Table of Contents

Project Idea Note (PIN)

A PROJECT IDENTIFICATION

A 1 Project summary	
Title of project activity	Small biodigesters for Georgia's regions
Applicant	Ministry of Economic Development, Department for Regional Policy
Host Country	Georgia
Project type	○ Joint Implementation X Clean Development Mechanism
Category of project activity	Renewable energy
Generation of emission reductions	
Estimated emission reductions *(in t CO_{2e} up to 2012)*	**46444 tCO2**
Crediting Period	10 years
Offered amount of emission reductions	CERs: 132 440 **tCO2**
Proposed CER price (EUR)	12

B PROJECT PARTICIPANTS

B 1 Applicant	
Name	The Ministry of Economic Development of Georgia, Department for Regional Development
Type of organisation *Please also describe the ownership structure.*	Government
Other functions of the Applicant within the project	○ Sponsor X Intermediary ○ Technical consultant ○ Other: _____
Main activities, knowledge and experience	Development of innovative projects with the application of the renewable energy sources
Name of contact person	Malkhaz Sanikidzre
Address	*12 Chanturia St Tbilisi 0108,*
Phone/fax	+ 995 32 999 528
E-mail	sanikidzem@gmail.com

B 2 Project developer	
Name	Energy Efficiency Center Georgia
Type of organisation- NGO	
Other functions of the project developer within the project	○ Sponsor ○ Intermediary X Technical consultant ○ Other: _____
Main activities, knowledge and experience	EEC Georgia is NGO with the main goal to support renewable energy and energy efficiency development and a s a result improve national energy Security level and minimize negative environmental impact. ***Specific aims:*** ✓ **Preparation of the sustainable basis for the functioning of the energy sector;** ✓ **Realization of economically effective and environmentally friendly projects;** ✓ **Preparation and realization of training programs for energy managers and engineers; Analysis of economic potential of energy sources;** ✓ **Creation of EEC as the basic informational core for popularization of activities directed to developing new non nuclear energy**

	technologies; ✓ **Support to the establishment of business relation with foreign and local potential partners, International organizations and financial institutions.** EEC Georgia operates *in energy, industrial and building sectors and provides consultancy services* such as energy audits, policy analysis and development of pre-feasibility studies, pre-investment surveys, in particular the organization is providing: • Training courses in renewable energy and environmental issues; • Assessment of technical and economic potential of the renewable energy resources; • Development and implementation of small scale hydro, solar, bioenergy and other renewable energy projects; • Searching the possibilities for attraction financing of renewable energy projects; • Activities for the development of CDM projects in Georgia.
Name of contact person	Liana Garibashvili
Address	19 Gamrekeli St. VI floor; Tbilisi 0160; Georgia
Phone/fax	+995 32 24 25 40/41; +995 32 24 25 42
E-mail	eecgeo@eecgeo.org; l_gari@eecgeo.org

B 3 Other project participants	
Name of project participant	"Energia"Ltd
Type of organisation	○ Governmental body: _____ X Private enterprise ○ NGO ○ Other: _Independent consulting company_____
Function within the project	○ Sponsor ○ Intermediary ○ Technical consultant ○ Other: _____
Name of contact person	Jondo Sanikidze
Address	77 Kostava St. Tbilisi
Phone/fax	Tel.+995 32 969278; Mob: 899 970257 / 877 5777888 Fax: +995 32 392743
E-mail	sanikidzem@gmail.com

C HOST COUNTRY

C 1 Location of project activity	
Host Country Party(ies)	Georgia
Region/State/Province etc.	
City/Town/Community etc.	
Brief description of the project location	The project location is 10 regions of Georgia- Racha, Guria, Samtskhe-Javakheti,Shida Kartli, Kvemo Kartli, Mtskheta-Mtianeti,Adjara, Kakheti, Samegrelo-Svaneti, Imereti.

C 2 Status of Host Country	
Host Country	X Signed and ratified, accepted, approved or acceded to the Kyoto Protocol ○ Signed the Kyoto Protocol and has demonstrated a clear interest in becoming a Party in due time ○ Has already started or is on the verge of starting the national accession process

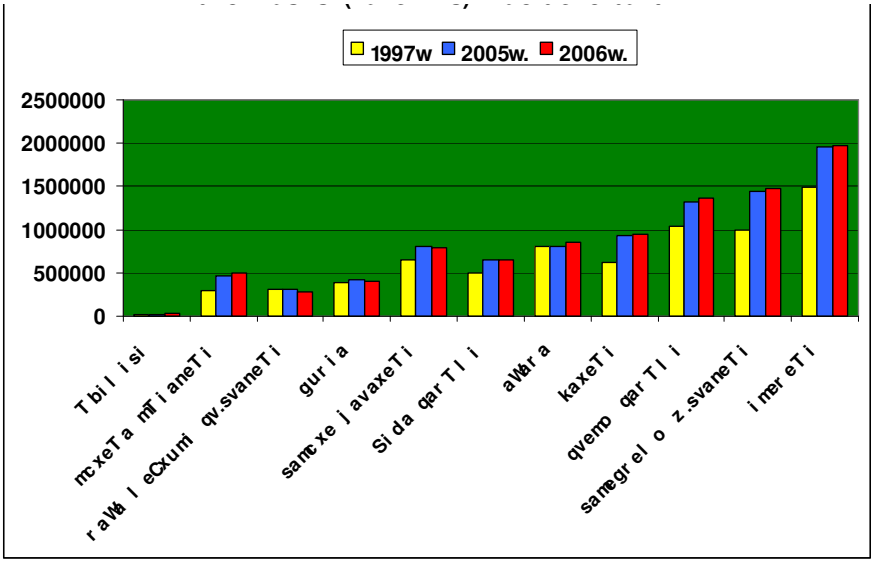
D GENERAL PROJECT INFORMATION

D 1 General Information	
Project name	Small biodigesters for Georgia's regions
Project objective	Construction of small biogas digesters for households in rural regions of Georgia. The project activity will reduce greenhouse gas (GHG) emissions by displacing conventionally used fuel sources for cooking, such as fuel wood and kerosene. The proposed activity additionally reduces CH4 and N2O emission reductions by introducing a proper disposal of animal waste and by producing a bio-slurry for replacing the household consumption of chemical fertilizers.
Description of project background	Development of the agricultural sector is the issue of the strategic importance for Georgia. Together with the development of other branches the development of the biotechnologies, in particular introduction and distribution of the biogas digesters, is considered to be one of the priority fields that will contribute to the agricultural sector development. Alongside with other contributing factors, the major one is the existence of necessary bio resources in the country. The utilization of these resources can satisfy of about 14-17% the energy needs of the agricultural sector. At the same time introduction of the biodigesters will contribute to the solution of other problems, like further development of animal husbandry, solution of problems connected with land-utilization, preservation and rehabilitation of forest resources. In Georgia there are about 600 000 small farms According to the statistic data the growth of the animal husbandry in the period 1997-2006 is estimated at 29,8%, which means the growth of bio energy potential in the country. Currently the total number of cattle on these farms is about – 1265100. (See detailed table below). According to the ministry of Agriculture annual consumption of wood by the small rural households (farms) is about 4,5 mln.m3 causing serious problem to the nature. In rural areas the majority of households are using the low efficient wood stoves with efficiency 10-15%. Another unsolved problem for rural households is the animal waste and its disposal. As estimated by the Ministry of Agriculture annually about 20 mln.tons of animal waste remains on the farms causing serious environmental problems. This means that about 180 000 small biogas digesters could be built in the country. In spite of existing huge potential only several pilot biogas projects have been implemented. All these projects were implemented with the support of the international donors. The total capacity of existing 337 biogas digesters functioning in various regions of Georgia is 2600 m3. It is expected that through the operation life (15-20 years) 4,67 million cubic meter of bio-gas will be generated and 215400 t. bio-fertilizer received.

The number of cattle by regions

Year	Tbilisi	Mtskheta-Mtianeti	Racha-Lechkh.	Guria	Shida Kartli	Kakheti	Samtkhe-Javakheti	Ajara	Kvemo Kartli	Samegrelo Z.Svaneti	Imereti
1997	2650	39876	41733	53803	67403	85650	90384	111463	143558	135450	205041
2005	3000	63065	41931	58400	89068	127436	110016	111213	181240	198115	268589
2006	3600	68023	38140	54377	89271	130786	107694	116282	186407	201288	269229

Biomass (manure) quantity in tons by regions



D 2 Category(ies) of project activity	
Project category *Please mark accordingly.*	○ Construction (or retrofitting) of combined heat and power installations; ○ Fuel-switch projects in energy conversion installations and production plants to renewable energy sources or from energy sources with high carbon content to energy sources with lower carbon content, especially in existing district heating systems; ○ Construction (or retrofitting) of generating plants operated with renewable energy sources (especially wind power plants, biogas or biomass combined heat and power plants as well as hydroelectric power plants); ○ Projects whose purpose is the avoidance or (energy) recovery of landfill gas; X Waste management measures which contribute to the avoidance of greenhouse gas emissions, especially through energy recovery from waste, if possible with waste heat utilisation; ○ Energy efficiency projects: projects serving the reduction of end-user energy consumption in residential buildings, public and private office buildings as well as industrial applications and processes (including waste heat potentials); ○ Other: _____

D 3 Technical aspects

Technical description

The essential technical aspects should be briefly presented.

A detailed description (max. 3 A4 pages) should be enclosed with the PIN including the following aspects:

Project purpose

Applicant's facilities to generate Emission Reductions

Description of technology employed and associated risks

Milestones, time schedule and current status of implementation

Key permits and expected date of approval

Key contracts and expected date of signing

Risks during project implementation and operation

The proposed project envisages the partial utilization of existing potential of bio resources existing in the country and the construction of about 10 500 small biogas digesters for households in rural regions of Georgia. The household biogas digester plants to be built under this project activity will provide biogas for the thermal energy needs of households with at least 3 heads of cattle (cow or buffalo) and will displace non-renewable biomass product (firewood). The proposed activity will reduce CH4 and N2O emission reductions by introducing a proper disposal of animal waste and by producing a bio-slurry for replacing the household consumption of chemical fertilizers.

As mentioned above currently about 337 biogas digesters are functioning in the country. All these projects have been implemented with the financial assistance of the international donors as the investment in the biogas sector is a non-commercial activity in Georgia. One of the objectives of the proposed project is to integrate carbon revenues and contribute to the implementation of the Government biogas support program.

In all the implemented projects 4 types of biogas technologies have been employed, in particular:

- Earthquake resistant biogas digester with solid dome.
- Indian type – with floating cover
- Biodigester constructed from polymeric material
- surface-mounted methane tank operating in thermophile regime

The proposed project envisages the installation of three various types of spherical biogas digesters with capacity 1,5 m3, 2 m3 and 4 m3 constructed of polymeric-fiber material with the expected lifetime of 20 years. These types of digesters requires little maintenance in comparison with other types (only every 10-12 years cleaning) and can be constructed on site by a team of 3 workers in 2 days. These kinds of digesters are manufactured locally and their cost varies from **$2,450 to $ 3270**.

The elements of spherical digester are as follows:
Reactor- polymeric;
Cylindrical element (structure)- polymeric;
pressure governor (regulator) tank- polymeric;
Inlet and outlet collectors- polymeric;
Inlet and outlet insulated pipes d=200mm;
Set of assembly fittings;
Biomass storage with separator;
Pump for biomass ;
Indicator for outside balance;
Ozonator;
Gas metering device;
Low pressure gauge.

In the table below see the details of the proposed biodigesters working in the thermophyle regime:

		Thermophyle regime		
Number of heads	Daily manure	digester volume	Received biogas	Cost of the digester
	kg	m3	m3/day	USD
3	75	1	0,9	1850
4	100	1,5	1,3	2450
6	150	2	1,9	2780
10	250	4	3,1	3270
14	350	5	4,4	3800
18	450	7	5,6	4790
22	550	8	6,9	6150

In addition annually one digester will provide for the production of 15-32 tons of organic fertilizer.

Number of biodigesters to be commissioned by years:

		Months													
Year	Type of digester	1	2	3	4	5	6	7	8	9	10	11	12		
2008	1,5							100	100	100	100	100	100	600	1500
	2							100	100	100	100	100	100	600	
	4							50	50	50	50	50	50	300	
2009	1,5	100	100	100	100	100	100	100	100	100	100	100	100	1200	3000
	2	100	100	100	100	100	100	100	100	100	100	100	100	1200	
	4	50	50	50	50	50	50	50	50	50	50	50	50	600	
2010	1,5	100	100	100	100	100	100	100	100	100	100	100	100	1200	3000
	2	100	100	100	100	100	100	100	100	100	100	100	100	1200	
	4	50	50	50	50	50	50	50	50	50	50	50	50	600	
2011	1,5	100	100	100	100	100	100	100	100	100	100	100	100	1200	3000
	2	100	100	100	100	100	100	100	100	100	100	100	100	1200	
	4	50	50	50	50	50	50	50	50	50	50	50	50	600	
Total															**10500**

E PROJECT ORGANISATION

E 1 Project team	
Project-specific qualifications and experiences	Since 1997 "Energia"Ltd has been actively engaged in the application of the renewable energy technologies, in particular the company has developed a prototype micro hydro plant, wind power water pump, simple biodigesters for individual family-farms as well as small capacity biodigesters operating in mesophilous and thermophile regimes. The company holds the biodigester construction licence issued by the Ministry of the Construction and Urbanization. With the WB financial support the company constructed 90 biogas digesters in Kobuleti, Lanchkhuti, KhelvaChauri and Khobi districts and 20 units of 10 m3 biodigesters in Adjara region. In the period 2006-2007 with financial assistance of Winrock Georgia and UNDP the company constructed 10 units of 6 m3 polimeric biodigesters in Mtkhta, Khelvachauri and Ambrolauri districts In addition the company has constructed 25 biodigesters for individual private farms. The company cooperates with "Global Energy" Ltd, Bakha Bioenergia" LTD JSC- "Eris Imedi" in the contruction of biodigesters. Current production facilities (in Tbilisi and Turkey) provide for the output of 2000 biodigesters annually but the production output could be increased up to 4500 annually. In March 2008 the Department started work on the improvements of the existing model of the biodigester together with the experts from the department of the heat engineering equipment at the Technical University. The carried tests gave the positive results increasing output of the digesters in the processing the cattle manure. EEC Georgia Since 2002, EEC Georgia has been working on Climate Change issues and Implementation of the Kyoto Protocol in the country through the involvement in various projects initiated by international and foreign organizations, in particular: 2002- Eastern Climate Change Synergy Project- 10 various CDM project ideas prepared (EU DG TREN); 2004-Preparation of UNFCCC 2nd National Communication- (UNDP/UNFCCC); 2006-2008-CDM as instrument for industrial development and poverty alleviation in Caucasus-(Norwegian MOFA, Norsk Energy; ECON) - CDM Capacity building workshops, identification and development of PINs. On 31st of August 2007, the ERPA has been signed between the International Bank for Reconstruction and Development –IBRD (World Bank) "Community Development Carbon Fund-CDCF" and Energy Efficiency Centre Georgia - EEC Emission Reductions Purchase Agreement. This is the first Clean Development Mechanism (CDM) agreement in Georgia. The mentioned agreement will enter into force after the UNFCCC and Designated National Agency (Ministry of Environment and Natural Resources of Georgia) procedures are finalized. EEC acts as a Bundling Agency for this ERPA and will bundle Verified Emission Reduction (VER) of 9 Small Hydro Power Stations rehabilitated in the frame of USAID funded "Rural Energy Development-RED" project and supply to World bank during 7 years (2008-2015). From 2003 EEC Georgia with the support of Norwegian ENSI established RE &EE Revolving Fund. The RF provided loans up to $ 10,000 to companies in Tbilisi and in Rustavi.

E 2 Schedule	
Current project status	X Project idea ○ Planning ○ Implementation
Status of financing	Renewable Energy Revolving Fund
Status of negotiations with the Host Country	
Status of permission procedures of authorities	Not required
Project preparation	
Construction/assembly	2008-2011 See tables and explanations above. The proposed types of biodigesters are pre-fabricated and only require 2 days to assemble on-site.
Project lifetime	20 years
Generation of CERs	Crediting period 10 years
Other milestones	
Effect of PIN acceptance on the time schedule of the project	

E 3 Financial aspects	
Costs of project development (EUR)	35,000
	Estimated revenues from sale of emission reductions for 10 years: € **132 440** x 12 = € 1 590 000 about 2,5 ml USD **Expected scheme of financing the project:** Renewable Energy Revolving Fund- 7 mln.USD
Estimated annual operating costs (EUR) Please give figures and briefly explain (background of) calculations.	60,450 (includes management of the revolving fund and operational costs)
Estimated annual revenues (EUR) Please give figures and briefly explain (background of) calculations.	It is envisaged that the Fund will issue 1 year loans at 14% interest. In the table below see simple calculations in USD.

Financing sources (equity/debt capital, financing institutions)	Government, International Financial Institutions
Proposed CER price (EUR)	12

Year		1	2	3	4	5	6	7	8	9	10	11	12	
2008	Loan							686500	686500	686500	686500	686500	686500	4119000
	Loan payment								65218	130436	195654	260872	326090	978270
	management													72850
	CER revenue													9728
2009	Loan	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	8238000
	Loan payment	391308	456526	521744	586962	652180	717398	782616	782616	782616	782616	782616	782616	8021814
	management	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	94000
	CER revenue													86887
2010	Loan	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	8238000
	Loan payment	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	9391392
	management	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	94000
	CER revenue													182837
2011	Loan	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	686500	8238000
	Loan payment	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	782616	9391392
	management	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	94000
	CER revenue													276203
2012	Loan	0	0	0	0	0	0	0	0	0	0	0	0	
	Loan payment	782616	717398	652180	586962	521744	456526	391308	326090	260872	195654	130436	65218	5087004
	management	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	7834	94000
	CER revenue													326781

F GREENHOUSE GAS EMISSION REDUCTIONS

Only projects resulting in emission reductions of greenhouse gases listed in table F1 can be accepted as JI or CDM projects. All emissions and/or emission reductions must be stated in metric tonnes of CO_2 equivalent.

F 1 Greenhouse gases	
Greenhouse gases to be reduced by the project	○ CO_2 X CH_4 X N_2O ○ HFCs ○ PFCs ○ SF_6

The Project Boundary shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the project activity.

F 2 Project Boundary	
Description of Project Boundary	The project boundary is the physical, geographical site of the methane recovery and combustion system.

F 3 Project emissions	
Description and estimation of project-specific greenhouse gas emissions within the Project Boundary	Project activity emissions: Project emissions consist of CO2 emissions from use of fossil fuels or electricity for the operation of the system and the physical leakages of methane from the recovery system. For the specific case of domestic biogas digesters, project emissions are calculated as follows: $PE_y = LF_{AD} [GWP_{CH4} * D_{CH4} * B_o * VS_{m,y}]/1000$ **(1)** Where: $PE_{y,}$ Project emissions from physical leakages in the biogas digesters in year *y*, (t CO_2e). LF_{AD} Methane leakages from anaerobic digesters; a default value of 0.10 can be taken according to table 10A-8 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10. GWP_{CH4} Global Warming Potential of CH_4. D_{CH4} Conversion factor of m^3 CH_4 to kilogram CH_4 (as per 2006 IPCC guidelines, see Volume 4, Chapter 10, Page 10.42). B_o Maximum methane producing potential of the manure type treated in the biogas digesters as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10 (m^3 CH_4 per kg of dm by animal type) VS Annual amount of volatile solids treated in the biogas digesters on dry matter weight basis as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10 (kg of dm per year) **0,1(21*0,67*0,17*2,7)/1000= 0,00065 tCO2/yr**

F 4 Baseline	
Outline of considered Baseline methodology/scenario and estimation of Baseline emissions within the Project Boundary	The baseline approach for the project is based on the small-scale CDM project activity categories contained in appendix B of the simplified M&P for small-scale CDM project activities. The baseline for the category I. C. Thermal Energy for the User under Type I, Renewable Energy Projects, is defined as follows: "For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficient may be used." "For renewable energy technologies that displace non-renewable sources of biomass, the simplified baseline is the non-renewable sources of biomass consumption of the technologies times an emission coefficient for the non-renewable sources of biomass displaced. IPCC default values for emission coefficient may be used." The proposed biogas digester systems generate heat for their owners (households) and displace fossil fuels and/or non-renewable sources of biomass (fuelwood). **1. CH_4 emission from manure management** **Emission factor for methane emission from manure (cow &buffalo)** According to IPCC Tier 1, is taken to be **13 kg/head/yr** **CH_4 emission from manure management** for various types of digesters 1,5 m3 digester- GWP *1/1000*4 heads*13 kg/head/yr = **21 *0,001*4*13=1,092 tCO_2e/yr** **2 m3 digester-** **21 *0,001*6*13=1,638 tCO_2e/yr** **4 m3 digester** **21 *0,001*10*13=2,73 tCO_2e/yr**

Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the Project Boundary, and which is measurable and attributable to the project activity.

F 5 Leakage	
Description and estimation of Leakage	According to ASM III.R as the methane recovery and combustion equipment neither is transferred from another activity nor the existing equipment is transferred to another activity, leakage is not considered.

F 6 Emission reductions	
Crediting period	10 years
Estimated annual and total abatement of greenhouse gas emissions in tonnes of CO_2 equivalent in comparison to the Baseline scenario (taking into account Leakage)	**Project emissions (see above) 0,00065 tCO2/yr** The proposed project envisages the gradual construction of 10500 plants, **thus estimated annual emission reductions after the plants are constructed will be- 17 199 tCO2eq/year** **For the 10 year crediting period emission reductions will be-** **132 440 tCO2eq/year**

Calculation of emissions in tCO2 for the period 2008-2012

Year	Type of digester	1	2	3	4	5	6	7	8	9	10	11	12		tCO2
2008	**1,5**								**9,1**	**18,2**	**27,3**	**36,4**	**45,5**	**136,5**	**511,875**
	2								**13,65**	**27,3**	**40,95**	**54,6**	**68,25**	**204,75**	
	4								**11,375**	**22,75**	**34,125**	**45,5**	**56,875**	**170,625**	
2009	**1,5**	**54,6**	**63,7**	**72,8**	**81,9**	**91**	**100,1**	**109,2**	**118,3**	**127,4**	**136,5**	**145,6**	**154,7**	**1255,8**	**4572,75**
	2	**81,9**	**95,55**	**109,2**	**122,85**	**136,5**	**150,15**	**163,8**	**177,45**	**191,1**	**204,75**	**218,4**	**232,05**	**1883,7**	
	4	**56,875**	**68,25**	**79,625**	**91**	**102,38**	**113,75**	**125,13**	**136,5**	**147,88**	**159,25**	**170,63**	**182**	**1433,25**	
2010	**1,5**	**163,8**	**172,9**	**182,0**	**191,1**	**200,2**	**209,3**	**218,4**	**227,5**	**236,6**	**245,7**	**254,8**	**263,9**	**2566,2**	**9623,3**
	2	**245,7**	**259,4**	**273,0**	**286,7**	**300,3**	**314,0**	**327,6**	**341,3**	**354,9**	**368,6**	**382,2**	**395,9**	**3849,3**	
	4	**204,8**	**216,1**	**227,5**	**238,9**	**250,3**	**261,6**	**273,0**	**284,4**	**295,8**	**307,1**	**318,5**	**329,9**	**3207,8**	
2011	**1,5**	**273,0**	**282,1**	**291,2**	**300,3**	**309,4**	**318,5**	**327,6**	**336,7**	**345,8**	**354,9**	**364**	**373,1**	**3876,6**	**14537,3**
	2	**409,5**	**423,15**	**436,8**	**450,45**	**464,1**	**477,75**	**491,4**	**505,05**	**518,7**	**532,35**	**546**	**559,65**	**5814,9**	
	4	**341,25**	**352,63**	**364**	**375,38**	**386,75**	**398,13**	**409,5**	**420,88**	**432,25**	**443,63**	**455**	**466,38**	**4845,75**	
2012	**1,5**	**382,2**	**382**	**382**	**382**	**382**	**382**	**382**	**382**	**382**	**382**	**382**	**382**	**4586,4**	**17199**
	2	**573,3**	**573**	**573**	**573**	**573**	**573**	**573**	**573**	**573**	**573**	**573**	**573**	**6879,6**	
	4	**477,75**	**478**	**478**	**478**	**478**	**478**	**478**	**478**	**478**	**478**	**478**	**478**	**5733**	

46444,125

G (ADDITIONAL) ECOLOGICAL, SOCIO-ECONOMIC AND/OR DEVELOPMENT EFFECTS

G 1 Expected environmental effects	
Expected global/local environmental effects (positive and negative) of the project[1]	Through developing, building, and putting into operation 10500 individual household based biogas digesters utilizing cattle manure available on the farm, the project will generate significant environment impact by improving the rural environment and living conditions of the individual households while reducing greenhouse gas

	emissions. In addition to reducing the GHG emissions from improved animal manure management and reducing burning of fuel-wood the proposed project will have the following environmental benefits: 1. Reduced non methane volatile organic compound (NMVOC) emissions into the atmosphere and odour caused by animal manure will be reduced. 2. Anaerobic treatment of farm manure will result in reduced water pollution and threat of spreading the infectious diseases transmitted from animals to people as well as by improved living conditions for the households 3. Improved indoor air quality from substituting fuel-wood with bio-gas, decrease of respiratory diseases, especially among the women and children 4. Reduction of use of fuel wood for cooking will lead to the wood cut reduction and land degradation in the project surrounding area

G 2 Socio-economic and development aspects	
Expected social and economic effects of the project	The project will contribute: ➢ towards better working conditions and will increase the employment opportunities in the area- the new plants will require the technical services and training to the local farmers on effective manure management and biogas digester operation and maintenance; ➢ towards better local economy conditions since the use of the renewable energy will decrease the dependence on fossil fuels; ➢ towards reduced expenditures of biogas plant owners for energy (fire wood) and increased income from selling of the excess of fertilizer received from the proper manure management; ➢ towards improving the living conditions of the population in the area through the improvement of indoor air quality from substituting fuel-wood with bio-gas
Project-related employment structure	○ Employees under 14 years X Employees over 14 years

H ADDITIONALITY AND SUSTAINABILITY EFFECTS

H 1 Additionality	
Presentation of the Additionality of the project	A number of significant barriers to the implementation of this project demonstrate clearly that the proposed CDM project is additional. These barriers include: **Investment Barrier** According to the project design, a total of 10,500 biogas digesters will be installed by individual households in the project areas. The total project investment cost, including the biogas digester installation, operation and maintenance cost, is US$ 7 million. At the household level the cost of biogas digester varies from 2450 USD- to

	3270 USD. In Georgia the majority of rural population is considered to be poor. Unemployment in rural areas is widespread and thus majority of the population there are self-employed on their own farms. The major source of income for the rural households is the revenues received from agricultural activities which cover family expenditures on purchase of food stuff they do not produce, firewood for cooking and heating, children's education, medical expenses and etc. The farmers will not able to invest in the cost of the digester, though they can provide in-kind contribution (own labour during the construction and pay-back low interest loan (if there is such a possibility) from the savings from purchasing less fuel wood, producing more agricultural goods and selling extra fertilizer. Most of the rural low income households have difficulties in accessing financing from local commercial banks and other financial institutions. Furthermore, currently, the local financial sector does not have loan products suitable for "non-productive" investments. As the biogas digesters will be installed for the households self-use with no products to be sold on the market generating revenues, the economic benefit of the biogas digester is reflected as savings in fuel expenditures and more agricultural yields . If this project is registered as a CDM project, the transaction of Carbon Credit for a substantial time period would be a stable source of revenue for the renewable Energy Revolving Fund and improve chances for farmers to borrow from the Fund. **Technical barrier:** The majority of farmers lack access to improved technologies and management methods. As mentioned above, some 337 biodigesters have been installed in Georgia in the period 2000-2006. Due to the lack of experience among the individual households, insufficient training and limited biogas service support some of these digesters are not functioning or are not properly functioning, the performance of digesters is not stable, they do not produce the expected volume of gas. The maintenance and management of biogas digesters require adequate support services and trained staff, which is not available to the project households without the project. The project will provide new technologies and best practices in manure management, as well as biogas digester construction and maintenance to the rural households and communities. Without CDM revenues from the proposed project activities the rural households are unlikely to obtain the necessary knowledge and competence to maintain and manage biogas digesters properly. **Barrier from Prevailing Practice** On an individual farm level the current practice of the manure treatment and management requires no or very little investment and labour input. The cost of the traditional wood stove which is used by the household for cooking is much less than a biogas digester. Though biogas digester can provide clean biogas energy, prevent deforestation from burning of fuel wood; improve the local environment by reducing air pollution and improve sanitation by avoiding disposal of aerobically treated manure there is no regulation in the country that would require from farmers any improvements in the current manure management system. The currently used practice for manure management is cheap and reliable. It is unlikely that the households will switch to a biogas digester and a gas stove requiring high upfront investment, regular maintenance cost, and special training to operate without financial support.

H 2 Sustainability Effects	
Summarising description of the project's contribution to the sustainable development of the Host Country	This project contributes to sustainable development in Georgia. Specifically, the project contributes as follows to the three aspects of sustainable development: economic, environmental and social aspects: **Economic:** **Increasing local incomes.** The project will reduce expenditures for household energy needs (fire wood). Residual biological slurry from the biogas plants can be used as superior organic fertilizers to enhance agricultural yields. The excess of the received fertilizer can be

	sold locally bringing additional income to the family. **Environmental** **Improving local environment and public health.** The project will reduce the usage of firewood per household by installing biogas burners for household cooking and heating. Improved manure management will lead to the reduction of the ground and surface water contamination, reducing spreading of diseases and odor caused by animal manure. Biogas recovery will diversify the sources of the rural energy supply reducing deforestation; **Reducing greenhouse gas (GHG) emissions to combat global climate change.** The project will adopt improved management methods changing the traditional practice of manure treatment to reduce CH4 emissions. Through developing and putting into operation biogas digesters to recover methane for household thermal energy needs, it will also replace to a certain percentage firewood with biogas reducing CO2 emissions. **Social aspects** The project will also increase employment locally for skilled labor during installation, operation, and maintenance of biogas digesters. Indoor air pollution will be reduced, thus reducing the incidence of respiratory diseases, etc., Less time will be spent by women on cooking on a gas stove.