission reductions resulting from various efficiency measures for a high number of buildings and installations under the supervision of the trained chimney sweepers for participating in the Kyoto mechanisms and hand over the revenues of the ERU-sales to the participants.

The idea is lasting back for some years and it has been tested in 2008 in a pilot project EmSAG 1.0. Joint Implementation was considered from the beginning as a suitable approach for getting access to the

Kyoto mechanisms in this sector and until now there are few similar JI projects in Germany addressing this sector in a way as presented in the following.

The programme addresses efficiency measures of the building envelope and modernization of the building installations. An explanation of categories of measures is given in Table 2. Single efficiency measures can also be implemented in combination with each other, as energy efficient buildings are to be considered as a complete system, where all components should aligned with each other. There will be no conclusive enumeration of efficiency measures, as it is an essential element of this programme to be open to a various range of high efficient technologies. More detailed information is given in section A.4. and in Annex 3.

The trained chimneysweepers will provide energy consultancies to interested homeowners or housing enterprises. Within these consultancies the chimneysweepers will review the building efficiency status and discuss possible efficiency measures with the homeowners or housing enterprise. When the owner or enterprise decides to participate and implements measures, the chimneysweeper will verify later on the implementation and calculate the emission reductions. The LIV Hessen will collect this information and coordinate the certification process. JI PoA participants will receive an annual ex-post payment based on individual generated emission reductions. The participants will receive a report about their specific annual emission reductions.

Table 2: Technologies implemented by JI PoA and brief description

Technologies		Brief description
Category I: Implementation of efficiency measures at the building		
TM1	**Thermal insulation measures**	Insulation measures of the outer shell, upper floor ceiling, roof, ground floor
TM2	**Replacement of building elements**	Replacement of windows, e.g. with double-glazing, insulating glazing etc., replacement of doors
TM3	**Other improvements**	Sealing of buildings, windows, doors, us of fittings (vitrified front buildings etc.)
Category II: Implementation of efficiency measures regarding building equipment/installations:		
TM4	**Replacement of heating / warm water system**	Replacement of low efficient heating and warm water systems (hot water) with or without fuel switch; this category may also include installation of heat pumps and solar heating systems
TM5	**Installation/ Replacement of ventilation system**	Installation of an automatic ventilation system e.g. with heat exchanger, optimization of existing ventilation systems etc.
TM6	**Other improvements**	Insulation of pipes, hydraulic regulation etc., optimization of installations

Different players for this JI PoA are defined as follows:

- **JI PoA applicant** is the LIV Hessen. The LIV Hessen is the coordinating/managing entity of this JI programme of activities.
- **JI PoA participant** is a single homeowner, a housing society or a housing enterprise, which implements emission reduction measures.

- **Energy consultant** is a chimneysweeper and/or certified building-energy-consultant for energy consultancy. The consultant will do the data-acquisition and a pre-calculation as part of his consultancy.

The final calculation of the reduction might be done centralised in order to guarantee authenticity. The applicant will most probably do the payment.

This JI PoA is a voluntary action by the LIV Hessen. The participation on this JI programme of activities is voluntary for each JI PoA participant.

With regard to **sustainable development** the project contributes in several ways, addressing:

1. **Social well-being:** The project motivates the public to implement active climate protection and energy efficiency. Homeowners and housing enterprises will be sensitised for energy saving measures and for political instruments of climate protection. They will save energy and therefore improve their own economic situation. Investments will be done by a huge amount of households and housing enterprises.
2. **Environmental well-being:** For the project fuel will be saved and primary energy demand will be reduced, therefore natural resources will be protected and less CO_2-emissions will be produced. Hence, the project activity will result in lower emissions to the surrounding environment, thereby contributing to environmental well-being on a regional as well as global level. Furthermore, the project activity shall contribute towards achieving the targets and objectives of the country's policy regarding emission reductions.
3. **Economic well-being:** The project activity shall reduce the costs for heating and warm water by reducing the energy consumption and by the payment of the bonus. Investments will be done and therefore support the regional economy. The beneficial effects would not materialize in the absence of the PoA implementation, as participants would lack information/awareness of the possible measures as well as the monetary effects. It will also help to conserve the fast depleting of natural resources, thereby contributing to the economic development of the country as a whole.
4. **Technological well-being:** Adopting of such efficiency measures shall contribute for an advanced and long-term sustainable technology practice. Moreover, implementing innovative technologies shall create and strengthen local know-how and experience in these technologies.

A.3. Coordinating entity and participants of the JI PoA, as appropriate:

Table 3: JI PoA and parties involved

Coordinating entity name	Landesinnungsverband Schornsteinfegerhandwerks Hessen (LIV Hessen)	
Party involved*	**Legal entity project participant (as applicable)**	**Please indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Germany (Host Party)	Landesinnungsverband Schornsteinfegerhandwerk	No

	Hessen (LIV-Hessen)	
Investor country	To be determined	No
* Please indicate if the Party involved is a host Party. Entities that are under the coordinating entity should not be included.		

The host country **Germany** fulfils the requirements for 1st Track JI.

LIV-Hessen will be the official programme applicant and the responsible body for all administrative affairs of the involved parties in host and investor countries: Designated Focal Point (DFP) and investor.

The German Act on the Flexible Mechanisms of the Kyoto-Protocol implementing the EU Linking Directive (ProMechG – "Projekt-Mechanismen-Gesetz") regarding "reciprocity" will be considered.

Please find contact data details in Annex 1.

A.4. Technical description of the JI PoA:

A.4.1. Location of the JI PoA:

The project is located in the national territory of the Federal Republic of Germany.

A.4.1.1. Host Party(ies):

The Host Party for the proposed project activity is Germany.

Germany fulfils the requirements for 1st Track JI.

A.4.1.2. Geographical boundary:

The geographical programme border is identical with the physical borders of Federal Republic of Germany[2].

A.4.2. Description of each type of JPA:

A.4.2.1. Technology(ies) to be employed, or measures, operations or actions to be implemented by each type of JPA:

[2] This procedure also corresponds to the definition of physical project boundaries in the registered CDM photovoltaic project following a programmatic approach in Morocco (Ref.: 0182).

Each single project activity is considered as a small-scale project activity in the category, Type II. Measures that will be implemented by the programme will lead to an improvement of energy efficiency and therefore to a reduction of the energy demand. The use of renewable energy sources will additionally lead to reduction of CO_2 emissions.

There will be no conclusive enumeration of efficiency measures, as it is an essential element of this programme to be open to a various range of high efficient technologies. Main focus is put on high-investment measures such as boiler replacement or thermal insulation composite systems. However, low-investment measures such as hydraulic regulation will be also implemented.

Categories concerned are as follows:

Category I: Implementation of efficiency measures at the building (renovation of buildings):

Renovation of the building will result in reduced temperature amplitude extremes (daily and seasonal). The reduced energy demand will lead to less fuel consumption for space heating/cooling purposes and in turn to reduce CO_2 emissions. The building component of the programme will comprise measures in the field of:

- **TM1:** Thermal insulation:

  Thermal insulation measures are applied to decrease heat loss. There is a broad range of insulation possibilities regarding the insulation type (such as core insulation, thermal insulation composite system), insulation materials (such as cellulose, fibreglass and rock wool etc.), the size of the insulation layer and the location at the building (such as insulating external walls, ceilings or the roof).

- **TM2:** Replacement of building elements:

  Optimal replacement of building elements (e.g. windows, doors, heaters) can play another significant role in reducing heat losses, such as the application of insulated glass (e.g. double glazing/ double glazed units or insulating glass units (IGU)).

- **TM3:** Other improvements at the building:

  There are still many other improvement measures for building and its architectures, such as sealing of building components, installation of external extensions (e.g. vestibule, vitrified front), which can be implemented as efficiency measures. It is not possible to list all those measures, as new ideas are constantly developed.

Category II: Implementation of efficiency measures regarding building equipment/installations:

Efficiency measures at the technical installations will reduce the fuel consumption to cover the heat demand of the building. There is also the possibility to switch to fuels with less or no CO_2-emissions. Both lead to less CO_2-emissions for room or warm water heating.

The installation component of the programme will comprise measures in the field of:

- **TM4:** Replacement of the heating / warm water system:

  Replacement of low efficient hot water boilers by e.g. low temperature, condensing or biomass boilers:

In contrast to the conventional constant temperature boilers, low temperature boilers are operating at lower or varying temperatures. In most cases operating on partial load leads to significantly higher efficiency levels of heating systems. Condensing boilers are even more efficient, as part of the steam enthalpy contained in the water vapour of the flue gas can be used by condensation. Further emission reductions can be achieved in case of fuel switching to a less CO_2 intensive fuel (e.g. from fuel oil to natural gas) or to biomass.

Installation of electric heat pumps

The installation of electric powered heat pumps to replace or support existing heating and warm water systems leads to substantial Green House Gas (GHG) emission reduction in existing buildings. An annual standard efficiency parameter of four (which is achieved by modern electric powered heat pumps under favourable conditions) means, that an electric heat pump provides four times more (heat) energy compared to the electrical energy it consumes. Thus, three quarters of the used primary energy is the renewable energy. Even under consideration of the losses connected to the limited efficiency for electricity generation, efficient heat pumps can be considered as ecological favourable compared to existing boilers.

Installation of a solar heating system

Solar panels can be used to support an existing or new heating and warm water system. The use of this renewable energy will reduce the fuel demand for the heating system substantially and thus contribute to lower emissions. Solar systems can support the heating of warm water with the help of a heat exchanger. With an adequate panel area, even the heating system can be supported.

- **TM5:** Installation/Replacement of ventilation system:

  Ventilation systems fulfil various functions: They exchange fresh air with exhaust air with minimum heat losses. At the same time they reduce the CO_2 and the humidity concentration in the room air. This increases the air quality and protects the building fabric. In combination with geo heat exchanger it regulates the heat in the building. There are systems with and without heat recovery systems, decentralised or centralised systems and combinations with heat pumps. A high amount of energy can be saved, up to 90% of the heat from the exhaust air can be recovered and used to heat the fresh air.

- **TM6:** Other improvements at installations

  There exist a broad range of other improvements for installations, and still new technologies are constantly developed. Some examples are: intelligent control systems, efficient heaters, floor/surface heating, modern flue gas systems, modern tank systems etc. Many of those measures will be implemented with other measures described above.

Under this programme it is possible to combine all described measures from the two main categories as it generally makes sense to align measures to reduce heat losses, e.g. insulation measures with measures to reduce fuel consumption as e.g. boiler replacement. In combination with the use of renewable energy sources such as biomass, solar energy or geothermal energy, emission reductions will be even higher.

For a detailed list of different measures please see Annex 3. However, please note that the list of measures in Annex 3 and section A 4.2. is not exhaustive as there is a broad range of possible installations and building measures, and still new technologies are constantly developed.

A.4.3. Eligibility criteria for inclusion of a JPA in the JI PoA:

In order to clearly define the participants, who qualify for the project, the project coordinating/managing entity will control each JI PoA participant using a list of eligibility criteria. If a homeowner or a housing enterprise decides to take part in the project, the general framework, conditions and the monitoring requirements described must be accepted, whereas the JI PoA participant and LIV Hessen will enter into a contract.

Table 4 and table 5 below sum up all criteria for participation:

Table 4: General Participation criteria

1. General JPA Participation Criteria	
1	The participant implements one efficiency measure from one of the categories described in section A.4.2.1 or a combination of several measures of one or both categories.
2	The measures are implemented in the building of one of the following target groups: • Single homeowners; • Housing societies; • Housing enterprises; • Small and medium enterprises (small offices, hotels); • Municipalities (public buildings). The size limit is in the scope of the "1. BundesImmissionsSchutzVerordnung" (1st Federal Emissions Protection Act). These are furnaces that are not covered by the 4th BImSchV regulations.
3	No public subsidies are used for the implementation of the measures.
4	The measures are neither registered as a JPA nor included in another registered JI PoA.
5	The generated emission reductions are not being sold to any other project.
6	The proposed JPA leads to annual energy savings that are not greater than 1% of the small scale threshold. If the JPA exceeds this threshold, the JPA should provide check according to the methodology provided below.

According to the rules provided in paragraph 2 "*Guidelines on assessment of de-bundling for SSC project activity*", Version 02, EB 47, it should be ensured that each JPA requesting registration under this PoA is in fact no de-bundled component of a large-scale activity:

> *"If each of the independent subsystems/measures (e.g. biogas digester, solar home system) included in the CPA of a PoA is no greater than 1% of the small scale thresholds defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check i.e. considered as being not a de-bundled component of a large scale activity."*

It can be shown that each subsystem/measure (small different efficiency measures) included in the proposed JPA leads to annual energy savings that are not greater than 1% of the small scale threshold defined by the "*Simplified modalities and procedures for small-scale clean development mechanism project activities*" (decision 4/CMP.1, Annex II)[3]. Furthermore, in the methodology it is stipulated a threshold of 15 megawatts maximum output capacity equivalent for renewable energy projects (Type A), a threshold of 15 gigawatt hours per year for energy efficiency measures, which reduce energy consumption, on the supply and/or demand side (Type B) and a threshold of 15 kilotonnes of carbon dioxide equivalent annually for other project activities that both reduce anthropogenic emissions by sources (Type C). This means: thresholds per measure for Type A of max. 150 kW capacities, for Type B of max. 150 MWh/a energy consumption, and for Type C of max. 150 t CO_2e/a emission reductions. As individual measures will in general concern mainly the household sector, all thresholds will easily be fulfilled. Thus, the JPA is exempt from performing the de-bundling check, as it is not considered to be a de-bundled component of a large-scale activity. However, the coordinating entity will check if the measures will be within the threshold limits. If not, the de-bundling check will be performed individually.

Table 5: Technology Specific Participation Criteria

2. Technology Specific JPA Participation Criteria		
	Category I	**Category II**
7	The heat for the building must not be provided by one of the following heating sources: • Biomass boilers; • Electric heaters or electric heat pumps; • District heating grid that is connected to EU-ETS installations.	The replaced installation must not be one of the following types: • Biomass boilers; • Electric heaters or electric heat pumps; • District heating grid that is connected to EU-ETS installations.
8	There is no legal requirement (national and EU-Law) for thermo-modernization of the building.[4]	There is no legal requirement (national and EU-Law) for modernization or replacement of the installation.[5]
9		There is no technical obligation for modernization or replacement of the installation [6]

Substitution of electricity or heat from EU-ETS-grids must not be accounted for ERU generation to avoid double counting. Therefore, heat supply from any of these sources is excluded from participation (criteria 7). The remaining lifetime for the old installation will be proven by legal requirements. If the replacement of boilers is not required, it is assumed that the expected lifetime of the boilers will be longer than the duration of the crediting period.

[3] UNFCCC: http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=43

[4] For further detailed information regarding the legal requirements please see Section E.2.3.

[5] For further detailed information regarding the legal requirements please see Section E.2.3.

[6] For further detailed information regarding the legal requirements please see Section E.2.3.

Every JI PoA participant, who wants to gain the income from the certificates sale, has to agree on the project conditions. The legal basis is constituted by the agreement between the JI PoA participant and the coordinating/managing entity. It includes:

- JI PoA participation;
- Collection and transfer of the relevant data and information before and after the activities implementation;
- Disposability of the generated project emission reductions from the project to the coordinating/managing entity;
- Commitment not to sell the generated emission reductions to any other project.

A separate document **"Participation agreement"** is attached in Annex 5. By signing the Participation agreement each participant is responsible for the accuracy of statements in the agreement and LIV Hessen has to check whether the participant is in conformance with all participation criteria.

A.4.4. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI PoA or each type of JPA, including why the emission reductions would not occur in the absence of the proposed JI PoA or each type of JPA, taking into account national and/or sectoral policies and circumstances, as appropriate (assessment and demonstration of additionality):

The programme at hand is designed in a way to facilitate energy efficiency measures, which lead to substantial emission reductions. Those GHG reductions are achieved due to:

- Lower fuel demand due to more efficient installations;
- Lower fuel demand due to the use of renewable energy sources;
- Lower carbon content of fuels in case of fuel switching;
- Lower fuel demand in case of measures at the building to reduce heat losses.

In the absence of the JI PoA respective efficiency measures would not be implemented in the housing/building market.

The **estimated emission reductions amount is about 60,000** t CO_2/yr over a crediting period of 10 years[7]. The emission reductions are based on a prognosis of the expected number of JI PoA participants. The amount of the emission reductions can increase or decrease over the course of the project. The following non-complete list gives possible reasons for an ex-post difference in the volume of emission reductions:

- Insufficient or excelled number of the JI PoA participants;
- New legislative regulations and technical requirements, not allowing on the further continuation of the project;

[7] Assumptions regarding emission reductions are based on the experience from the pilot project EmSAG 2.0.

- New technologies are developed, which makes the participation in this project unattractive;
- New subsidy-programmes are floated, which make the participation in this project unattractive.

It is assumed, that during the project period none new technologies are invented, which make the participation on this project unattractive.

A.4.5. Operational, management and monitoring plan:

A.4.5.1. Operational and management plan for the JI PoA:

LIV Hessen in the role of a managing/coordinating entity will supervise the monitoring process. The operational and management structure is based mostly on existing LIV Hessen procedures. Small adjustments are introduced in order to provide evidence on emission reductions.

The following **LIV Hessen units will be involved in the management** of the Programme:

- **Technical Department** will be responsible for:
  - Maintaining contact with DFP, verifier;
  - Overseeing the proper implementation of the Programme;
  - Monitoring of eligibility of each participant acceding to the PoA;
  - Processing of the aggregate data on implemented measures, monitoring effects;
  - Calculation of the ecological effect (CO_2 emission reduction);
  - Submitting monitoring reports to the verifier and to the DFP.
- **Financial Department** will be responsible for:
  - Supporting the Technical Department regarding financial and accounting issues of emission trading;
  - All aspects of the certificate management and bonus payment to the participants.
- **Department Quality Management** will be responsible for:
  - Internal verification of the data management.
- **Landesfachschule des Schornsteinfegerhandwerks Hessen** will be responsible for:
  - Training of the energy consultants regarding the Programme implementation in tight cooperation with the Technical Department.

The energy consultants, who are certified building-energy consulting chimneysweepers or others with a comparable qualification (certified building-energy consults from different crafts), will implement and supervise the JI PoA at JPA level. They are directly responsible to report to the LIV Hessen. All JI PoA

consultants are directly or indirectly through his/her employer associated to the LIV Hessen. They will be responsible for:

- The data acquisition at JPA level;
- Maintaining contact to the JI PoA participant and to LIV Hessen (Technical Department);
- First eligibility criteria check;
- A pre-calculation of emission reductions at JPA level;
- Check of the implemented measures;
- Collection of all necessary data and documentations;
- Data entry at JPA level in a predefined form with the help of energy consultancy software programmes before and after the implementation of measures at JPA level;
- Data transfer of this form to LIV Hessen.

LIV Hessen and its associated companies are certified according to DIN EN ISO 9001:2000/14001:2005 Quality and Environmental Management System. This system is now implemented on all organizational levels of the association and its members. This QM/EM system will also be applied to the operation and management of the JI PoA and guarantees the correct handling of the JI PoA.

Eligibility criteria checks

The eligibility for participant registration will be checked in 2 stages.

Stage 1: *Consultancy stage*

Within its energy consulting service the energy consultant checks the eligibility criteria of the potential JI PoA participant. All necessary data about measures, which qualify for the Programme, is collected in a predefined form with the help of an energy consulting software programme. This information is part of the "Participation agreement", signed by the JI PoA participant, which contains also other necessary information from the participant. See Annex 5 for a template "Participation agreement".

The energy consultant will then store the calculation form and the signed "Participation agreement" with all necessary documents and will send them to LIV Hessen after the implementation stage (see stage 2).

Stage 2: *Implementation stage*

At the implementation stage, the energy consultant will again visit the JI PoA participant and check what measures have been implemented and collect again all necessary data and documents, and enters the data in the predefined form. Again, the JI PoA participant and the consultant sign this form. The consultant will send this form and all necessary documents to LIV Hessen. Here, all data and documents will be checked regarding their completeness and plausibility. If this check is positively evaluated, the participant will be registered as potential JI PoA participant. Within the scope of the internal verification process of the quality management system there will be an extra internal verifying process performed. This includes also the sample check of input data at JPA level.

At LIV Hessen, the data will be checked regarding its completeness and plausibility. After the measures have been implemented and only if all eligibility criteria are fulfilled at this point of time the participant will be registered JI PoA participant. Within the scope of the internal verification process of the quality management system there will be an extra internal verifying process performed. This includes also the sample check of input data at JPA level.

A.4.5.2. Monitoring plan for each technology and/or measure under each type of JPA:

The monitoring plan chosen for each type of JPA is based on a deemed savings calculation as it is required for the issuance of a so-called *"Energieausweis"*, which is an energy pass for the building. This is regulated by the *EnEV* act (*Energy saving act – "Energieeinsparverordnung"*). The calculation of emission reductions will be performed for all JPAs based on the calculated fuel demand of the baseline building and the fuel demand after implementing reduction measures (**ex-ante calculation**). As a general rule it can be said that the heat demand for older buildings (baseline) will be corrected to lower values whereas the values for newer buildings (project) will be increased. Therefore, the discounting results are in a conservative calculation of emission reductions. In addition a yearly discount factor of 1% per year shall be applied on the results, considering smaller emission reduction achievements in the absence of the project.

To avoid any discrepancies due to different software applications, the same software tool shall be utilized for the calculation of baseline and project emissions of each participant. The calculation of emission reductions will be done centrally at LIV Hessen based on the exported results of the energy consulting tools. All documents will be stored and back-ups of the digital data will be made and stored safely at the coordinating entity.

For a more detailed description of the monitoring plan please see section E.4.

A.6. JI PoA approval by the Parties involved:

Landesinnungsverband Schornsteinfegerhandwerk Hessen (LIV-Hessen) will apply with this document for a Letter of Approval (LoA) by the DEHSt as DFP of the host country after receiving the determination report.

Furthermore, an approval by the DFP of the investor country has to be issued before the project registration and the first verification report upon request of the project coordinating/managing entity Landesinnungsverband Schornsteinfegerhandwerk Hessen (LIV-Hessen).

SECTION B. Duration of the JI PoA / crediting period

B.1. Starting date of the JI PoA:

The starting date of the programme is considered to be the application for a Letter of Endorsement (LoE) at the DEHSt, which took place on 22/03/2010.

Table 6: Chronology of the programme start and developments

Date	Actions
14/09/2005	Start of the pilot project EmSAG
15/12/2008	Final report of the pilot project
29/01/2010	Kick Off Workshop PIN development with FutureCamp Climate
22/03/2010	Application for LoE
23/06/2010	Workshop PDD Development with FutureCamp Climate
11/11/2010	Receipt of LoE

B.2. Expected operational lifetime of the JI PoA:

The expected lifetime of technical installations depends on the technology applied. According to technical-scientific literature called VDI 2067[8], the expected lifetime is between 30 and 50 for each thermal insulation measures, between 25 and 40 for window and between 15 and 20 years for thermal generating plants[9].

Thus the measures under the PoA are expected to generate lasting effects for several decades.

[8] VDI Gesellschaft Technische Gebäudeausrüstung (2007): Verbrauchskennwerte für Gebäude, Blatt 1: Energie- und Wasserverbrauchskennwerte für Gebäude – Grundlagen (Consumption parameters for buildings, sheet 1: energy and water consumption parameters for buildings –basic)

[9] „Effekte der Förderfälle des Jahres 2009 des CO2-Gebaeudesanierungsprogramms und des Programms Energieeffizient Sanieren“, August 2010, KfW Bankengruppe und Bremer Energie Institut

B.3. Length of the crediting period:

A fixed crediting period of 10 years for each JI PoA participant shall be applied. Therefore, the crediting period is assumed to last from the year when the particular JPA starts until maximum 2022, for example 2012 until 2022.

However, the current regulations define the crediting period to be in principle 01/01/2009 up to 31/12/2012. As confirmed by the German National Focal Point DEHSt, JI projects in Germany can generate emission reduction units (ERU) after receipt of the LoE, which is 11/11/2010 until 31/12/2012. However, if there's a successor of the current EU emissions trading guideline for 2013 onwards and if a post-Kyoto treaty will allow a continuation of the JI project, appropriate steps shall be taken to prolong the crediting period.

SECTION C. Environmental impacts

C.1. Documentation on the analysis of the environmental impacts of each type of JPA, including transboundary impacts, in accordance with procedures as determined by the host Party(ies):

The programme activity shall contribute towards achieving the targets and objectives of the country's policy regarding emission reductions. The following environmental aspects are linked to the programme activities:

In case of natural gas/oil:

- Lower flue gas emissions (NO_X, SO_2, dust, soot) from production and transport of coal in case of fuel switch from coal to natural gas/or oil
- Lower emissions from production and transport of coal in case of fuel switch from coal to natural gas/or oil;
- Lower emissions from production, transport and refining of oil in case of fuel switch from oil to natural gas.

In case of biomass:

- Lower emissions from natural gas losses in production process and in transport of natural gas in case of fuel switch from gas to biomass;
- Possibly lower emissions from production, transport and refining of fuel oil or from production and transport of coal in case of fuel switch from coal or oil to biomass;
- Increase of dust emissions in case of switch from natural gas to biomass;
- Decreased dust emissions in case of switch from coal to biomass;
- Increase of noise, e.g. from transportation of biomass.

The only possible negative environmental effects are linked to the handling and burning of biomass. This might result in increased dust emissions (compared to natural gas installations). However, the German legislation defines strict emission limits regarding the considered installation types and it will be guaranteed that all installations will meet all necessary requirements.

All installations have to comply with regulations of the 1. *BImSchV*. The following regulations are applied:

- According to the 1. BImSchV the dust emission values shall be below 150 mg/m³.

Besides the requirements of the *BImSchG*, the following legislative requirement makes sure that possible negative environmental effects are minimised:

- *"Combustion Regulation" (FeuVO - Feuerungsverordnung):* On the level of federal states the ordinance regulates details about storage and handling of biomass as well as installation of boilers

In case of heat pumps:

Potential impacts are:

- Hydro Fluoro Carbon (HFC) emissions of the working fluid during the operation of some heat pump systems; and
- Upstream emissions from burning fossil fuels for meeting electricity demand of the pump.
- Lower emissions from natural gas losses in production process and in transport of natural gas;
- Possibly lower emissions from production, transport and refining of fuel oil or from production and transport of coal;
- Reduction of flue gas emissions (NO_X, SO_2, dust, soot).

The first aspect is considered in section E.4.1.2 under project emissions. The second aspect is further discussed in the section on potential leakages (cf. E.4.3) where also justification for the negligibility of such effects is given.

In case of insulation and solar-thermal application:

- Lower emissions from natural gas losses in production process and in transport of natural gas;
- Possibly lower emissions from production, transport and refining of fuel oil or from production and transport of coal;
- Reduction of flue gas emissions (NO_X, SO_2, dust, soot).

The following **socio-economic aspects** are linked to the programme activities:

- Creating an incentive for investment;
- Stimulating technology diffusion;
- Stimulating cost cutting;
- Raising activity in the handcraft sector;
- Development of rural areas (in the case of biomass);
- Reduction of energy demand and costs for consumers.

Besides, there are no essential differences between the baseline and the programme situation.

C.2. If environmental impacts are considered significant by the participants or the host Party(ies), please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party(ies):

1. Environmental Impact Assessment is done at PoA level ☐
2. Environmental Impact Assessment is done at JPA level ☐

As negative environmental impacts are not considered significant, an environmental impact assessment is not necessary on programme level. On project activity level, environmental impact assessments will be done if required by legislation (Environmental Impacts Assessment Act).

SECTION D. Stakeholders' comments

D.1. Information on stakeholders' comments on the JI PoA, as appropriate:

There will be no local stakeholder consultations, as it is not required by legislation and no negative impacts can be expected to any stakeholders.

SECTION E. Application of a baseline and monitoring plan for each technology and /or measure under each type of JPA

E.1. Description and justification of the baseline chosen for each technology and/or measure under each type of JPA:

The available approved baseline methodologies for programmatic CDM or JI projects do not provide adequate procedures/ways for determination of GHG reductions within this programme. Existing efficiency improvement methodologies (cf. AMS II.E) or fuel switch methodologies (cf. AMS I.C, AMS II.D, AMS III.B) are not applicable because none of them describe the calculation of baseline emissions based on a conservative emissions trend that is based on a statistical scientific study. Therefore, for any arguable data calculation and adaptation a conservative project specific approach is used.

The following Baseline approaches are generally available:

Option 1:

Historical emissions: within the JI PoA, the historical emission data will be determined for each JI PoA participant. Every participant shall be considered individually. Within this baseline approach the actually achieved emission reductions are accurately calculated.

Option 2:

Least Cost Alternative: The JI PoA does not aim on JI PoA participants who are planning to implement energy efficiency measures anyway and just looking for the most economic way of its implementation. Of interest are those participants, who are not planning to implement measures without any additional incentive. Therefore the Least Cost Alternative approach is not applicable for the described project activities.

Option 3:

Benchmark: a comparison with the best 20% similar projects is here not reasonable. Goal of the JI project is not the distribution of a new technology, which has not been used in Germany before. It concerns the innovative development of a potential, which has not been reached up to now, namely low and high investment measures to increase energy efficiency.

The **Option 1: Historical emissions approach** is most suitable for the preparation of a reference scenario for the existing installations and user behaviour. This approach will allow on calculation of the actual emission reductions.

For each individual participant data on the historical situation (heat demand of the building via compilation of an energy profile) will be collected before implementation of measures. This data will be obtained through special trained chimneysweeper within an individual energy consultancy.

The fuel demand will be calculated as described in section E.4.

Baseline emissions will be reduced yearly, based on the CO_2 building report by the Federal Ministry of Traffic, Construction and Urban Development [10], by 1 % - taking into account the actual emissions trend in the absence of the project activity. This includes also effects of the rise or cut in the fuel price and emission reductions due to investments based on subsidies and legal enforcement.

E.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI PoA or the JPA, as appropriate:

The assessment of **additionality analysis** for a typical JPA is performed **based on the "*Additionality Tool*"** of the CDM Executive Board (Version 05, 2 EB 39). The additionality tool is generally made **from perspective of JI PoA participant and coordinating/ managing entity** in order to ensure a wide view of all aspects of the project partners. The general approach of the additionality analysis with information relevant for the PoA is described in this section. Thus, where reasonable the **discussion will take into account both additionality perspectives**, in section B.2.2: Coordinating/managing entity (JI PoA level) and in section B.2.3.: JI PoA participants (JPA level).

In addition the Guidelines for demonstrating additionality of renewable energy projects =<5 MW and energy efficiency projects with energy savings <=20 GWh per year, (Version 01) shall be applied. These Guidelines are applicable as the following criteria are satisfied:

3 (b) The project activity is an energy efficiency activity with both conditions (i) and (ii) satisfied (see below);

(i) Each of the independent subsystem/measure in the project activity achieves an estimated annual energy savings of equal to smaller than 600 megawatt hours; and

(ii) End users of the subsystem or measure are households/communities/SME.

[10] Ministry report: „CO_2 Gebäudereport 2007“ by the Federal Ministry of Traffic, Construction and Urban Development (Bundesministerium für Verkehr, Bau und Stadtentwicklung – BMVBS): The CO_2 emissions of private households for living have been reduced from 1990 till 2005 by 13 %, which is an annual reduction of 0,9 %.

The evaluation of the alternatives is based on economic attractiveness and other critical considerations. The programme proponent carried out a complete analysis among the credible and realistic alternatives (as mentioned above) based on the following key parameters:

1. Possible public funding
2. Legal framework;
3. Common practice analysis;
4. Other important considerations in order to determine the baseline and additionality.

E.2.1. Public funding of the programme of activities relevant for JI PoA and JPA level:

1. ***"KfW":*** Subsidies are available in the form of low-interest loans as well as a repayment-allowance of up to 15 % as part of the "*KfW's CO_2 Building Refurbishment programme" ("CO_2-Gebäudesanierungsprogramm")*, as part of the "*KfW's Housing Modernisation" ("Wohnraum Modernisieren")*, *"Ecological Building" ("Ökologisch Bauen")* programmes or *"Social Investment-Energetic Building Refurbishment programme"("Sozial investieren – Energetische Gebäudesanierung")* for public buildings. These support programs apply to action packages for building works and heating installation modernisations or to single measures for energy efficiency renovations.
2. ***"BAFA - Marktanreizprogramm":*** There are also BAFA support programmes for gas condensing boilers and solar panels. In case of switching to biomass there are public subsidies available under the "*Marktanreizprogramm"*. Those subsidies are available for Individuals, small and medium-sized private commercial enterprise as defined by the European Communities, companies in which majority owned by municipalities and at the same time below the thresholds for SMEs and municipalities, local authorities, local syndicates, non-profit investors. Therefore, installations that receive remuneration in terms of "*BAFA"* are excluded from this JI PoA project.
3. ***"German Heat and Power Cogeneration Act"* and *"EEG":*** As defined in § 5 art. 1 "*ProMechG" ("Pro-Mechanismen-Gesetz"*), the remuneration of electricity pursuant to "*EEG" ("Energie-Einspeise-Gesetz" – "Energy feed in tariff act")* and the bonus payable for electricity from combined heat and power installations pursuant to the "*KWKG" ("Kraft-Wärme-Kopplungsgesetz", "German Heat and Power Cogeneration Act")* are considered equivalent to public funding. Therefore, installations that receive remuneration in terms of "*EEG"* or "*KWKG"* are excluded from this JI PoA project.

4. ***„Vor-Ort-Beratung"*[11]:** Existing consultation programme supported with financial incentives by the government has according to the scientific study of the Bremer Energy Institute[12] almost no influence on decreasing energy consumption in private households. Most consumers who already decided to implement measures do, however, inform themselves before implementing efficiency measures. However, this is not relevant for the programme at hand, since energy consultancy by chimney sweeps do not benefit from it as they are excluded
5. There are further various funding programmes. However, they are regional specific and not applicable for the programme at hand[13].

To **exclude eventual double-funding** with these existing schemes, the participants of the JI PoA accept within the participation agreement to indicate any subsidies received for the respective measure which shall be implemented during the crediting period. The exclusion modalities for participation are determined in the PDD – section A (cf. participant criteria) and will be furthermore indicated and explained in a Participation agreement. It is regulated, that in order to qualify for this JI project, JI PoA **participants must not use any public subsidies for the implementation of the activities** (cf. Table 4 of A.4.3).

E.2.2: Additionality from the perspective of the coordinating/managing entity (JI PoA level):

Step 1: Identification of alternatives to the programme of activities consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:

Regarding the planned JI-Project, the following alternatives have been identified:

[11] BAFA„Vor-Ort-Beratung" des Bundesministeriums für Wirtschaft und Technologie, http://www.bafa.de/bafa/de/energie/energiesparberatung/index.html

[12] Obtained from the study of the energy institute of Bremen (bremer energie institut): Entwicklung des Energieverbrauchs für Heizung und Warmwasser bei Einfamilienhäusern, 2007.

[13] Förderprogramme", Kompetenz Zentrum HessenRohstoffe (HeRo), http://www.holzundpellets.de/images/stories/koop_hero_foerderprogramme.pdf , August 2008

Alternative 1. *Status quo*

The coordinating/managing entity has not up to now implement any JI project and does not provide incentives to implement such ones within the scope of existing incentive programmes. Since there are no legal requirements to do so, this status quo would be a realistic alternative.

Alternative 2*. Increased incentive for fuel switch and/or efficiency measures at the building or installations without a programme*

The coordinating/managing entity does not implement any JI project, but provides other incentives to implement the efficiency increase activities such as boiler replacement without fuel switch beyond the scope of existing programmes. Here again no national or state specific legal or other obligation enforces such incentives.

All alternative investments are in compliance with the mandatory applicable legal and regulatory requirements in Germany.

Outcome of Additionality analysis for JI PoA:

It can be stated that due to its features (no legal obligation) the status quo alternative must represent the baseline of the JI PoA project.

E.2.3. Additionality from the perspective of typical JPA (JPA level):

Step 1: Identification of alternatives to the programme of activities consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:

Regarding potential JPAs, the following two alternatives have been identified:

Alternative 1. *Status quo*

The current situation is continued, i.e. there is no change in existing fossil fuelled systems; thus

- no energy efficiency measures at the building are to be implemented (Category I);
- no modernization of the existing installation is conducted (Category II);

Alternative 2. *Programme scenario without JI income – implementation of energy efficiency measures (Category I, Category II), i.e.*

- energy efficiency measures at the building (Category I);
- installation modernisation (Category II).

In this second scenario one or several measures within the above mentioned categories are implemented.

Sub-step 1b: Consistency with mandatory laws and regulations:

The following laws are relevant and thus considered here:

Currently, as described below, all legal regulations relevant for the programme at hand are taken into account. In case new legislations or regulations come in the time frame of the programme, the relevance for the participants and the programme will be checked within the eligibility criteria as well as the "Participation agreement".

1. ***"EnEV" act***:: The ***"energy saving act" (EnEV - Energieeinsparverordnung)*** is a part of the German building law. It regulates the standard requirements for energy efficient operation of building or construction projects. It applies to residential buildings, office buildings and some farm buildings.

   The following regulations are relevant for above mentioned buildings, except from residential buildings with only one or two apartments, if the building owner lives in one of those apartments and the ownership does not change[14].

[14] In case of change of building owner after 1st February 2002, the new owner shall fulfil the requirements according to EnEV.

- *"EnEV 2009"* regulates in addition the insulation of heating pipes in the heat distribution and warm water net (§10(2), EnEV 2009). This regulation is mandatory for existing installations as well.
- *"EnEV 2009"* regulates in addition insulation requirements of the upper ceiling (§10(3), EnEV 2009).

2. ***"1. BImSchV "***: The *"1. BImSchV" ("1. BundesImmissionsSchutzVerordnung" – 1st Federal Emissions Protection Act)* for small and medium heating systems must also be taken into account. It does not stipulate any technical operational lifetime, but maximum emission values, which the heating system must not exceed. These are checked by the chimney sweeper, who is entitled to order the decommissioning, if the thresholds are exceeded. In summary it can be ascertained, that boilers can be operated as long as they do not exceed the thresholds defined in the *"1. BImSchV"*.
3. ***"TA Luft":*** The requirements of the "*TA Luft" ("Technische Anleitung Luft" – "Technical Instructions on Air Quality Control")* apply to industrial heating systems, which are subject to authorisation (coal, heavy fuel oil >1MW). Thus, this regulation is not relevant for the target group.
4. "***4. BImSchV"***: According to "*4. BImSchV"*the following installations require permission:
   a) natural gas and light fuel oil operating installations for steam generation of thermal input> 20MW ("*4. BImSchV"*Nr. 1.2 c)[15]
   b) coal and heavy oil operating installations of thermal input > 1MW ("*4. BImSchV"*Nr. 1.2 a)

   Thus, this regulation is not relevant for the target group. Installations requiring permission according to 4th BImSchV are excluded from participation.
5. ***"German Act on the promotion of Renewable Energies in the Heat Sector:"*** The "*German Act on the promotion of Renewable Energies in the Heat Sector"* (*EEwärmeG* – Erneuerbare-Energie-Wärme-Gesetz*)* went into force at 1st January 2009. Owners of newly erected buildings must use renewable energies for their heat requirements. This Act is irrelevant for the programme at hand as it is regarding only new buildings and those are excluded from the programme.
6. ***"Heat act" ("Wärmegesetz"):*** In Baden-Württemberg there's a similar heat act implemented for households that also affects existing buildings if heating systems will be replaced as from 2010. However, this law does not affect the baseline of the programme, as the continued operation of the old installations is not restricted at all.

[15] Installations, which are liable to European Emissions Trading according to TEHG are excluded from this JI project

7. ***"German Biomass Regulation"*:** The *"German Biomass Regulation" (BiomasseV – Verordnung über die Erzeugung von Strom aus Biomasse)* from 21st June 2001 regulates definitions and environmental requirements for biomass used for power production. This regulation is irrelevant for the programme, as it is regarding only power generation and this is excluded from the programme.
8. ***"Environmental Impacts Assessment Act":*** („*Gesetz über die Umweltverträglichkeitsprüfung*"): This Act is relevant only for installations above 1MW. Those installations are obliged to check the necessity of an environmental impact assessment. As installations within this programme will have less 1 MW, this act is not relevant for this programme.
9. ***"Feuerungsverordnung"***: On the level of federal states the ordinance regulates details about storage and handling of biomass as well as installation of boilers.

Currently there are no regulations concerning modernization of existing buildings. The requirements in the most relevant regulations for buildings (1-EnEV, 5-Renewable energies in the heat sector) target either new buildings or new building elements in case of extension of a building. Both are not in the target group of this programme as only modernization of existing buildings will be considered.

In case of boiler replacement, modernization might be required due to 1 (EnEV) or 2 (1.BImSchV). This will be checked in the participation agreement. In case of modernization requirements, this measure cannot be included in the programme. However if additional thermomodernization measures will be implemented in the building which are not subject to any subsidies or legal requirements, they can still be included. In that case the baseline will be calculated in a conservative way by use of the new heat installation's values for both, the baseline and the project scenario.

All legal regulations relevant for the programme at hand are taken into account. In case new legislations or regulations come in the time frame of the programme, the relevance for the participants and the programme will be checked within the eligibility criteria as well as the "Participation agreement".

Outcome of Step 1a and 1b:

All alternative investments are in compliance with the mandatory applicable legal and regulatory requirements in Germany. At the same time there is no effects from mandatory requirements regarding the use of any technology scenario. Therefore, every future JI PoA participant may freely chose between the different scenarios.

For further additionality discussion Step 2 and 3 are skipped as the simplified guidelines for demonstrating additionality are applied which is also in line with the LoE.

Step 4: Common Practice Analysis

The goal of the JI project activities is to implement technologies, which could be respectively common practice, in order to cut emissions to zero and to save energy and costs.

Sub-step 4a: Analyse other activities similar to the proposed programme of activities:

With this project LIV Hessen is the second company/organization nationwide providing such type of project. Neither the JI PoA nor the JPAs are common practice in the household sector. Therefore, this project is not considered as common practice. Furthermore, the project can be also considered as first of its kind as there is only one comparable JI project in Germany known. This is the programme from EWE AG. Each single participant has to confirm in a Participation agreement that he/she is not included in another registered JI project as project participant.

Category I:

According to the report "*CO_2 Gebäude Report 2007"* most building owners are not willing to invest in such efficiency measures[16]. For example, only 0.91% of the existing buildings have been modernised in 2009 within the *"CO_2 building refurbishment programme*" and the *"Energy efficient refurbishment*"[17]. Furthermore, the pilot project EMSAG demonstrates that half of the efficiency measures are fulfilled voluntary without any public funding or due to legal requirements[18].

[16] CO_2 Gebäude Report 2007, im Auftrag des Bundesministeriums für Verkehr, Bau und Stadtentwicklung

[17] „Effekte des Foerderfaelle des Jahres 2009 des CO2-Gebaeudesanierungsprogramms und des Programms Energieeffizient Sanieren", August 2010, KfW Bankengruppe und Bremer Energie Institut

[18] Abschluss Bericht 2008, Model Projekt EmSAG, Landesinnungsverband Schornsteinfegerhandwerk Hessen

Besides, in accordance to "*CO_2 Gebäude Report 2007"* report in the last twelve years, the remediation activities have increased. During the period 1994 to 2006 the rate of refurbishment has increased from 1.6 percent to 2.2 percent. This represents the equivalent of about 230,000 fully renovated buildings per year. Furthermore, insulation measures have been done on only 11% of the buildings facade and on only about 20% of the roof[19]. Therefore, it can be stated that such measures are not common practice in Germany.

Category II:

Regarding different installation measures there is further demand for renovation.

Studies regarding the high number of old oil boilers and the great potential for boiler replacement in the household sector for Germany has been issued "*CO_2 Gebäude Report 2007*"[20]. According to that study, in 2006 14 % of all German oil burners were older than 23 years and an additional nine percent were older than 27 years. Regarding natural gas burners eight percent are older than 23 years and three percent were older than 27 years. Taking into account that heating technologies have been significantly developed in last years, it can be stated that there is a great potential for modernisation in the household sector and that there are still existing barriers for the replacement of boilers especially for households.

Moreover, regarding biomass installations, the majority of new biomass installations in the last years in Germany have been stipulated by the renewable energy law, these installations are not allowed to participate in the programme. Existing installations for heat generation are often located in industries where biomass residues can be used (i.e. wood processing industries) or in public buildings where beyond economical considerations the image plays a vital role. The market share of biomass in the commercial and industrial heating segment is still small. A survey about renewable energies in Germany states the overall contribution of biomass in the heating segment at 4 % in 2005. The majority of this contribution is in the programme target group, household sector, whereas commercial and industrial users account for about 20% of this share[21]. Therefore, it can be stated that the project activity regarding biomass is not common practice in the household-heating segment and sub-step 4b can be skipped regarding biomass installations.

Furthermore, according to a study of the Wuppertal Institute for Climate, Environment and Energy there is large energy saving potential, which could be used by application of the best available technologies. The largest CO_2 saving potential exists in the industry by combustible economization of heat processing. An

[19] CO_2 Gebäude Report 2007, im Auftrag des Bundesministeriums für Verkehr, Bau und Stadtentwicklung

[20] CO_2 Gebäude Report 2007, im Auftrag des Bundesministeriums für Verkehr, Bau und Stadtentwicklung

[21] „Jahrbuch Erneuerbare Energien 2007", page I-50

exchange of central-heating boilers has also a considerable economical potential[22]. According to this survey, the reasons for the marginal utilization of the existing potential are linked with the consisting barriers, such as financial restrictions and lack of information[23].

Taking into consideration all exposed facts, it can be stated that those installation measures are not common practice in Germany and therefore, sub-step 4b should not be further discussed.

Sub-step 4b: Discuss any similar options that are occurring

Taking into account the consideration described above under sub-step 4a, it can be stated that the programme activities is not common practice in the considered market segment and **sub-step 4b** can be skipped regarding all measures.

[22] Wuppertal Institute for Climate, Environment, Energy GmbH (2006): Options and potentials for secondary energy efficiency and energy services, Summary; p. 21

[23] „The main reason for the not-exhaustion of the large economical energy efficiency potentials is various structural, economical and socio-psychological implementation barriers, which are supported through diverse analysis“. Wuppertal Institute for Climate, Environment, Energy GmbH (2006): Options and potentials for secondary energy efficiency and energy services, Summary; p. 11

Outcome of Step 4:

In summary, it can be stated that there are no other similar programme activities although the considered technologies are state of art and therefore the programme activities cannot be considered as common practice from the perspective of either programme participant or coordination/managing entity.

Outcome of additionality analysis:

It can be stated, that due to its features the status quo alternative (alternatives 1 and 3) must represent the baseline of the JI PoA project.

E.3. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline for each technology and/or measure under each type of JPA:

Name of entity setting the baseline information: FutureCamp Climate GmbH

E.4. Description of monitoring plan chosen for each technology and/or measure under each type of JPA:

The monitoring plan chosen for each type of JPA is based on a deemed savings calculation as it is required for the issuance of a so-called *"Energieausweis"*, which is an energy pass for the building. This is regulated by the *EnEV* act (*Energy saving act – "Energieeinsparverordnung"*). The calculation of emission reductions will be performed for all JPAs based on the calculated fuel consumption of the baseline building and the fuel consumption after implementing reduction measures (**ex-ante calculation**).

LIV Hessen will offer through its members, the chimneysweepers, an energy consultancy including information on CO_2 reductions possibilities for homeowners, housing enterprises and other owners of buildings. The chimneysweepers have to be trained as energy consultant according to the *EnEV act*. With this training they can offer consultancy services to building owners and housing enterprises regarding energy-efficiency options and are allowed to issue the energy pass.

Basis for data acquisition are the results of standard calculation tools which are also applied for energy pass calculations. The calculations of heat demand of buildings performed with programmes are based on the EnEV 2009 and the DIN 4108-6/4701-10. The DIN V18599 will not be applied, because for the household sector the DIN 4108-6/4701-10 provides better results. If new regulations will be adopted, those will be applied in the future.

The relevant data and parameter are exported via a standardized interface into a central database, where the CO_2e emission reductions will be calculated. Final emission reductions can only be allocated to the participant, if all eligibility criteria are fulfilled and all data and documents are available. This means, with an onsite visit of the energy consultant, data before and after the implementation of measures each time will be assessed and sent to the coordinating entity. There its plausibility will be checked. Once the final calculation has been performed from respective participant, the calculation of emissions reductions for the whole crediting period for this participant is possible.

In order to guarantee transparent data acquisition and calculations, following steps will be performed:

- **Accompanying the data acquisition**, documents showing the baseline situation and the implemented measures have to be provided by the participant. Those include: photos from the building and installations before and after the implementation and protocols from the chimneysweeper before and after the implementation. The energy consultant is responsible to check these documents. He also will take the photos with engraved datum, and send them together with the questionnaire to the coordinating entity. The rest of the documents will be stored at the participants' site, and will be checked with verification. For more details see Annex 4.
- **The internal quality management system** will be expanded. Taking into account the data acquisition process for this JI PoA according to the ISO 9001, internal and external audits will be performed. For more details see Annex 4. Within the verification process, additional on-site checks will be performed on a sample basis. For more details see Annex 4.

The heat demand of buildings depend strongly on the age of the building, and respective calculations can only estimate the heat demand, they do not represent the exact fuel consumption of the participant. Fuel consumption depends also on user behaviour and weather conditions. According to several studies[24] investigating this relation, heat demand is estimated often too high for older buildings and too low for newer buildings.

A conservative discount factor will be applied on the results of this calculation based on an evaluation report from SEnerCon[25] that compared calculated heat demand and real fuel consumption for 90,000 buildings. Result of the evaluation is a modified heat demand calculation that applies a coefficient and a constant correction classified for 36 building typologies. As a general rule it can be said that the heat demand for older buildings (baseline) will be corrected to lower values whereas the values for newer buildings (project) will be increased. Therefore, the discounting results in a conservative calculation of emission reductions. Annex 3 lists all values applied for the discounting.

In addition a yearly discount factor shall be applied on the results, considering smaller emission reduction achievements in the absence of the project.

[24] Jagnow, Dr.-Ing. Kati und Prof. Dr.-Ing. Dieter Wolff, OPTIMUS Studie, "*Umweltkommunikation in der mittelständischen Wirtschaft am Beispiel der Optimierung von Heizungssystemen durch Information und Qualifikation zur nachhaltigen Nutzung von Energieeinsparpotenzialen - Teil 2: Technische Optimierung und Energieeinsparung*", http://optimus-online.de/pdf/Endbericht%20Teil%202.pdf
Becker, Benjamin, 2010, SenerCon: „*Qualitätskontrolle der modifizierten Wärmebedarfsrechnung – HeizCheck und Modernisierungsratgeber*"

[25] Becker, Benjamin, 2010, SenerCon: „*Qualitätskontrolle der modifizierten Wärmebedarfsrechnung – HeizCheck und Modernisierungsratgeber*"

The bonus for the participants will be paid annually after the verification process. The coordinating entity is responsible for the verification of emission reductions and the bonus payment. The coordinating entity will pass the sales revenues of the issued certificates directly, after deduction of the administrative costs, to the participants.

Further information about monitoring is provided in Annex 4. Exact calculation paths are only laid down in the respective DIN Norms and software configurations, which cannot be depicted within this JI PoA DD, as the data is restricted for publication. Within the verification process, the verifier will get access to all necessary data and calculation paths.

E.4.1. Option 1 – Monitoring of the emissions in the JPA scenario and the baseline scenario:

* Please see for further data and parameter section/Annex 3

E.4.1.1. Data to be collected in order to monitor emissions from the JPA, and how these data will be archived*:

ID number *(Please use numbers to ease cross-referencing to E.5.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e) Standard value (s) Recorded (r)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	Name and address of the owner	Participation agreement		r	Once at registration		Electronic database	
2	Address of the building	Participation agreement		r	Once at registration		Electronic database	
3	Subsidies received?	Participation agreement	Y/N If yes, please provide also type of subsidies and	r	Once at registration		Electronic database and paper document	

			measures					
4	$EF_{CO2,\ fuel\ new,\ participanti}$ Specific emission factor for the used fuel(s)	Fixed value, ex ante definition; Standard, see Annex 3	tCO_2/ kWh	s	Automatically given in database		Electronic database	
5	$FD_{PE,fuel\ new,participant\ i,\ modified}$: Modified fuel demand of participant number i after implementation of the measures	central database	kWh/a (based on net calorific value)	c	Once at registration		Electronic database	
6	*An* Heated living area	Import from energy consultancy software	m²	r	Once at registration		Electronic database	
7	$SFD_{PE,fuel\ new,participant\ i,\ heat\ demand}$: Specific fuel demand of participant number i after implementation of the measures as calculated by special energy consulting software	Import from energy consultancy software	kWh/m²a (based on net calorific value)	c	Once at registration		Electronic database	
8	$HFC_{emissions,heatpumps}$	Fixed value	$kgCO_2e$	s	Once at registration	Only in case of electrical heat	Electronic database	

						pumps		
9	$coeff_j$ regression coefficient for the adaption of the calculated heat demand	Fixed value, ex ante definition; Standard, see Annex 3	-	s	Automatically given in database		Electronic database	building type "after 2002" shall be generally applied for project scenario
10	$cons_j$ regression constant for the adaption of the calculated heat demand	Fixed value, ex ante definition; Standard, see Annex 3	-	s	Automatically given in database		Electronic database	building type "after 2002" shall be generally applied for project scenario

E.4.1.2. Description of formulae used to estimate JPA emissions (for each type, gas, source etc.; emissions in units of CO_2 equivalent):

Project emissions will be calculated via obtained fuel demand after the installation of measures and a standard emissions factor:

$$PE_y = FD_{PE,\,fuel\,new,\,participant\,i,\,modified} \cdot EF_{CO2,\,fuel\,new} (+HFC_{emissions,heatpumps}) \qquad \textbf{Formula 1}$$

with:

$FD_{PE,fuel\,new,participant\,i,\,modified}$: Fuel demand of participant number i after implementation of the measures as calculated by special energy consulting software, modified to adapt to actual fuel consumption

$EF_{CO2,\,fuel\,new}$: Emission factor of the new used fuel before implementation as listed in Annex 3

$HFC_{emissions,heatpumps}$ only in case of installation of electrical heat pumps, fixed value of 260 $kgCO_2eq/a$ (see explanation below)

while:

$$FD_{PE,\,fuel\,new,\,participant\,i,\,modified} = An \cdot ((SFD_{PE,\,fuel\,new,\,participant\,i,heat\,demand} \cdot coeff_j) + cons_j) \qquad \textbf{Formula 2}$$

with:

An: *Heated living area*

$SFD_{PE,fuel\ new,\ participant\ i,\ heat\ demand}$: Specific fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software (heat demand)

$coeff_j$ regression coefficient for the adaption of the calculated heat demand to the actual fuel consumption, according to building type j; building type "after 2002" shall be applied for project scenario to consider correction factor in a conservative way

$cons_j$ *regression constant* for the adaption of the calculated heat demand to the actual fuel consumption, according to building type j building type "after 2002" shall be applied for project scenario to consider correction factor in a conservative way

In case of electrical heat pumps, there are no direct CO_2 emissions generated, only indirect emissions, which almost exclusively occur in power plants, which are subject to emissions trading.

However in some heat pump systems HFCs are used as working fluid. They are partially exhausted during the operation and have a high Global Warming Potential (GWP). Often the HFC blends R 404A (GWP: 3,260), R 407C (GWP:1,525) and R 410A (GWP: 1,725) are used or the HFC R134a (GWP: 1,300) (Source GWP: http://www.grida.no/climate/ipcc_tar/wg3/144.htm). Most manufacturers use volumes of 2-4kg. German Federal Environmental Agency (UBA) in its annual report HFC assumes, that the leakages rate is ca. 2% (Source: UBA 2004: Fluorierte Treibhausgase in Produkten und Verfahren). Therefore, the maximum annual emissions from a heat pump using 4kg of R 404A amount to ca. **260 $kgCO_2eq/a$.** This value is applied as a conservative maximum value to consider HFC emissions for heat pump applications. (see formula above).

** Please for further data and parameter see section/Annex 3

E.4.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the JPA boundary, and how such data will be collected and archived*:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e); Standard value (s) Recorded (r)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

11	Name and address of the owner	Participation agreement		r	Once at registration		Electronic database	
12	Address of the building	Participation agreement		r	Once at registration		Electronic database	
13	District heating – connected to EU-ETS installations	Participation agreement	Y/N	r	Once at registration		Electronic database	
14	$EF_{CO2,\ fuel\ old,\ participanti}$ Specific emission factor for the used fuel(s) for old system	Fixed value, ex ante definition;	tCO_2/ GJ	s	Automatically given in database		Electronic database	
15	$FD_{PE,fuel\ new,\ participant\ i,\ modified}$: Fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software, modified	central database	kWh/a GJ (based on net calorific value)	c	Once at registration		Electronic database	
16	*An* Heated living area	Import from energy consultancy software	m²	r	Once at registration		Electronic database	
17	$SFD_{PE,fuel\ new,\ participant\ i,\ heat\ demand}$: Specific fuel demand of participant number i before	Import from energy consultancy software	kWh/a GJ (based on net calorific value)	c	Once at registration		Electronic database	

	implementation of the measures as calculated by special energy consulting software							
18	$coeff_j$ regression coefficient for the adaption of the calculated heat demand	Fixed value, ex ante definition; Standard, see Annex 3	-	s	Automatically given in database		Electronic database	$coeff_j$ regression coefficient for the adaption of the calculated heat demand
19	$cons_j$ regression constant for the adaption of the calculated heat demand	Fixed value, ex ante definition; Standard, see Annex 3	-	s	Automatically given in database		Electronic database	$cons_j$ regression constant for the adaption of the calculated heat demand
20	Legal requirement for boiler replacement or thermomodernization existing?	Participation agreement	Y/N	*r*	Once at registration		Electronic database and paper document	
21	technical requirements for boiler replacement existing?	Participation agreement	Y/N	r	Once at registration	Only in case of boiler replacement	Electronic database	
22	$f_{emissions\ trend}$ Annual reduction factor due to an	Fixed value, ex ante definition; Fixed factor of	-	s	Automatically given in database		Electronic database	

	emission reduction trend	1%						
23	$f_{nuclear,}$ fraction of nuclear energy in German electricity mix	*BDEW (Bundesverband der Energie- und Wasserwirtschaft e.V.)*	-	c	Once per year	Only in case of electrical heatpumps	Electronic database	

E.4.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Baseline emissions will be calculated via obtained fuel demand and a standard emissions factor, considering the annual reduction factor *f* and (only in case of electrical heat pumps) a discount factor for consideration of nuclear energy as required by point 10 of the LoE:

$$BE_y = FD_{BE,\,fuel\,old\,,\,participant\,i,\,\mathrm{mod}\,ified} \cdot EF_{CO2,\,fuel\,old} \cdot f_{emissions\,trend} \cdot (1 - f_{nuclear}) \qquad \textbf{Formula 3}$$

with:

$FD_{BE,fuel\,old,participant\,i,\,modified}$:	Fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software, and adapted to actual fuel consumption
$EF_{CO2,\,fuel\,old}$:	Emission factor of the previous used fuel before implementation as listed in Annex 3
$f_{emissions\,trend}$	Annual reduction factor due to an emission reduction trend
$f_{nuclear}$	only relevant for electrical heat pumps: fraction of nuclear energy in German electricity mix

while:

$$FD_{BE,fuel\ old,participant\ i,\mathrm{mod}\ ified} = An \cdot ((SFD_{BE,fuel\ old,participant\ i,heat\ demand} \cdot coeff_j) + cons_j) \qquad \textbf{Formula 4}$$

with:

An: *Heated living area*

$SFD_{BE,fuel\ old,participant\ i,\ heat\ demand}$: Specific Fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software (heat demand)

$coeff_j$ regression coefficient for the adaption of the calculated heat demand to the actual fuel consumption, according to building type j

$cons_j$ *regression constant* for the adaption of the calculated heat demand to the actual fuel consumption, according to building type j

E. 4.2. Option 2 – Direct monitoring of emission reductions from JPA:

Not applicable.

E.4.2.1. Data to be collected in order to monitor emission reductions from each technology and/or measure under each type of JPA, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to E.5.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not applicable.

E.4.2.2. Description of formulae used to calculate emission reductions for each type of JPA (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Not applicable.

E.4.3. Treatment of leakage in the monitoring plan:

Preliminary production chain and fuel transformation are outside the project boundary, as they are beyond the influence of LIV. This particularly applies to the production, distribution and transformation of the fuels considered in the programme.

For those emissions, the current "*EU Emissions Trading Directive*" and the Kyoto Protocol require that emissions certificates are to be held from companies or countries, where the fuels are produced, distributed or transformed. Therefore, by including those emissions (reductions) this would lead to double-counting. For systematic and methodological reasons these emissions are not accounted for project emissions and are not included in the project boundary.

Moreover, in the methodology *ACM 0009 "Consolidated baseline methodology for fuel switching from coal or petroleum fuel to natural gas"* (Version 03.2, Sectoral scope 01 & 04, 28nd July 2006) it is set that to the extent that upstream emissions occur in Annex I countries that have ratified the Kyoto Protocol, from 1st January 2008 onwards, these emissions should be excluded, if technically possible, in the leakage calculations.

Biomass boilers

In case of biomass boilers, part of leakage emissions will result from biomass transportation. The biomass would be mainly from regional suppliers within a radius of 150 km and so the transport emissions in the programme scenario should be in general slightly lower than in the baseline scenario where oil or natural gas would be delivered over greater distances. The biomass used for the installations included in this programme will be from regional biomass suppliers.

Calculations by the "*Global Emission Model for Integrated Systems (GEMIS)*" from the German "*Öko-Institut*" are listed in table 16 below and show that even for greater transport distances the emissions in the production chain of wood chips or wood pellets are lower than the emissions in the production chain of fuel oil and natural gas. Therefore in case of biomass boilers, leakage emissions are negligible.

Table 7: CO_2e-emissions per MWh calculated by GEMIS, ver.4.4 including emissions in the production chains and transport emissions

	Wood chips[26] [kg CO_2e/MWh]	Wood pellets[27] [kg CO_2e/MWh]	Light fuel oil[28] [kg CO_2e/MWh]	Natural gas[29] [kg CO_2e/MWh]
100km	3.01	12.4	39.78	27.67
150km	4.19	14		
200km	5.36	15.65		
500km	12.42	25.38		

Heat pumps:

In case of heat pumps CO_2 emissions occur upstream in the generation of electrical energy in fossil fuel power plants. These emissions mostly stem from plants, which are subject to emissions trading. In order to avoid double counting these emissions shall not be included.

Nevertheless according to the LoE and an additional email from the DFP[30] indirect emissions can only be neglected for the calculation of project or leakage emissions if it can be shown that the activity would lead to a net emission reduction even under consideration of indirect emissions.

Therefore it has to be shown in case of installation of heat pumps that under consideration of the seasonal performance factor (VDI 4650) there will be a net emission reduction even if the indirect emissions will be considered (on the basis of the German electricity grid factor). If this cannot be shown, the indirect emissions have to be considered as suggested in point 8 of the LoE on the basis of the German electricity grid factor.

[26] GEMIS process "Hacker-gross\Holz-HS-Wald-DE-2005"
[27] GEMIS process "Fabrik\Holz-Pellets-Holzwirtschaft-DE-2005"
[28] GEMIS process " Raffinerie\Öl-leicht-DE-2005"
[29] GEMIS process " Pipeline\Gas-DE-2000-mix"
[30] email from 22/11/2010 precising point 8 from LoE

E.4.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects each type of JPA:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
24	*$SPF_{heatpump}$ Seasonal performance factor*	*Participation agreement*		*c*	*Once at registration*		*Electronic database*	
25	*GF National electricity grid factor*	*BDEW (Bundesverband der Energie- und Wasserwirtschaft e.V.)*	*tCO_2/MWh*	*c*	*Once per year*		*Electronic database*	

E.4.3.2. Description of formulae used to estimate leakage for each type of JPA (for each gas, source etc.; emissions in units of CO_2 equivalent):

As explained above leakage is only applicable in case of electrical heat pumps.

Based on the monitored parameter there will be a comparison of baseline scenario and the calculated leakage emissions in the German electricity grid under consideration of the seasonal performance factor and the national electricity grid factor:

$$LE_y = \frac{FD_{PE,\,fuel\,new,\,participant\,i,\,\mathrm{mod}\,ified} \cdot GF}{SPF_{heatpump}}$$ **Formula 5**

If it can be shown that $LE_y < BE_y$, leakage emissions can be neglected. Otherwise LE_y has to be considered for the relevant participant.

E.4.4. Description of formulae used to estimate emission reductions for each type of JPA (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Emission reductions are calculated by subtracting the project emissions from the baseline emissions:

$$ER_y = BE_y - PE_y - LE_y$$ **Formula 6**

E.4.5. Where applicable, in accordance with procedures as required by the host Party(ies), information on the collection and archiving of information on the environmental impacts of each type of JPA:

Not applicable

E.5. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
E.4.1.1.: 1-3	Medium	Participant information. Data will be verified annually.
E.4.1.1.: 4	Low	Standard values. QA/QC not necessary
E.4.1.1.: 5	Medium	Data obtained from the simplified assessment tool will be annually verified.
E.4.1.1.: 6	Medium	Data is imported from energy consultancy software. Data will be verified once at registration.
E.4.1.1.: 7	Medium	Data obtained from the simplified assessment tool will be annually verified.
E.4.1.1.: 8-10	Low	Standard values. QA/QC not necessary
E.4.1.3.: 11-13	Medium	Participant information. Data will be verified annually
E.4.1.3.: 14	Low	Standard values. QA/QC not necessary
E.4.1.3.: 15	Medium	Data obtained from the simplified assessment tool will be annually verified.
E.4.1.3.: 16	Low	Data is imported from energy consultancy software. Data will be verified once at registration.
E.4.1.3.: 17	Medium	Data obtained from the simplified assessment tool will be annually verified.
E.4.1.3.: 18-19	Low	Standard values. QA/QC not necessary
E.4.1.3.: 20-21	Medium	Participant information. Data will be verified annually
E.4.1.3.: 22	Low	Standard values. QA/QC not necessary
E.4.1.3.: 23	Low	Standard values. QA/QC not necessary
E.4.3.1.: 24	Medium	Participant information. Data will be verified annually
E.4.3.1.: 25	Low	Standard values. QA/QC not necessary

E.6. Name of person(s)/entity(ies) establishing the monitoring plan:

Name of entity setting the monitoring plan: FutureCamp Climate GmbH
Aschauer Str. 30
81549 Munich
Germany

FutureCamp Climate is not a JPoA project participant.

Version: 01

The date of completion: 06/04/2011

ANNEX 1

CONTACT INFORMATION ON CORDINATING ENTITY AND PARTICIPANTS OF THE JI POA

Organisation:	Landesinnungsverband Schornsteinfegerhandwerk Hessen
Street/P.O.Box:	Am Sportplatz
Building:	1a
City:	Bebra
State/Region:	
Postal code:	36179
Country:	Germany
Phone:	06622/60 63
Fax:	06622/4 40 39
E-mail:	alexander.prinz@myschornsteinfeger.de
URL:	www.myschornsteinfeger.de
Represented by:	Alexander Prinz
Title:	
Salutation:	Dipl.-Ing.
Last name:	Prinz
Middle name:	
First name:	Alexander
Department:	Technik
Phone (direct):	
Fax (direct):	
Mobile:	
Personal e-mail:	

ANNEX 2

JPA'S INFORMATION TABLE

JPAs included in the JI PoA											
No.	*Name of the JPA*	*Type of JPA*	*Brief summary*	*Geographical reference*	*Name and contact detail of the responsible for the operation of the JPA*	*Host Party(ies)*	*Starting date*	*Length of the crediting period*	*Estimation of emission reduction*	*Information confirming that all eligibility criteria described in Section A.4 and Section E of the JI PoA-DD are met and a description on how they are met*	*Confirmation that the JPA has not been determined as a single JI project or under a different JI PoA*
1.	*JPA 1*	*Category I (TM1,2) + Category II(TM4)*	Insulation of exterior walls, basement ceiling and the sloping roof, replacement windows and replacement of heating to biomass	See participation agreement	See participation agreement	*Germany*	22/03/2010	*10 years*	*18.4 tCO_2/yr*	See participation agreement	See participation agreement

Appendix A to Annex 2

Participation Agreement

Part I Information on the participant (to sign before implementation of measures)

Responsible Person:

First name, surname: _____**Confidential**_____

Street: _____ **Confidential** _____

Postcode & Town: _____Reichelsheim_____

E-mail (optional): _____

Address of building (only in case of different address):

Street: _____

Postcode & Town: _____

As a participant in this programme, I agree:

- to make the generated emission reductions from the programme available to LIV Hessen or any company authorized by LIV Hessen and not to take into account the generated emission reductions within other projects;
- that an on-site visit and a proof of my data can take place by an independent entity during my participation in this programme.

Furthermore, I confirm that:

- The energy efficiency measures are neither registered in this JI PoA nor included in another registered Joint Programme of Activities (programmatic JI-Project);
- The energy efficiency measures are notregistered in another Joint Implementation Project;

_____

Date/signature JI PoA participant

Part II: Information from energy consultant (to sign after implementation of measures)

Information on the situation before implementation of efficiency measures (existing situation)

1. date of energy consulting (final date): **17/08/2010**

2. building type (for calculation of correction factors, see Annex 3): __ **mfh_freistehend_bis1983_klein**

3. heated living area (An): ___**463.8_m²**

4. Does the boiler have to be replaced, the heating system to be modernized, the building or parts of the building to be modernized according to legal requirements (e.g. EnEV, 1.BImSchV)?

☐ **X No** ☐ Yes, please specify_____

5. Does the boiler have to be replaced or modernised according to technical requirements, (installation is not operational at the date of replacement)?

☐ **X No** ☐ Yes, please specify_____

fuel demand calculation for existing situation:

6. heating:

- fuel source:

☐ **X oil** ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ other _____

- total calculated fuel demand: **__91,309__kWh/a**

7. hot water preparation:

- fuel source: ☐ **X same as heating**

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ electricity ☐ biomass ☐ other _____

- calculated fuel demand: _____**12,778_kWh/a**

modified fuel demand calculation under consideration of legal / technical required changes and subsidized measures (Baseline):

8. modified fuel demand calculation necessary (legal / technical requirements or public subsidies received)?

☐ X No (skip 9 and 10) ☐ Yes (please fill in 9 and 10)

9. heating:

- fuel source:

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ other _____

- total calculated fuel demand: _____kWh/a

10. hot water preparation:

- fuel source: ☐ same as heating

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ electricity ☐ biomass ☐ other _____

- calculated fuel demand: _____kWh/a

Information on situation after implementation of efficiency measures (Project situation)

11. date of finalization of measures: **October 2011**

12. implemented measures: **Insulation of exterior walls, basement ceiling and the sloping roof, replacement windows and replacement of heating to biomass**

13. heating:

- fuel source:

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas☐ electricity ☐ district heating ☐ **X biomass** ☐ other _____

- total calculated fuel demand: ___**37,901**__**kWh/a**

14. hot water preparation:
    - fuel source: ☐ same as heating

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas☐ electricity ☐ district heating ☐ **X biomass** ☐ other _____

- calculated fuel demand: _____**13,869**___**kWh/a**

15. Usage of any public subsidies?

☐ No ☐ Yes, please specify: _____

16. In case of installation of heat pumps (add references for calculation):

- calculated seasonal performance factor (VDI 4650):_____

As energy consultant, I confirm that:

- calculations have been done following the rules of DIN 4108-6/4701-10
- The same software has been used for calculation before and after implementation
- The main fuel source before implementation of measures is not biomass, electricity or district heating
- in case of any legal or technical requirements for modernization the modified fuel demand calculation is adjusted to a configuration that conforms to all requirements, e.g.
    - if boiler replacement is required:, the calculation shall be based on a new state of the art boiler or
    - if isolation of heating tubes is required, the calculation shall be based on an isolated system
- in case of usage of public subsidies the modified fuel demand calculation is adjusted to a configuration that includes all measures that are subsidized, e.g.
    - if solar water heating shall be installed using public subsidies:, the calculation shall be done including the solar water heating
    - if public subsidies shall be used for the installation of an electrical heat pump, the calculation shall not be based on the old heating system but on the new electrical heat pump
- No public subsidies have been received for the measures implemented besides those that have been considered for the modified fuel demand calculation
- photos from the building and the heating system have been attached, documenting relevant elements of the building's condition before and after implementation of measures (marked with date)
- protocols from the chimneysweeper before and after the implementation have been attached

_____

Date/signature energy consultant

Appendix B to Annex 2

In accordance with the formula provided in Section E.4.1.2. and E.4.1.4. as well as E.4.4., following emission reductions have been calculated for the real case at hand.

Baseline emissions Real case

$BE_y = FD_{BE,fuel\,old,participanti,modified} \cdot EF_{CO2,fuel\,old} \cdot f$

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Summ	Average
BEy	19,2	19,0	18,9	18,7	18,5	18,3	18,1	17,9	17,7	17,5	184	18,4

with:

$FD_{BE,fuel\,old,participanti,modified}$	72.220	kWh	Fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software, and adapted to actual fuel consumption
$EF_{CO2,fuel\,old}$ (OIL)	0,2664	tCO2	Emission factor of the previous used fuel before implementation as listed in Annex 3
f	1%		Annual reduction factor due to an emission reduction trend

while:

$FD_{BE,fuel\,old,participanti,modified} = An \cdot ((SFD_{BE,fuel\,old,participanti,heat\,demand} \cdot coeff_j) + cons_j)$

$FD_{BE,fuel\,old,p}$ 72.220

with:

	Heating	Water		
$SFD_{BE,fuel\,old,participanti,heat\,demand}$	194,77	27,26	kWh/m2	Specific Fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software
An	468,8		m2	Heating living area
$coeff_j$	0,302			Regression coefficient for the adaption of the calculated fuel demand to the actual fuel consumption, according to building type j
$cons_j$	87			Regression constant for the adaption of the calculated fuel demand to the actual fuel consumption, according to building type j

Fuel Demand old	91.309	12.778	kWh

Project emissions Real case

$PE_y = FD_{PE,fuelnew,participanti,modified} \cdot EF_{CO2,fuelnew}$

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Summ	Average
PEy	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	0,0

with:

$FD_{PE,fuel\ new,participant\ i,\ modified}$	46.285	kWh	Fuel demand of participant number i after implementation of the measures as calculated by special energy consulting software, modified to adapt to actual fuel consumption
$EF_{CO2,\ fuel\ old}$ (BIOMASS)	0	tCO2	Emission factor of the new used fuel before implementation as listed in Annex 3

while:

$FD_{PE,fuelnew,participanti,modified} = An \cdot ((SFD_{PE,fuelnew,participanti,heat\ demand} \cdot coeff_j) + cons_j)$

$FD_{PE,fuel\ old,p,}$ 46.285

with:

	Heating	Water		
$SFD_{PE,fuel\ new,\ participant\ i,\ heat\ demand}$	80,85	30	kWh/m2	Specific fuel demand of participant number i before implementation of the measures as calculated by special energy consulting software
An	468,8		m2	Heating living area
$coeff_j$	0,559			Regression coefficient for the adaption of the calculated fuel demand to the actual fuel consumption, according to building type j
$cons_j$	37			Regression constant for the adaption of the calculated fuel demand to the actual fuel consumption, according to building type j

Fuel Demand new	37.901	13.869	kWh

Emission Reductions Real case

$$ER_y = BE_y - PE_y - LE_y = FD_{BE,fuel old,participant modified} \cdot EF_{CO2,fuel old} \cdot f - FD_{PE,fuel new,participant modified} \cdot EF_{CO2,fuel new} - 0$$

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Summ	Average
ERy	19,2	19,0	18,9	18,7	18,5	18,3	18,1	17,9	17,7	17,5	184	18,4

ANNEX 3

BASELINE INFORMATION

Possible project activities

Following, a list of possible project activities to reduce CO_2 emissions for covering heat demand in private households. Figure 1 shows general objectives for heat energy savings, the areas of activities, where these objectives apply and different techniques, which can be implemented. Table 8 gives an overview of possible project activities and lists some examples with their potentials of energy reduction and needs of financial investments.

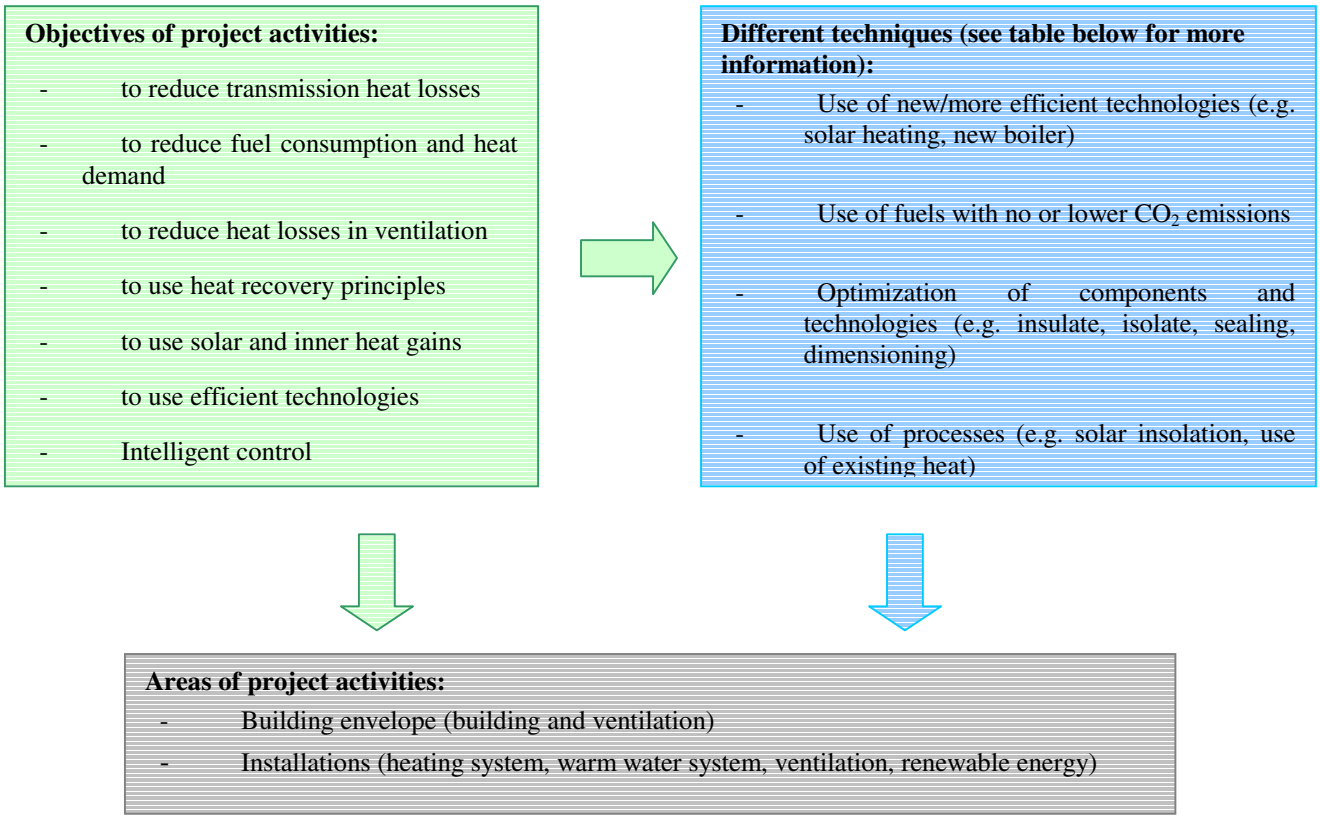

Figure 1: Objectives and areas of project activities and different techniques to reduce heat demand

Table 8: Examples of possible measures for emissions reductions in private households[31]

Category I: Implementation of efficiency measures at the building (renovation of buildings)	**Examples (not complete)**
- to reduce transmission heat losses	- the use of insulation materials (such as cellulose, fiberglass, rock wool etc.) - Insulation of roof, outer envelope, floors/ceiling, cellar, compound insulation - Modernize windows / doors - Modernize heaters
- to reduce heat losses in ventilation	- Sealing of building - Sealing of windows / doors - Optimization of ventilation (windows, automatization) - Using insulation glass
- to use existing heat in buildings	- Rejected heat of people/animals - Rejected heat of installations/equipment
- to use solar insulation	- Optimization of building orientation in planning - Optimization of transmissibility of windows - Use of transparent heat insulation - Consideration of ability of heat storage of the components - Optimization of building zoning (North: stairway, East: dormitory, South/West: living room) - Use of fittings (winter garden, vitrified front buildings) – without heating
Category II: Implementation of efficiency measures regarding building equipment/installations	**Examples (not complete)**
- to optimize/replace heating system	- Optimization of heat transformation (optimize technology: e.g. new boiler, increase efficiency, optimize dimensioning, regular maintenance, heat recovery) - Optimization of heat storage (insulation of heat storage, optimize dimensioning) - Optimization of heat distribution (insulation of pipes (if not recommended by the EnEV (German energy saving regulation)), optimize pumps, hydraulic calibration) - Optimization of heat supply (thermostatic valves, heat control for single rooms, area heating system, optimize heater) - Optimization of regulation / control conforming demand - Installation of heat pumps

[31] Please note that the list of provided examples in the table is not complete as there is a broad range of building and installation measures, and still new technologies are constantly developed.

- to optimize/install ventilation system	- Optimization of ventilation installations (technology, efficiency, dimensioning, maintenance, heat recovery) - Optimization of ventilation distribution (insulation of ventilation duct, optimize aerator and dimensioning) - Optimization of ventilation supply - Optimization of regulation / control conforming demand (supply air, outlet air, recirculation air)
- to optimize/replace warm water system	- Optimization of water heating (technology, efficiency, dimensioning, maintenance, heat recovery) - Optimization of warm water storage (insulation of heat storage, optimize dimensioning) - Optimization of warm water distribution (insulation of pipes(if not recommended by the EnEV (German energy saving regulation)), optimize pumps and dimensioning) - Optimization of warm water supply - Optimization of regulation / control conforming demand
- to use renewable energies	- Technology (solar collector for warm water, solar collector for support of heating system, geothermic technology)

Additional Baseline Information

Emissions factors:

For the fuels such as natural gas, light fuel oil, liquid gas and biomass the following emission factors are used:

Natural gas : **0.056 t CO_2/ GJ**

Light fuel oil: **0.074 t CO_2/ GJ**

Liquid gas (butane): **0.064 t CO_2/ GJ**

Biomass: **0 t CO_2/ GJ**

Source: “Zuteilungsverordnung ZuV2012“, Annex 1

Correction factors for calculation of modified heat demand (Source: „SEnerCon: Qualitätskontrolle der modifizierten Wärmebedarfsrechnung“)**:**

Building type	$cons_j$	$coeff_j$
efh_ecke_ab2002	35,6	0,52
efh_ecke_bis1983	68,5	0,443
efh_ecke_bis1994	78,1	0,296
efh_ecke_bis2001	77,1	0,234
efh_freistehend_ab2002	52,8	0,325
efh_freistehend_bis1983	73	0,414
efh_freistehend_bis1994	82	0,272
efh_freistehend_bis2001	89,6	0,142
efh_mitte_ab2002	80	-0,098
efh_mitte_bis1983	70	0,397
efh_mitte_bis1994	87	0,189
efh_mitte_bis2001	87	-0,013
mfh_ecke_ab2002_gross	64	0,114
mfh_ecke_ab2002_klein	73	0,055
mfh_ecke_bis1983_gross	93	0,33
mfh_ecke_bis1983_klein	93	0,289
mfh_ecke_bis1994_gross	62	0,403
mfh_ecke_bis1994_klein	65	0,39
mfh_ecke_bis2001_gross	25	0,871
mfh_ecke_bis2001_klein	94	0,09
mfh_freistehend_ab2002_gross	26	0,767
mfh_freistehend_ab2002_klein	37	0,559
mfh_freistehend_bis1983_gross	93	0,298
mfh_freistehend_bis1983_klein	87	0,302
mfh_freistehend_bis1994_gross	70	0,315
mfh_freistehend_bis1994_klein	93	0,19
mfh_freistehend_bis2001_gross	41	0,674
mfh_freistehend_bis2001_klein	57	0,44
mfh_mitte_ab2002_gross	59	0,36
mfh_mitte_ab2002_klein	94	-0,44

mfh_mitte_bis1983_gross	82	0,441
mfh_mitte_bis1983_klein	80	0,426
mfh_mitte_bis1994_gross	54	0,513
mfh_mitte_bis1994_klein	57	0,507
mfh_mitte_bis2001_gross	57	0,532
mfh_mitte_bis2001_klein	144	-0,392

ANNEX 4

MONITORING PLAN

Preparatory steps:

The energy consultant verifies the necessary input parameter at the JI PoA participant site, calculates the fuel demand for the baseline situation and takes a photo of the building and the heating system before implementation of energy efficiency measures. The JI PoA participant signs Part I of the participation agreement, declaring his intention to participate in the JI PoA.

After implementation of the measures the energy consultant again verifies the situation onsite and calculates the fuel demand for the project situation. In case that any of the implemented measures have received public subsidies or have been required by law or technical requirements, the energy consultant has to recalculate the baseline situation under consideration of the measures that are not eligible for the JI PoA. Again the consultant has to document the building and the heating system by photography. The signed participation agreement (part I and II) and other necessary documents will then be transferred to LIV Hessen.

The responsible person at the technical department of LIV Hessen verifies for every potential JI PoA participant, if there exists:

- a signed Participation agreement with the consent to participate in generating emission reductions (for essential terms and conditions see Annex 5),
- the results of the fuel demand calculation (data set as required for the import in the central database)
- additional photos or documents

Data assessment:

The required data for all JPA types will be collected before and after project implementation by the energy consultant with a special energy consulting software. The results will be exported into a central software programme at LIV Hessen. Here, emissions reduction will be calculated.

Internal quality assurance:

Check if the data in the datasets of the central database conform to the data from the Participation agreements and the questionnaires.

The project developer verifies the data finally. If the data do not conform to the monitoring requirements, as stated in the programme documentation, the project developer must ask for an amendment from the participant, if the reductions are to be counted.

Sampling should be performed on random basis. The sample should be representative for the participating energy consultants as well as the building owners.

The consistency of the collected data with the building parameters is part of the checks. Furthermore, it should be examined whether estimated data is plausible and if it satisfies the requirements. The audit covers the following areas.

Participants before the implementation of the project:

- Checking the information on the building envelope (based on available documentation such as photos or based on a site inspection carried out so far);
- Checking the information on systems (based on available documents, such as chimney sweep logs, photos, or based on an on-site inspection carried out so far);
- Checking the presence of required supporting documents and references.

Participants after the implementation of the project:

- Checking the information on the building envelope, especially the correct implementation of measures if defined (based on available documentation such as photos or based on a site inspection carried out so far)
- Chekcing the information for technological systems, particularly the proper execution of measures if defined (based on available documents, such as chimney sweep logs, photos, or based on an on-site inspection carried out so far)
- Checking the presence of required supporting documents and references.

Scope:

Sampling, which usually is used to determine the necessary site visits to JI programs, is the determed based the root of the number of participants:

$$Numberofparticipants = \sqrt{Participant}$$

For example taking 8,000 participants would correspond to a sample size of 90 participants. If necessary such checks may be partially implemented as a desk-proof. As references for the desk-proof calculation form and photos of the building shall be available during audit.

Data storage:

According to the legal requirements and after the JI guidelines all paper documents (equivalent to Programme application, Participation agreements, supply contracts, invoices) must be stored in the original form or confirmed copy for at least five years after the loan repayment. According to internal procedures a portion of the information derived from paper documents is processed in electronic database. It is further determined that all essential data covered by the programmes conditions will be processed electronically in way of central data base system. At least every six months electronic data are to be secured on a storage data medium, which is to be stored as long as paper version of documentation. In case of system break or data losses, data can be reconstructed from a securing database file that makes monthly logs and thus allows reconstruction of lost files. Therefore, immediate access to the database during the verification process is assured.

Permanent monitoring:

The responsible department at project developer regularly controls the current statutory requirements, which could affect the programme. The monitoring plan is therefore regularly adjusted according to the current internal company procedures and statutory requirements.

ANNEX 5

Participation Agreement

Part I Information on the participant (to sign before implementation of measures)

Responsible Person:

First name, surname: _____

Street: _____

Postcode & Town: _____

E-mail (optional): _____

Address of building (only in case of different address):

Street: _____

Postcode & Town: _____

As a participant in this programme, I agree:

- to make the generated emission reductions from the programme available to LIV Hessen or any company authorized by LIV Hessen and not to take into account the generated emission reductions within other projects;
- that an on-site visit and a proof of my data can take place by an independent entity during my participation in this programme.

Furthermore, I confirm that:

- The energy efficiency measures are neither registered in this JI PoA nor included in another registered Joint Programme of Activities (programmatic JI-Project);
- The energy efficiency measures are notregistered in another Joint Implementation Project;

_____

Date/signature JI PoA participant

Part II: Information from energy consultant (to sign after implementation of measures)

Information on the situation before implementation of efficiency measures (existing situation)

17. date of energy consulting (final date):

18. building type (for calculation of correction factors, see Annex 3): _____

19. heated living area (An): _____**m²**

20. Does the boiler have to be replaced, the heating system to be modernized, the building or parts of the building to be modernized according to legal requirements (e.g. EnEV, 1.BImSchV)?

☐ No ☐ Yes, please specify_____

21. Does the boiler have to be replaced or modernised according to technical requirements, (installation is not operational at the date of replacement)?

☐ No ☐ Yes, please specify_____

fuel demand calculation for existing situation:

22. heating:

- fuel source:

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ other _____

- total calculated fuel demand: _____**kWh/a**

23. hot water preparation:

- fuel source: ☐ same as heating

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ electricity ☐ biomass ☐ other _____

- calculated fuel demand: _____**kWh/a**

modified fuel demand calculation under consideration of legal / technical required changes and subsidized measures (Baseline):

24. modified fuel demand calculation necessary (legal / technical requirements or public subsidies received)?

☐ No (skip 9 and 10) ☐ Yes (please fill in 9 and 10)

25. heating:

- fuel source:

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ other _____

- total calculated fuel demand: _____kWh/a

26. hot water preparation:

- fuel source: ☐ same as heating

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas ☐ electricity ☐ biomass ☐ other _____

- calculated fuel demand: _____kWh/a

Information on situation after implementation of efficiency measures (Project situation)

27. date of finalization of measures:

28. implemented measures:

29. heating:

- fuel source:

☐ oil ☐ natural gas ☐ lignite ☐ hard coal

☐ liquid gas☐ electricity ☐ district heating ☐ biomass ☐ other _____

- total calculated fuel demand: _____**kWh/a**

30. hot water preparation:
    - fuel source: ☐ same as heating

    ☐ oil ☐ natural gas ☐ lignite ☐ hard coal

    ☐ liquid gas☐ electricity ☐ district heating ☐ biomass ☐ other _____

    - calculated fuel demand: _____**kWh/a**

31. Usage of any public subsidies?

    ☐ No ☐ Yes, please specify: _____

32. In case of installation of heat pumps (add references for calculation):

    - calculated seasonal performance factor (VDI 4650):_____

As energy consultant, I confirm that:

- calculations have been done following the rules of DIN 4108-6/4701-10
- The same software has been used for calculation before and after implementation
- The main fuel source before implementation of measures is not biomass, electricity or district heating
- in case of any legal or technical requirements for modernization the modified fuel demand calculation is adjusted to a configuration that conforms to all requirements, e.g.
    - if boiler replacement is required:, the calculation shall be based on a new state of the art boiler or
    - if isolation of heating tubes is required, the calculation shall be based on an isolated system
- in case of usage of public subsidies the modified fuel demand calculation is adjusted to a configuration that includes all measures that are subsidized, e.g.
    - if solar water heating shall be installed using public subsidies:, the calculation shall be done including the solar water heating
    - if public subsidies shall be used for the installation of an electrical heat pump, the calculation shall not be based on the old heating system but on the new electrical heat pump
- No public subsidies have been received for the measures implemented besides those that have been considered for the modified fuel demand calculation
- photos from the building and the heating system have been attached, documenting relevant elements of the building's condition before and after implementation of measures (marked with date)
- protocols from the chimneysweeper before and after the implementation have been attached

_____

Date/signature energy consultant

References

BImSchG und BImSchV (1988, last modification 26th February 2009): Erste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Artikel 1 der Verordnung zur Neufassung der Ersten und Änderung der Vierten Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes)

(German Federal Emissions Protection Regulation)

BiomasseV – Verordnung über die Erzeugung von Strom aus Biomasse (21st June 2001)

(German Biomass Regulation)

Bremer Energieinstitut (2007): Entwicklung des Energieverbrauchs für Heizung und Warmwasser bei Einfamilienhäusern

(Development of the energy consumption for heating and warm water of one family houses)

Bremer Energieinstitut (2010): „Effekte des Foerderfälle des Jahres 2009 des CO2-Gebaeudesanierungsprogramms und des Programms Energieeffizient Sanieren“, KfW Bankengruppe

(Effects of the funding cases in the year 2009 of the CO_2 and the program Building refurbishment and the programme Energy-efficient refurbishment)

Bundesumweltministerium (2007): Zuteilungsverordnung 2012, Anhang 1

(Allocation ordinance 2012, Annex 1)

1– BMVBS (2007): Ministry report: „CO_2 Gebäudereport 2007“

(CO_2 Building report 2007)

C.A.R.M.E.N. (February 2010), http://www.carmen-ev.de/dt/energie/pellets/pelletpreis_laender.html

CDM Executive Board: EB 32, Meeting Report, Annex 38: Guidance on the registration of project activities under a programme of activities as a single CDM project activity (Version 02)

CDM Executive Board: EB 39, Meeting Report, Annex 10: Tool for the demonstration and assessment of additionality (Version 5.2)

Commission of the European Communities: Communication from the Commission, 19.10.2006; Action Plan for Energy Efficiency: Realizing the Potential

EEwärmeG – Energiewärmegesetz (1st January 2009)

(German Act on the promotion of Renewable Energies in the Heat Sector)

ENEV (2002, last modification 29th April 2009): Verordnung über energiesparenden Wärmeschutz und energiesparende Anlagentechnik bei Gebäuden – Energieeinsparverordnung

(German Energy Saving Regulation)

Energy Institute of Bremen (Bremer Energie Institut) (2007): Entwicklung des Energieverbrauchs für Heizung und Warmwasser bei Einfamilienhäusern

(Development of energy consumption for heating and hot water for single-family houses)

Energiesparen im Haushalte (January 2010): Vergleich Ölheizung, Gasheizung, Pelletsheizung und Wärmepumpe,

http://www.energiesparen-im-haushalt.de/energie/storage/sites/vergleich-oelheizung-gasheizung.html

(Comparison of oil, gas, pellet heating systems and heating pumps)

Gesetz über die Umweltverträglichkeitsprüfung, (February 1990, last modified 24th February 2010)

(Environmental Impacts Assessment Act)

IBM (2007): Preis, Verbrauch und Umwelt versus Komfort – der mündige Energieverbraucher

(Price, consumption and environment versus comfort – the mature energy consumer)

„Jahrbuch Erneuerbare Energien 2007“, page I-50

(Book of renewable energies 2007)

KfW (2007), Gebäudesanierungsprogramm

http://www.kfw.de/DE_Home/Research/Sonderthem68/CO2-Gebaeudesanierungsprogramm.jsp

(Building refurbishment programme)

Klaus-Dieter Clausnitzer Dr.-Ing (Decemeber 2008): Bremen Energy Institute, „Emissionsankauf durch Schornsteinfeger für energetische Verbesserungen in Anlagentechnik und Gebäudehülle (EmSAG)“,

(Buying emissions by chimney sweepers for energy-saving improvements for in engineering and building envelope)

Landesinnungsverband Schornsteinfegerhandwerk Hessen (2008), Abschluss Bericht 2008, Model Projekt EmSAG,

(Pilot Project EmSAG)

Mainova (01/09/2009), Preisliste Erdgas für Privat- und Gewerbekunden, http://www.mainova.de/privatkunden/erdgaspreise.jsp.

(Price list for natural gas for private and commercial clients)

Schwäbisch Hall (2002): Energiesparmaßnahmen mit Sofortwirkung – Wissenswertes für Mieter und Hausbesitzer, Hessisches Ministerium für Umwelt, Landwirtschaft und Forsten (Hrsg.), http://www.schwaebisch-hall.de/bsh/content/medien/pdf/energiesparen.pdf

(Energy saving measures with immediate impacts – worthknowing information for tenants and homeowners)

Technische Anleitung Luft (1st October 2002)

(Technical Instructions on Air Quality Control)

VDI Gesellschaft Technische Gebäudeausrüstung (2007): Verbrauchskennwerte für Gebäude, Blatt 1: Energie- und Wasserverbrauchskennwerte für Gebäude – Grundlagen

(Consumption parameters for buildings, sheet 1: energy and water consumption parameters for buildings –basic)

Wärmegesetz (1st January 2009)

(Heat act)

Wuppertal Institute for Climate, Environment, Energy GmbH (2006): Options and potentials for secondary energy efficiency and energy services, Summary; p. 21