JI Baseline and monitoring

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General

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Hostetin Biomass Heating Project

3. Greenhouse gas emissions:
4. Emissions reduction other gases
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INTRODUCTION

- ✓ Kyoto Protocol: reduction GHG emissions of the industrial countries by 5% compared to 1990
- ✓ Reductionpercentages EU: 8%(compared to 1990)
- ✓ Reductionpercentages The Netherlands: 6% (compared to 1990)
- ✓ Commitment period: 2008-2012

Cost to reach the proposed reduction are higher in US and EU compared to CEE

Instruments to reduce GHG emissions:

- ✓ Joint Implementation (JI)
- ✓ Clean Development Mechanism (CDM)
- ✓ International Emission Tradding (ET)

CONCEPT JI (I)

JI Mechanism:

- ✓ Investor country contributes to implementation in host country;
- ✓ Advantage investor country: attains its GHG emission targets;
- ✓ Advantage host country: financial support for environmental friendly technologies.

A JI project should:

- ✓ Significantly larger GHG emission reduction;
- ✓ Compatible with policy host country;
- ✓ Project would not take place without JI funding;
- ✓ GHG reduction should be established by decreasing sources or increasing sinks.

CONCEPT JI (II)

- ✓ GHG reductions: CO_2, CH_4, N_2O and fluor combination
- ✓ Emission Reduction Units (ERU) = 1 ton CO_2-equivalent
- ✓ 1 ton CH_4 = 21 ton CO_2-eq.
- ✓ 1 ton N_2O = 310 ton CO_2-eq.
- ✓ Reference level = project baseline (GHG emissions without project)

HOSTETIN: GREENHOUSE GAS EMISSIONS

BASELINE

The base line consists of 68 houses in the village Hostetin which are currently heated by:

- ✓ Central heating with electric boiler or direct electric heating (9 houses);
- ✓ Electric (and coal) oven and direct electric heating (27 houses);
- ✓ Coal and wood heating (32 houses).

PROJECT

- ✓ 733 kWth wood fuelled boiler applied for heating

EMISSION BALANCE COMPARING PRESENT SITUATION AND BIOMASS FUELLED BOILER

Global warming effect	**Base line (present situation)**	**Project (biomass fuelled)**
CO_2 emission	from coal, brown coal and *wood* combustion in stoves	
	biological degrading wood residues	*from biomass combustion*
	from brown coal combustion in power plants to produce the needed electricity in the electricity based heating system	
	from coal, brown coal and wood transport to Hostetin	from transport of biomass from wood resource to Hostetin
CH_4 emission (CO_2 equivalence factor: 21)	biological degrading wood residues	
	from coal, brown coal, wood combustion in stoves	
CO_2 uptake	*by growing tree parts which, in Baseline, will become processing residues*	*by growing tree parts which are used as fuel*

HOSTETIN: GHG EMISSIONS

Green house gas	**Resulting from:**	**ton**	**G.W.P.**	**Quantity (t CO_2 eq./yr)**
CO_2 emission	Combustion fossil fuels	1434	1	1,434
	Biological degrading wood residues			Cancelled out
	Transport of (brown) coal and wood in present situation	2.1	1	2.1
CH_4 emission	Biological degrading wood residues	91	21	1,905
	Combustion fossil fuels	0.4	21	8.5
CO_2 uptake	Growing tree parts which, in Baseline			Cancelled out
Total				**3,350**

CO_2 EMISSIONS BY COMBUSTION FOSSIL FUELS

Input parameters	**Brown coal**	**Coal**	**Wood**	**Electricity**	
Annual consumption (ton)	248	19	190		
Annual consumption (kWh)				585,000	
Efficiency (thermal)	55%	60%	50%		
Average electrical efficiency brown coal power plants (including losses electrical network)				20%	
Results					**Total**
Annual primary energy converted (GJ/yr)	3,653	466	1,870	10,530	16,518
Specific CO_2 emission/GJ primair energy	0.10	0.09	0.11	0.10	
Annual CO_2 emissions (ton/yr)	358	44	cancelled out	1,032	**1,434**

ANAEROBIC DIGESTION OF DUMPED WOOD RESIDUES

- ✓ Wood residues are dumped
- ✓ Available oxygen in dump is used for increase temperature to 30-50°C
- ✓ Anaerobic digestion will take place and methane is formed
- ✓ Released methane depends on:
  - amount of carbon that can be converted
  - duration period of its degradation.

CALCULATION CH_4 EMISSIONS

Input parameters		
Carbon content wood	50%	dry basis
(hemi-)Cellulosis content of C in wood	65%	
Forming factor (available C to methane)	50%	
Moisture content wood	55%	
Annual quantity of wood not dumped	761	ton wood (at 55% moisture, wet basis)
CO_2 equivalent of CH_4	21	t CO_2 eq./t CH_4
Emission period	2	year
Results		
Specific methane emission	0.22	kg CH_4/kg dry wood
Quantity CH_4 produced	0.12	kg/kg wood (at 55% moisture, wet basis)
Quantity CH_4 produced	45	ton CH_4/yr
Annual CH_4 emission in CO_2 equivalents	953	t CO_2/yr

EMISSION REDUCTION WITH PROJECT

Year	**1**	**2**	**3**	**4**	**5**
CO_2 (t CO_2 eq./yr)	1,436	1,436	1,436	1,436	1,436
CH_4 (t CO_2 eq./yr)	961	1,914	1,914	1,914	1,914
N_2O (t CO_2 eq./yr)	0	0	0	0	0
HFK's (t CO_2 eq./yr)	0	0	0	0	0
PFK's (t CO_2 eq./yr)	0	0	0	0	0
SF_6 (t CO_2 eq./yr)	0	0	0	0	0
Other	0	0	0	0	0
Total (t CO_2 eq./yr)	2,397	3,350	3,350	3,350	3,350
Total (t CO_2 eq.; 15 yr project lifetime)	49,291				

EMISSIONS REDUCTION OTHER GASES

Year	1	2	3	4	5
NO_x (t/yr)	-1.5	-1.5	-1.5	-1.5	-1.5
O_3 (t/yr)					
CO (t/yr)	19.3	19.3	19.3	19.3	19.3
SO_x (t/yr)	5.1	5.1	5.1	5.1	5.1
Dust (t/yr)	-0.6	-0.6	-0.6	-0.6	-0.6
Other					

ANNUAL INCREMENTAL COSTS

Investments Dutch and foreign partners (Dutch Guilders)

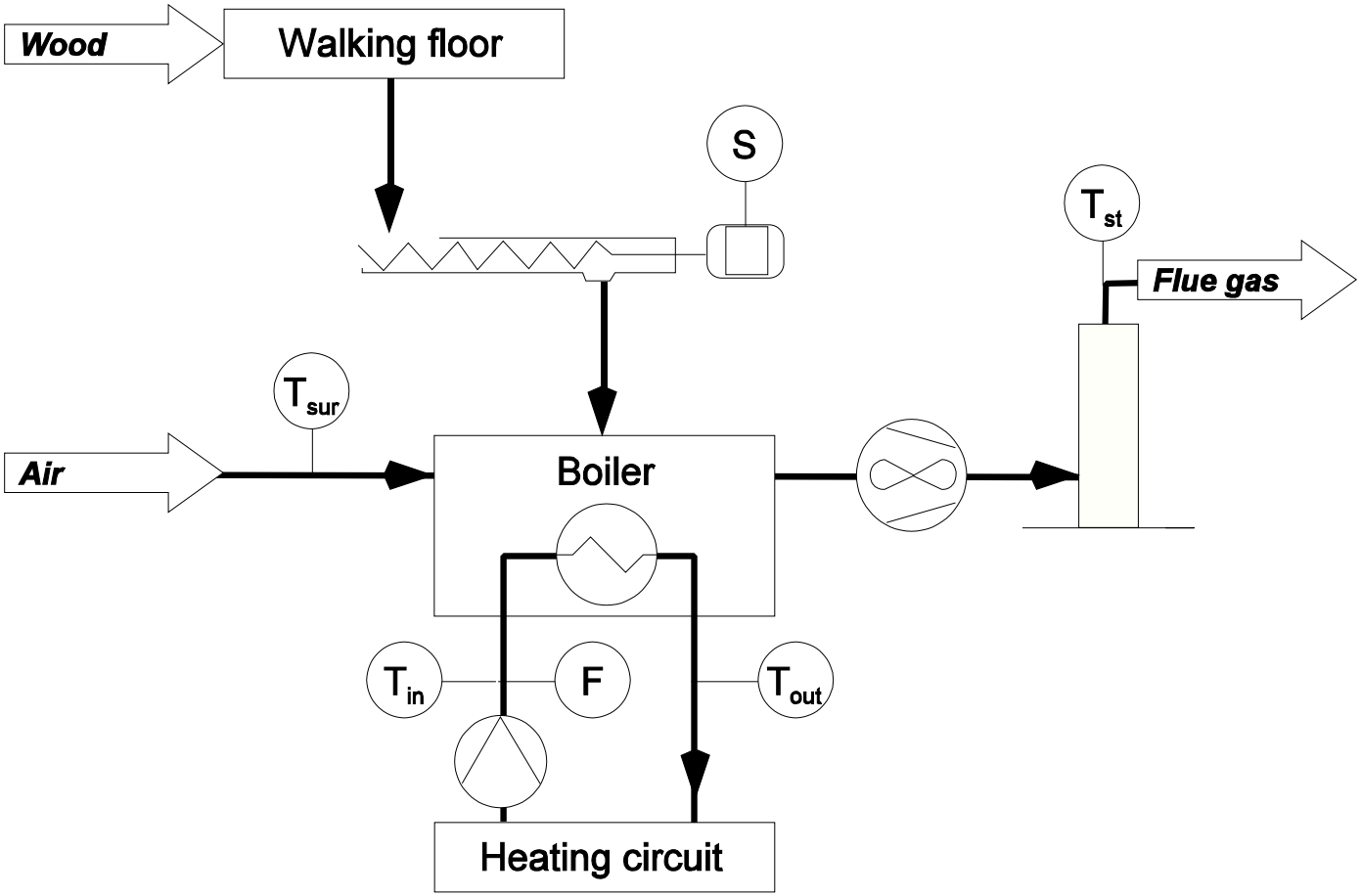
Year	**1**	**2**	**3**	**4**	**5**
Investments	1,806,210	0	0	0	0
Labour cost for construction	68,960	0	0	0	0
Operational costs (yearly)	0	-38,252	-38,252	-38,252	-38,252
Monitoring	14,648	14,648	0	0	0
Training	50,431	0	0	0	0
Total cost	1,940,249	-23,604	-38,252	-38,252	-38,252
Avoided CO_2 emissions (t CO_2 eq./yr)	2,397	3,350	3,350	3,350	3,350
Discount rate	5%				
NPV of net cost (15 yr project lifetime)	1,500,533				
CO_2 emissions (t CO_2 eq.; 15 yr project lifetime)	49,291				
Specific emission reduction cost (NLG/t CO_2)	30				

ANNUAL INCREMENTAL COSTS

Investments Dutch and foreign partners (Dutch Guilders)

Year	**1**	**2**	**3**	**4**	**5**
Investments	677,210	0	0	0	0
Labour cost for construction	68,960	0	0	0	0
Operational costs (yearly)	0	(38,252)	(38,252)	(38,252)	(38,252)
Monitoring	14,648	14,648	0	0	0
Training	50,431	0	0	0	0
Total cost	811,249	-23,604	-38,252	-38,252	-38,252
Avoided CO_2 emissions (t CO_2 eq./yr)	2,397	3,350	3,350	3,350	3,350
Discount rate	5%				
NPV of net cost (15 yr project lifetime)	425,295				
CO_2 emissions (t CO_2 eq.; 15 yr project lifetime)	49,291				
Specific emission reduction cost (NLG/t CO_2)	9				

MONITORING SYSTEM (I)



MONITORING SYSTEM (II)

The following parameters will have to be determined online:

- ✓ Operational time screw of the biomass inlet (on/off time);
- ✓ Inlet and outlet temperature in °C (hourly average);
- ✓ Flow in m^3/h (hourly average);
- ✓ Surrounding temperature in °C (hourly average);
- ✓ Temperature of the flue gasses in °C (hourly average).

The following parameters have to be determined in a week of intensive monitoring:

- ✓ Operational time screw of biomass inlet;
- ✓ Stack temperature versus pressure drop/volume flow over the flue gas fan.

The following parameters have to be determined by the operators by batch:

- ✓ Number of trucks and the capacity of the trucks.

The following parameters have to be determined per year:

- ✓ Factures of the delivered wood, including weight/volumes.

FUTURE JI ACTIVITIES HOSTETIN PROJECT

- ✓ JIRC approved the Registration
- ✓ JIRC transmitted the JI activities to KPMG Certification
- ✓ KPMG will validate the baseline
- ✓ KPMG will visit Hostetin to check the baseline and monitoring system
- ✓ KPMG will give a certificate of the ERU’s after monitoring