MONITORING REPORT

Methane Recovery Project

Praktijkcentrum Sterksel

Crediting Period: 01 May 2006 – 31 December 2007

ARA Carbon Finance GmbH

19 March 2008; Version 02

KEY DATA

➢ Project Name	*Methane Recovery Project Praktijkcentrum Sterksel*
➢ Project Location	Sterksel, North Brabant, The Netherlands
➢ Project Operator	Praktijkcentrum Sterksel
➢ VER Owner	ARA Carbon Finance GmbH
➢ Baseline (Approach I)	Uncontrolled methane emissions during storage of manure
➢ Baseline (Approach II)	Heating through fossil energy sources
➢ Project Activity (Module I)	Technical digestion of manure, plus combined heat and power
➢ GHG Reduction (Approach I)	Mitigation of uncontrolled methane emissions through digestion
➢ GHG Reduction (Approach II)	Substitution of fossil fuel through renewable heat production
➢ Validation	August 25, 2007
➢ Validator	TÜV Rheinland Group
➢ Start Crediting Life Time	May 01, 2006
➢ Verification Period I	May 01, 2006 to Dec 31, 2007

CONTENT

1 Introduction

The Methane Recovery Project Praktijkcentrum Sterksel was validated by TÜV Rheinland Group on August 25th, 2007 as domestic GHG offset project according to JI standards. The reduction approaches were demonstrated by the mitigation of uncontrolled methane emission out of manure and organic wastes, as well as the generation of renewable thermal energy decentrally used to substitute fossil sources. The crediting life time of the project started on May 1st, 2006. The Methane Recovery Project Praktijkcentrum Sterksel should be verified for its first operation period from May 1, 2006 to December 31, 2007 in order to certify the correspondingly reduced GHG emissions by this project activity within this period.

This monitoring report on hand refers to the monitoring concept of the PDD submitted in its version 04 by ARA Carbon Finance GmbH on Jun 28th, 2007 to the TÜV Rheinland Group.

2 Project Status

The project activity was set into operation in May 2006. At this stage one engine with a capacity of 330 kWel was installed. The waste heat produced will be used for space heating of the farm buildings. An extension by 330 or 500 KWel is foreseen for 2009 in order to provide thermal energy to a nearby nursery centre for epileptics and to extend electricity production.

3 Data Analysis

All data have been designated to be recorded according to the monitoring plan as stated at Section D of the PDD. Table 1 lists the monitoring parameters.

The flow meter installed is not capable to measure in norm cubic meter, but it measures the biogas at constant conditions of 110 mbar above atmospheric pressure and about 27° C. Thus, a calculative adjustment is needed in order to get the biogas amount in norm cubic meters.

Table 1 Monitoring Parameters of the *Methane Recovery Project Praktijkcentrum Sterksel*

ID	Parameter	Unit	Device	Recorded	Remark
1. BGP	Biogas produced	m³	Flow meter	Yes	Converted to norm cubic.
2. MC	Methane content	Vol%	Gas analyser	Yes	
3. FT	Fraction of time	h	Runtime counter	Yes	
4. ETP	Thermal energy produced for external utilisation	MWh	Heat meter	n/a	Not available. *Will be calculated as per section D.2 in PDD*
5. EEP	Electrical energy produced	MWh	Power meter	Yes	
6. EEI	Electrical energy imported	MWh	Power meter	Yes	
7. $MCOF_i$	Mass of co-ferment i fed into digester	t	Scales recording	Yes	
8. MANURE	Volume of manure fed into the digester	t	Scales recording	Yes	
9. OIL	Oil consumed in emergency boiler	m³	Volume scale and/or delivery receipts	Yes	

3.1 Digester Input Materials and Gas Production Ratios

The digester of the biogas module was constantly fed with swine manure as primary ferment, as well as with numerous co-ferments like sugar cane, potato starch, maize, glycerine, vegetable juice, crushed grain, wheat starch, permeate milk, mustard- and sunflower seed from agricultural industry. The input materials have been weighed and subsequently fed into the digester. Table 2 shows the monthly mass balances of these feed materials.

The masses of the delivered co-ferments are weighted and recorded continuously, but reported only annually. Hence, average values need to be applied in order to get monthly consumption figures. Figure 1 demonstrates the yearly input masses of manure and co-ferments between May 01, 2006 and December 31, 2007

The amount of manure input has been continuously around 15 t per day during the monitoring period and can thus be regarded as fairly steady. As the result of that, the smallest input took place in February 2007 because of the shortness of that month. In 2007, the average co-ferment use was about 12 % higher than in 2006.

Since only the manure and organic waste digestion is of relevance for the reduction of uncontrolled methane emissions occurring during the storage and disposal of untreated manure and organic waste in the baseline scenario, the ratio of the biogas produced in the digestion process caused by the non-waste co-ferments has to be deducted from the total amount of biogas produced within the project activity. Table 3 reflects the derivation.

Table 2 Digester Input Materials

Month	Swine manure (m^3)	Sugar cane (t)	Potato starch (t)	Maize (t)	Glycerine (t)	Vegetable juice (t)	Crushed grain (t)	Unpacked drinks (t)	Wheat starch (t)	Cookies / grains (t)	Permeate Milk (t)	Mustard seed (t)	Sunflower seed (t)
May 06	465	79	6	0	63	27	74	7	98	0	0	0	0
Jun 06	450	79	6	0	63	27	74	7	98	0	0	0	0
Jul 06	465	79	6	0	63	27	74	7	98	0	0	0	0
Aug 06	465	79	6	0	63	27	74	7	98	0	0	0	0
Sep 06	450	79	6	0	63	27	74	7	98	0	0	0	0
Oct 06	465	79	6	0	63	27	74	7	98	0	0	0	0
Nov 06	450	79	6	0	63	27	74	7	98	0	0	0	0
Dec 06	465	79	6	0	63	27	74	7	98	0	0	0	0
Jan 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Feb 07	420	0	3	20	48	25	59	0	102	6	17	29	9
Mar 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Apr 07	450	0	3	20	48	25	59	0	102	6	17	29	9
May 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Jun 07	450	0	3	20	48	25	59	0	102	6	17	29	9
Jul 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Aug 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Sep 07	450	0	3	20	48	25	59	0	102	6	17	29	9
Oct 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Nov 07	450	0	3	20	48	25	59	0	102	6	17	29	9
Dec 07	465	0	3	20	48	25	59	0	102	6	17	29	9
Total digester input	**9.150**	**629**	**85**	**244**	**1.078**	**512**	**1.297**	**56**	**2.003**	**72**	**198**	**350**	**109**

.

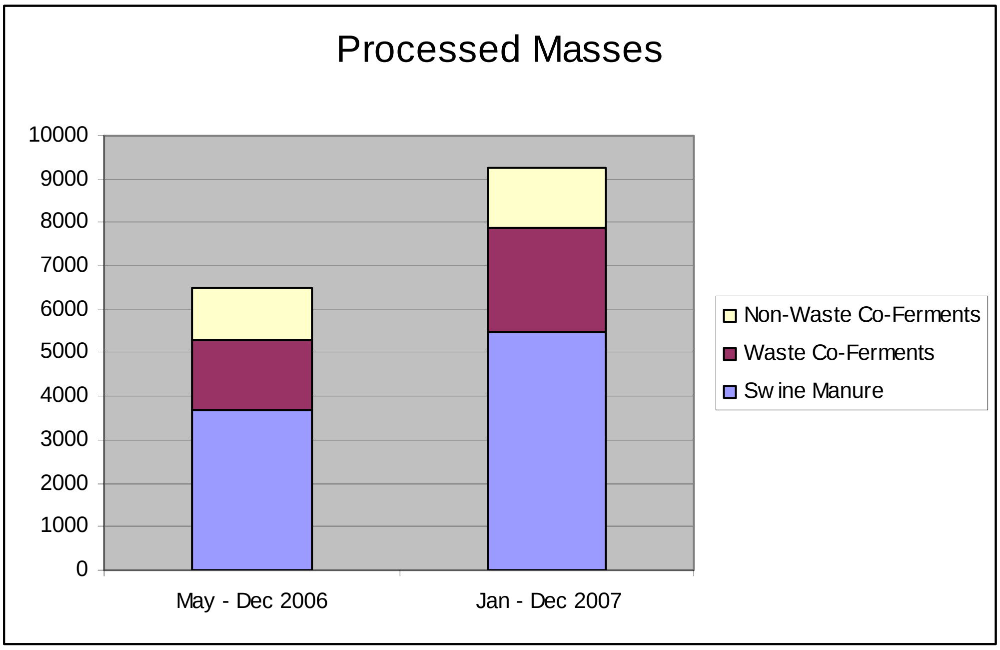

Figure 1 Digester mass input of manure and co-ferments (sum)

From the total input mass of each single ferment applied as raw material to the project activity, the CO_2e gas ratio produced by technical digestion was determined by using the specific literature data of CH_4 capacity. Some adjustments needed to be do as no literature values where available for all the co-ferments. Most suitable values are applied, in a way which gives rather high methane potential for non-waste co-ferments (conservative approach).

Applying this approach, during the monitoring period May 1, 2006 to December 31, 2007 the gas production ratio caused by the manure and waste co-ferment input through technical digestion could be determined to 81,27-vol% (volume percent) of the entire gas produced. This value will be applied in section 4.1 when calculating the methane mitigation from the biogas volume flow produced.

Table 3 Derivation of gas production ratio manure and organic waste / total input amount

	Manure	Waste							Non-Waste				
	Swine manure	**Potato starch**	**Glycerine**	**Vegetable juice**	**Unpacked drinks**	**Wheat starch**	**Cookies (grains)**	**Permeate milk**	**Mustard seed**	**Sunflower seed**	**Sugar cane**	**Maize**	**Crushed grain**
Total digester input; t	**9.150**	**85**	**1.078**	**512**	**56**	**2.003**	**72**	**198**	**350**	**109**	**629**	**244**	**1.297**
dmc; %	7	83	47	4	4	83	88	7	89	89	23	35	35
dom; %	86	99	69	75	75	99	96	92	86	86	95	95	95
VS; t	551	70	350	14	2	1.645	61	12	268	83	137	81	431
CH_4 capacity; m³/t	450	400	413	1.100	1.100	240	324	495	144	144	473	385	118
CH_4 density; t/m³							0,0007168						
CH_4 potential; t	178	20	103	11	1	283	14	4	28	9	47	22	36
GWP	21	21	21	21	21	21	21	21	21	21	21	21	21
CO_2e potential; t	3.731	422	2.171	235	26	5.944	297	88	582	181	979	469	764
CO_2e potential from manure ; t	**3.731**					**CO2e potential from waste ; t**	**9.185**					**CO2e potential from non-waste ferment ; t**	**2.976**
Gas production ratio single feed / total	23,48%	2,65%	13,66%	1,48%	0,16%	37,41%	1,87%	0,56%	3,66%	1,14%	6,16%	2,95%	4,81%
Gas production ratio manure and waste / total					**81,27 %**								
Gas production ratio non- waste ferment/ total											**18,73 %**		

Sources: For manure: IPCC 2006. For co-ferments: Fachagentur Nachwachsende Rohstoffe e.V 2006. Handreichung p. 95, Forschungsanstalt für Agrarwirtschaft und Landtechnik 2006, FAT Bericht Nr. 546 p. 2, Universität für Bodenkultur Wien 2004, Untersuchungen zur Wirkung von Rohglycerin aus der Biodieselerzeugung als leistungssteigerndes Zusatzmittel zur Biogaserzeugung aus Silomais, Körnermais, Rapspresskuchen und Schweinegülle p. 4 and 10 and webistes of Bavarian State Research Center for Agriculture [http://www.lfl.bayern.de/ilb/technik/10225/?sel_list=24%2Cb&strsearch=&pos=left]

3.2 Biogas Flow and methane content

The monthly biogas production has been measured continuously with a flow meter. Unfortunately, the existing flow meter is not calibrated for the measurement of norm cubic meters. However, since the pressure of the biogas is continuously measured and the temperature during this measurement can be estimated to be constantly about 27°C, the metered cubic meters could be adjusted to norm cubic meters.

Furthermore the CH_4 volume content has been measured with a gas analyser. These figures are presented in table 4 on a monthly basis. Since only the share of methane gas resulting from the manure and waste fermentation is of relevance for the reduction of uncontrolled emissions, the gas production ratio caused solely by the manure and waste fermentation (81,27 vol-%) is used to determine the methane production.

Table 4 Biogas production

Month	Biogas produced (Nm^3)	Methane Content (%)	CH_4 (Nm^3)		CH_4 from Manure and Waste (Nm^3)
May 06	76.244	54%	41.172		33.462
Jun 06	76.244	52%	39.647		32.223
Jul 06	76.244	50%	38.122		30.984
Aug 06	76.244	58%	44.222		35.941
Sep 06	115.879	58%	67.210		54.624
Oct 06	118.886	57%	67.765		55.075
Nov 06	78.931	51%	40.255	81,27%	32.717
Dec 06	106.320	51%	54.223		44.070
Jan 07	118.172	49%	57.904		47.061
Feb 07	109.841	48%	52.724		42.851
Mar 07	125.719	50%	62.859		51.088
Apr 07	124.658	50%	62.329		50.658
May 07	117.837	51%	60.097		48.843
Jun 07	64.529	53%	34.200		27.796
Jul 07	125.181	53%	66.346		53.922
Aug 07	112.558	52%	58.530		47.570
Sep 07	117.782	54%	63.602		51.692
Oct 07	113.141	54%	61.096		49.656
Nov 07	95.186	53%	50.449		41.002
Dec 07	83.713	53%	44.368		36.060
Total Output	**2.033.312**	**53%**	**1.067.121**		**867.295**

Figure 2 demonstrates the output curves from total digestate as well as manure solely between the period May 2006 and December 2007.

In total 2.033.312 m^3 biogas was produced. The amount of biogas produced was lower in the beginning of the period, which is typical for biogas plants, as the achievement of ideal biological conditions and maximum methane production takes some time. The productions figures varied through the whole period. Maximum production war reached on March 2007 with 125.719 m^3 followed by significant decrease during the next month reaching minimum production level of 64.529 m^3. This drop in June 2007 was caused by biological problems (significant occurrence of foam) which even lead to the destruction of the ceiling foil of one fermenter.

As the co-ferment input has been reported in annual bases and further average monthly values has been applied, it is impossible to make any implications from the interconnections between ferment input material and biogas production. The mean methane content during the period May 1, 2006 to December 31, 2007 was 53%.

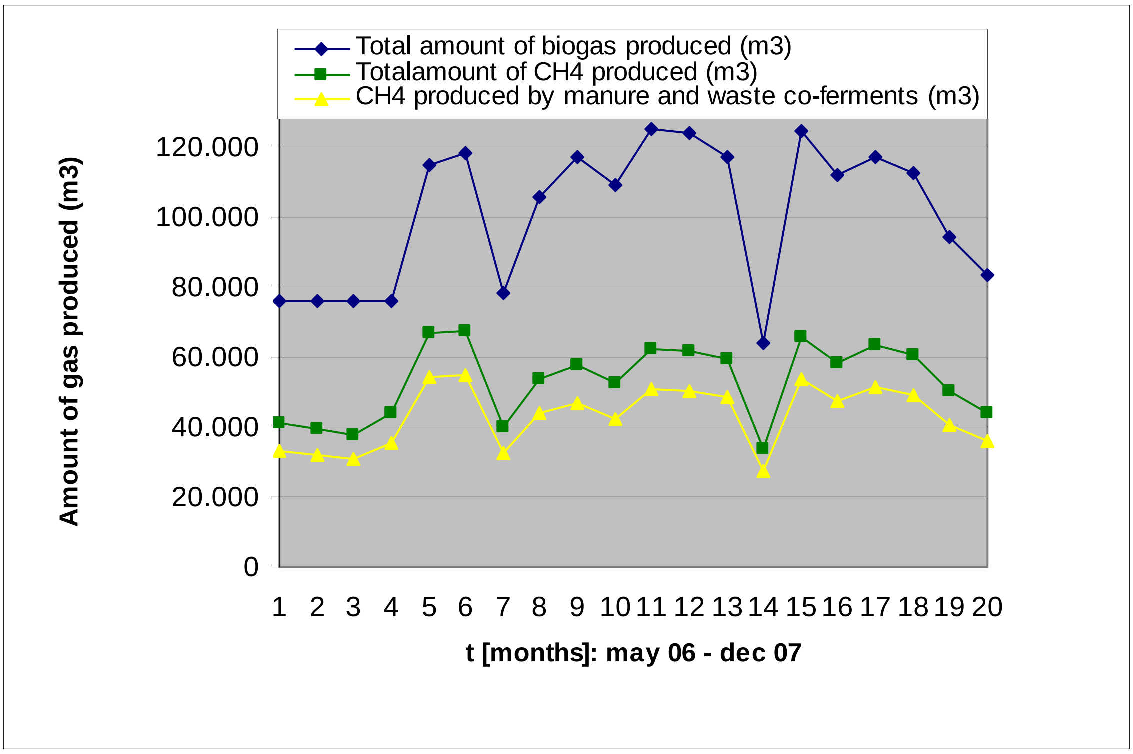

Figure 2 Biogas and methane production

3.3 Power Production of CHP Engines

The power production of both CHP engines installed has been continuously recorded. In total, 3.548.455 kWh of electricity has been produced by the biogas unit for own use and to be fed into the grid. The electricity production was achieved with an electric capacity of 330 kWel. Table 5 shows the results on a monthly basis.

Table 5 Power production of the CHP engines attached to the biogas module

Months		Power production CHP kWh/ month	Engine power output CHP kW	installed kW (total)	Efficiency %	full load run time h/a
May 06	1	120.058	167	330	51%	4.426
Jun 06	2	108.185	150	330	46%	3.989
Jul 06	3	123.697	172	330	52%	4.561
Aug 06	4	179.870	250	330	76%	6.632
Sep 06	5	215.780	300	330	91%	7.956
Oct 06	6	216.513	301	330	91%	7.983
Nov 06	7	131.714	183	330	55%	4.856
Dec 06	8	183.564	255	330	77%	6.768
Jan 07	9	200.736	279	330	84%	7.401
Feb 07	10	183.862	255	330	77%	6.779
Mar 07	11	219.242	305	330	92%	8.083
Apr 07	12	208.521	290	330	88%	7.688
Mai 07	13	194.595	270	330	82%	7.174
Jun 07	14	96.244	134	330	41%	3.548
Jul 07	15	223.754	311	330	94%	8.250
Aug 07	16	199.336	277	330	84%	7.349
Sep 07	17	220.323	306	330	93%	8.123
Oct 07	18	220.986	307	330	93%	8.147
Nov 07	19	163.354	227	330	69%	6.023
Dec 07	20	138.121	192	330	58%	5.092
Total		**3.548.455**	**4.928**		**75%**	**6.971**
					Arithmetic mean	

Figure 3 illustrates the power production of the CHP engines versus their installation capacity.

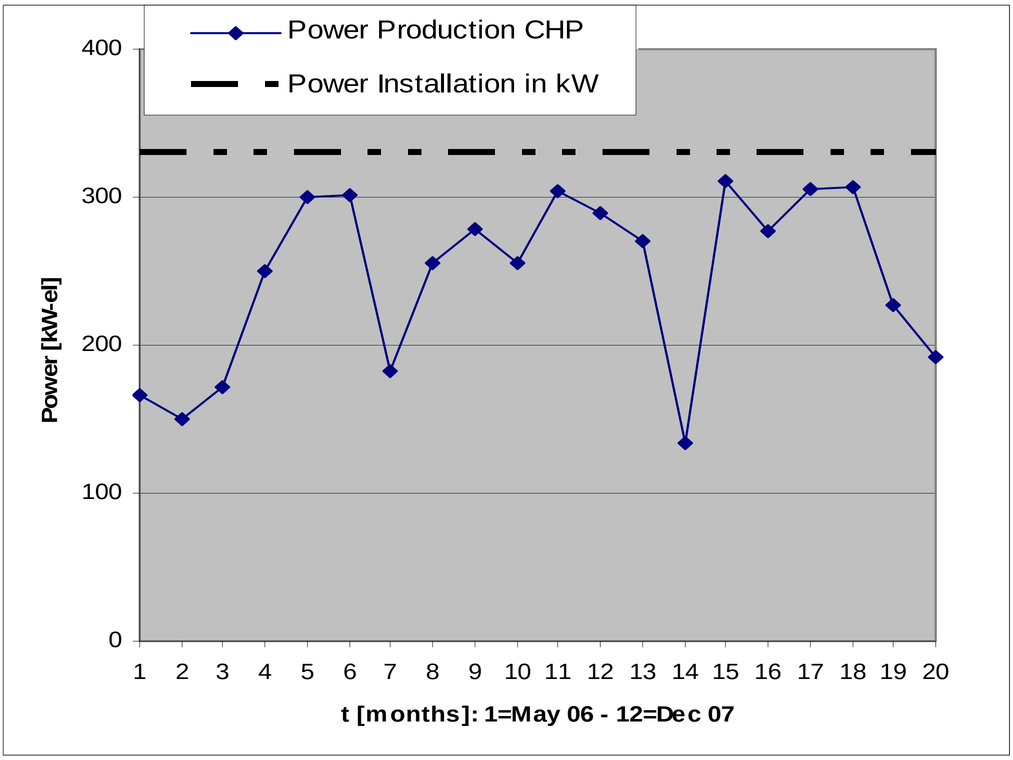

Figure 3 Power production of the CHP engines vs. the installation capacity

As the figure 3 shows, the amount of electricity produced during the period May 2006 to December 2007 has varied significantly. Accordingly the energy production ratio has changed between 41 % and 92 % of the installed capacity. The average production rate of electricity generated by the CHP in the monitoring period was still high 75 %, which corresponds to 6.971 hours of annual run-time of the CHP engine at full load.

3.4 Biogas Production with help of Run Time Hours of CHP Engines

The monthly biogas flow rates into the CHP engines installed with their corresponding CH_4 volume contents, as well as the run time hours of the engines are shown in table 6.

Table 6 Runtime hours of and biogas flow to CHP engines

Months		Runtime	CHP CH4 content	Biogas Flow
		h	vol %	m³
May 06	1	605	54	57.450
Jun 06	2	517	52	53.759
Jul 06	3	559	50	63.926
Aug 06	4	697	58	80.135
Sep 06	5	707	58	96.133
Oct 06	6	725	57	98.152
Nov 06	7	622	51	66.735
Dec 06	8	736	51	93.005
Jan 07	9	699	49	105.857
Feb 07	10	668	48	98.978
May 07	11	742	50	113.303
Apr 07	12	718	50	107.763
May 07	13	674	51	98.594
Jun 07	14	574	53	46.923
Jul 07	15	742	53	109.090
Aug 07	16	690	52	99.054
Sep 07	17	707	54	105.428
Oct 07	18	731	54	105.745
Nov 07	19	710	53	79.642
Dec 07	20	720	53	67.340
		13.543	**53**	**1.747.010**
		Total	**Mean**	**Total**

The biogas flow presented in the above table 6 has been derived according equation 1. The figures are used to cross-check the plausibility of measured biogas production.

The biogas production has been calculated as follows[1]:

$$BGP = \frac{EEP}{(ETA_{CHP-el}) * HV_{Biogas}} \qquad (1)$$

[1] In accordance with the CCX Agricultural Methane Gas Project Guidelines

with:

- *BGP:* Biogas produced [m³]
- *EEP:* Electricity energy produced [MWh]
- ETA_{CHP-el} Electric efficiency of the CHP engines = 0,387 (Ref.: engine data sheet)
- HV_{Biogas} Caloric value biogas [MWh/m³],

$$HV_{Biogas} = 0{,}01 \frac{MWh}{m^3} * x_{CH4}$$

with:
x_{CH4}: = CH_4 volume content of biogas flow

3.5 Cross-check of Biogas Parameters

The figures of biogas production calculated with help of electricity production (section 3.4, table 6, and equation 1) will be used as cross-check for the measured biogas production figures (section 3.2, table 4, figure 2). Since only the amount of methane produced from manure and waste ferment is of relevance only these figures will be presented herein in figure 4.

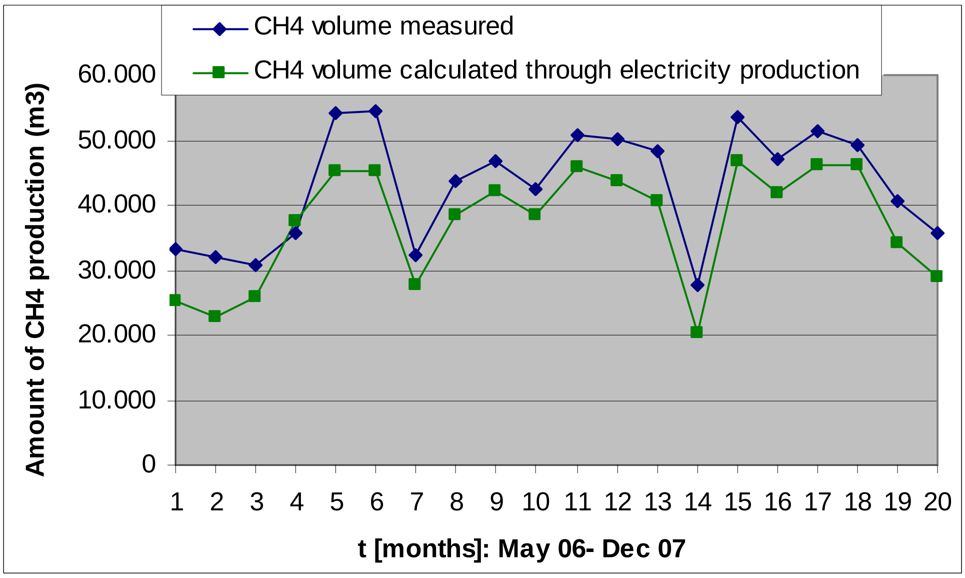

Figure 4 Cross-check of the produced methane amount

Due to the parallel courses of the curves methane production and the electricity production, it is clearly proved that the monitored and reported parameters are consistent and hence the data is postulated to be plausible.

3.6 Thermal Energy for external Utilisation

As a heat meter for metering the "thermal energy produced for external utilisation" was not installed due to financial causes, the emissions reductions gained through the thermal energy delivered to the swine stall and administrative buildings were determined with calculative methods as shown in table 7. The calculation bases on the amount of fossil fuels substituted. The operator of the biogas plant has kept record of the historic fuel use and the amount of fuel substituted by the biogas produced.

Table 7 Amount of fossil displaced and the occurring emission reductions

Parameter	Symbol	Unit	Value	Reference
Natural Gas substituted	Fuel	Nm³	72.855	Project setup
Heating Value	HU_{NGas}	kWh/Nm³	9,5	Supplier fuel data sheet
Thermal energy displaced	ETP	TJ	2,49	Calculated

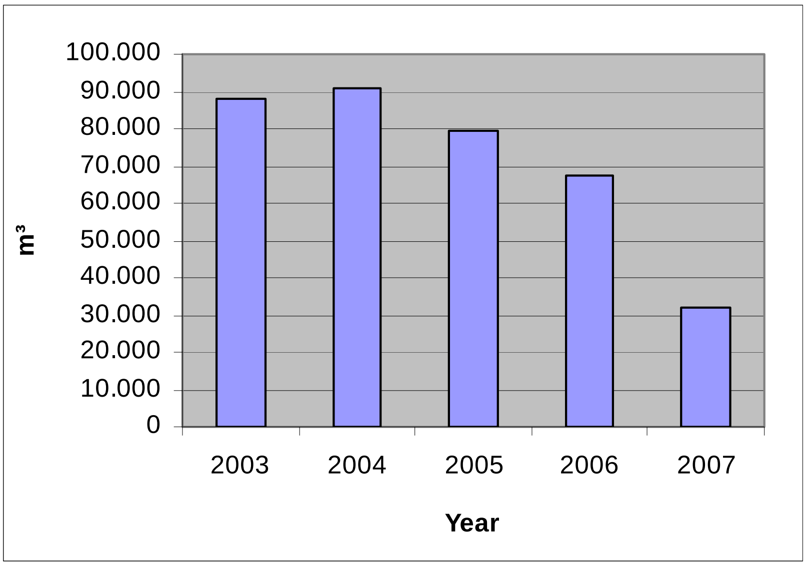

Figure 5 Natural Gas saved by Substitution

In the period May 1, 2006 to December 31, 2007 the project activity has produced thermal energy for external use 2.490.000 MJ, substituting fossil fuels.

3.7 Electric Energy imported

The project activity has imported electricity of 88.226 kWh from the public grid during the period from May 1, 2006 to December 31, 2007. During this period the project activity has produced electricity of 3.548.455 kWh (table 5), from which 2.368.492 kWh has been fed into the grid. Thus, the project activity provides a positive green energy balance.

3.8 Oil Consumption

An oil-fired boiler exists in order to keep the bacteria environment on temperature in case ofe of a breakdown of the CHPs. It has not been used during the period from May 1, 2006 to December 31, 2007.

4 Emission Reductions

The emission reductions of the project activity are determined by the two mitigation approaches (1) reduction of uncontrolled methane emissions which occur during storage of untreated manure and during disposal of decaying organic wastes, and (2) substitution of fossil fuels for heating purposes in the near vicinity farm through production and delivery of thermal energy by the project activity

4.1 Methane Mitigation

The methane emission reduction through the project activity *Methane Recovery Project Praktijkcentrum Sterksel* is to be derived according to the PDD, section D, by the following equation:

$$GHG_{red,\ IIID} = AF \bullet (BGP \bullet MC - \Sigma\ BGCO_i \bullet MCCO_i) \bullet D \bullet GWP_{CH4} \qquad (2)$$

With:

$AF = 1 - dm_{nw,\, i} / (dm_{manure} + \Sigma\, dm_{nw,\, I} + \Sigma\, dm_{w,\, j}) \bullet 0{,}1$

Where:

- $GHG_{red,IIID}$ is the annual emission reduction through methane recovery, in t CO_2e
- *BGP* is the total annual biogas produced by the project activity BGP, in m³
- *BGCOi* is the annual biogas portion of the total biogas amount produced, caused by a digested co-ferment i if applied, to be determined by the appropriate input amount (*MCOFi*) and the specific gas productivity of the co-ferment i, in m³
- *MC* is the average annual methane content in the biogas, in m³ methane / m³ biogas
- $MCCO_i$ is the average methane content arising in the biogas through digesting a co-ferment i, in m³ methane / m³ biogas
- *D* is the density of methane, set to 0,0007168 t CH_4 / m³ CH_4 according to ACM0001
- GWP_{CH4} is the Global Warming Potential of methane, set to 21 t CO_2e / t CH_4 according to UNFCCC
- $dm_{nw,\, I}$ is the dry matter of the proceeded quantity of non-waste co-ferment i
- dm_{manure} is the dry matter of the proceeded quantity of manure
- $dm_{w,\, j}$ is the dry matter of the proceeded quantity of waste co-ferment j

Referring to the derived gas production ratio of manure and waste of 81,27- vol % related to the total input amount and to the mean methane content 53 %, the methane reduction equation reduces to (please see table 3 and 4):

$$GHG_{red,\, IIID} = AF \bullet 0{,}8127 * BGP * 0{,}53 * D * GWP \qquad (3)$$

The table 8 shows the amount of GHG reduced during the monitoring period.

Table 8 Data applied to calculate the GHG reductions through methane mitigation

	Emission reduction trough manure and waste co-ferments				
Month	**CH4 (m^3)**		**CH4 (t)**		**CO2 (t)**
May 06	33.462		24		504
Jun 06	32.223		23		485
Jul 06	30.984		22		466
Aug 06	35.941		26		541
Sep 06	54.624	**Density**	39	**GWP_{CH4}**	822
Oct 06	55.075	0,0007168	39	21	829
Nov 06	32.717	t/m^3	23		492
Dec 06	44.070		32		663
Jan 07	47.061		34		708
Feb 07	42.851		31		645
May 07	51.088		37		769
Apr 07	50.658		36		763
Mai 07	48.843		35		735
Jun 07	27.796		20		418
Jul 07	53.922		39		812
Aug 07	47.570		34		716
Sep 07	51.692		37		778
Oct 07	49.656		36		747
Nov 07	41.002		29		617
Dec 07	36.060		26		543
Total	**867.295**		**622**		**13.055**
dry matter of the proceeded quantity of non-waste co-ferment (t)					1.001
dry matter of the proceeded quantity of manure					551
dry matter of the proceeded quantity of waste co-ferment					2.154
Adjustment Factor					0,9730
CO_2 emission reduction / m.p.					**12.703**

m.p. refers to monitoring period: May 1, 2006 - Dec 31, 2007

The methane emissions reduction achieved during May 1, 2006 and December 31, 2007 through the project activity *Methane Recovery Project Praktijkcentrum Sterksel* are calculated to be:

12.703 tons of CO_2e.

4.2 Thermal Energy for the User

The GHG mitigation through the thermal energy produced and delivered to the farm buildings in the near vicinity of the biogas plant where fossil sources are displaced, are calculated based on equation presented in the PDD under section D:

$$GHG_{red,\ IC} = Gas_{hist} * 0{,}0036\ TJ/MWh * CEF * FCO * 44/12\ t\ CO_2 / t\ C_{ox} \qquad (4)$$

Where:

- $GHG_{red,IC}$ is the annual emission reduction through thermal energy displacing fossil energy, in t CO_2 = t CO_2e
- Gas_{hist} is the average annual thermal energy previously needed to heat the stalls and administration buildings, in MWh (corresponds ETP presented in table 7)
- *CEF* is the carbon emission factor, set to 15,3 t C / TJ according to IPCC
- *FCO* is the fraction of carbon oxidised, set to 1 t C_{ox} / t C according to IPCC

Table 9 shows the data applied for this equation.

Table 9 Data applied to calculate the GHG reductions through thermal energy

	Parameter	Unit	Value	Reference
Thermal energy displaced	Gas_{hist} = ETP	TJ	2,49	Project setup (table 7)
Carbon Emission Factor (NG)	CEF	t C/ TJ	15,3	IPCC 2006, page 1.24
Fraction of Carbon oxidized	FCO	t C_{ox} / t C	1	IPCC 2006, page 1.24
Conversion Factor		t $C0_2$ / t C_{ox}	3,67	844 g/mol / 12 g/mol
CO_2 reduction through thermal energy		**t CO_2 e /m.p.**	**140**	

The CO_2 reduction achieved during May 1, 2006 and December 31, 2007 through thermal energy production by the project activity *Methane Recovery Project Praktijkcentrum Sterksel* calculates to be:

<u>**140 tons of CO2e.**</u>

4.3 Emissions by Sources

As the oil-fired emergency generators have not been used during the period from May 1, 2006 to December 31, 2007, no emission by the source of the project activity occurred.

4.4 Compilation

The project activity *Methane Recovery Project Praktijkcentrum Sterksel* causes GHG emission reductions due to both approaches methane reduction occurring during storage from manure and waste decay as well as substitution of fossil sources by thermal energy produced. The project activity itself did not cause any additional emissions through the operation. Since the project owner has to deal with a lot of organic waste streams of different type, in order to be extremely conservative when determine the final GHG reductions for verification an additional security factor of 0,5 to the reduction calculations made above shall be applied. However, the project owner shall reserve the right to later enhance this GHG reduction figure of 12.703 t CO2e retroactively by specified proof of every single waste stream and its associated parameter applications to the baseline. The emission reduction achieved trough the project activity is shown in table 10.

Table 10 Summarized data of the GHG emissions and reductions

Reduction Approach	**t CO_2e**
Methane Reductions	12.703
Heat Production / fuel switch	140
Emission by Sources / oil combustion	0
Electricity	0
Total GHG Reductions	12.842
GHG Reductions claimed	**6.421**

The total CO_2 net reductions claimed by the project activity Methane Recovery Project Praktijkcentrum Sterksel calculate for the operation period May 1, 2006 - December 31, 2007 to be:

6.421 tons of CO_2e.

5 References

- ARA Carbon Finance GmbH; PDD – Project Design Document, *Methane Recovery Project Praktijkcentrum Sterksel*, Final Version 04, June 28, 2007
- Operators Data Recordings for the operation period May 2006- Dec 2007
- Tüv Rheinland Group; Determination Report and Determinaiton Protocol; Final Version, 2007-08-25
- Chicago Climate Exchange; CCX Agricultural Methane Gas Project Guidelines

- <u>Contact information for VER activities:</u>

  ARA Carbon Finance GmbH
  Grosser Burstah 31
  20457 Hamburg
  Germany
  Represented by Ms. Laura Lahti (lahti@ara-co2.de)