JOINT IMPLEMENTATION PROJECT

«Implementation of energy efficiency measures in enterprises of «Agrarian Holding Avangard»

Title of the head of the company,
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Consulting company "Company "MT-Invest"

14.11.2012

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Director
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JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
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SECTION A. General description of the project

A.1. Title of the project:

Implementation of energy efficiency measures in enterprises of "Agrarian Holding Avangard"

Sectoral scope: 3. Energy consumption.
13. Recycling and waste disposal.

Version of the document: 2.0

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A.2. Description of the project:

The project aims at achieving of the greenhouse gas emissions reduction by decreasing of specific energy consumption at enterprises of "Agrarian Holding Avangard" (hereinafter – Company or Enterprise), and improving of production waste management practice (chicken manure).
After establishing the "Avangard" Holding company in 2007, one of the primary actions that have been implemented by the company management, was a large-scale modernization of enterprises, carried out to improve the technological level of production, to provide a high quality of products, to improve energy efficiency and to implement modern waste management practices as one of the most important factors for ensuring a long-term operation of enterprises. Thus, in 2007-2009 Company's production facilities were completely modernized and are currently among the most technically advanced enterprises in Ukraine.[1] Implementation of energy efficiency measures has been continued further in 2010-2011. Under the program of modernization and reconstruction the following actions were realized:

- Energy supply schemes optimization;
- Pumping, compressing and climate equipment modernization, including engines replacement;
- Lighting systems renovation, including replacement of light bulbs with the energy efficient lamps;
- The use of integrated control systems in all production facilities to automate the production process;
- Shift to solid chicken manure storage practice at the farms that used to store manure in liquid form;
- Shift to composting or daily removal of chicken manure to the fields at small-capacity farms with a relatively small amount of manure produced; or at those farms where arising from the aspects of technological process (less frequent removal of manure from a floor house or litter use), solid manure storage was applied in practice.

Currently, most of the planned activities under the Program have been already implemented and resulted in the generation of CO_2 emissions reduction. The Company is supervising every phase of shell eggs and egg products production process, thus cutting the costs and improving the quality control. The project includes modernization of 21 farms and their divisions (total number of modernized facilities − 30), located in 14 regions of Ukraine. The first steps of equipment replacement and changes in waste management practices were implemented in 2007, which resulted in the start of emission reductions generation in 2008. Project duration is 13 years, which is an operating lifetime of the installed facilities for poultry housing, while the use of this equipment ensures the characteristics of liquid chicken manure to be preserved (continuous removal of manure by belt conveyor without dry biomass being added).

[1] http://avangardco.ua/ukr/about/glance/

Situation before project implementation
Before the beginning of the project realization, most of poultry farms were working while using equipment manufactured in Soviet times, according to standards developed under the availability of cheap energy resources. It is characterized by limited effective power adjustment, low process automation, high heat losses or performance non-productive work. Since the time of its production, new technologies have raised in the market, the use of which allowed for achieving of significant energy savings, for instance light-emitting-diode (LED) lighting systems, more efficient transformers, and others.
As for the waste management, the poultry farms should have to bury their production waste within the received limits of waste generation paying the prescribed fee. Waste from poultry slaughtering, egg shell and birds' mortality should have to be disposed at the special plants. Chicken manure placed in storage, where it is taken in solid (water content less than 50%), plastic (water content of 50-82%) or liquid (water content over 82%) consistency that depends on a technological process of a particular plant. Significant volume of manure accumulated in a storage led to arising of anaerobic conditions of fermentation, which resulted in generation of significant amount of methane, which is a greenhouse gas.

Baseline scenario
In the baseline scenario, facilities would have continued to work with the same specific power consumption, as well as before the project realization. In case of equipment failure, its replacement would have been carried out element-by-element to the equipment with similar technical specification that would have not led to the emergence of energy-saving effect due to the lack of systematic approach and limited opportunities for optimizing of energy consumption.
Chicken manure would have been mixed as it had been produced, with no additional operations aimed at its drying, addition of dry biomass and its subsequent composting.

Project scenario
In the project scenario a large-scale modernization of enterprises is taking place, along with replacing equipment that is selected based on its technical specifications in terms of power consumption and ability to optimize its performance under particular conditions at a facility. When choosing the equipment, such additional features as drying of manure at the stage of its collection in the floor house and its transportation by belt conveyor are also taken into account. Therefore, the derived manure is drier, but after the addition of dry biomass its water content gets to level as it gets while storing in solid substance. At the facilities where the amount of manure produced per day is small, the shift to the method of removing to the fields is occurring. While being distributed into small portions, the chicken manure decomposes quite quickly, when turning into valuable fertilizer, thus the high level of its aeration is ensured, due to which anaerobic fermentation and the appropriate allocation of methane is being significantly reduced. At the new facilities with great capacity, received manure in solid form is subjected to composting, during which a mixture of litter and manure from time to time is being stirred to ensure better access of oxygen. Microbiologic specimens may be added in order to accelerate decomposition of chicken manure to substances that can be easily assimilated by plants. The resulting product is ready for use as a fertilizer; it has no strong odor and does not pollute groundwater with infiltrate.

Project history
The project was initiated at the beginning of 2007, when the "Avangard" Holding Company has been established. The general strategic modernization program was applied, which adjusted with the specific conditions of production process. Implementation of the basic program activity took place during 2007-2009, although implementation of some measures continued even in 2010-2011. Since the project leads to greenhouse gas emissions reduction into the atmosphere, this reduction is necessarily has been taken into account when making a decision on the project realization. Emissions reductions will be sold as ERUs in the international market of emissions reductions, and the funds obtained will improve the financial performance of the project to a level that justifies the means that were used for its implementation. From the very beginning, JI mechanism was one of the prominent factors of the project

and financial benefits under this mechanism plays an important role in making the decision on the start of the operation and considered to be one of the reasons for beginning of the project realization.

A.3. Project participants:

Table 1. Project participants

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	LLC "Agrarian Holding Avangard"	No
The Netherlands	United Carbon Finance Ltd	No

LLC "Agrarian Holding Avangard" is one of the leading agro-industrial companies in Ukraine, focusing on the production of shell eggs and egg products. According to LLC "Financial and Analytical Group "Pro-Consulting" report, "Agrarian Holding Avangard" had a market share of approximately 32% of all shell eggs (51% of all industrially produced shell eggs) and 87% of all dry egg products produced in Ukraine in 2011. Company's production facilities are located in 14 out of the 24 regions of Ukraine and also in the Autonomous Republic of Crimea. Company's flock of laying hens is the largest in Ukraine. LLC "Agrarian Holding Avangard" is a project participant.

United Carbon Finance Ltd is a potential buyer of emission reductions from this project.

"Company "MT-Invest" LTD is a consultant in the development of JI projects and is not a project participant. It is responsible for development of data substantiating materials, PDD, support LLC "Agrarian Holding Avangard" in the process of determination, obtaining Letter of Endorsement and a Letter of Approval, support for the final determination of the project. "Company "MT-Invest" LTD is a potential buyer of the emission reduction units generated by the project.

A.4. Technical description of the project:

A.4.1. Location of the project:

A.4.1.1. Host Party(ies):

Ukraine

A.4.1.2. Region/State/Province etc.:

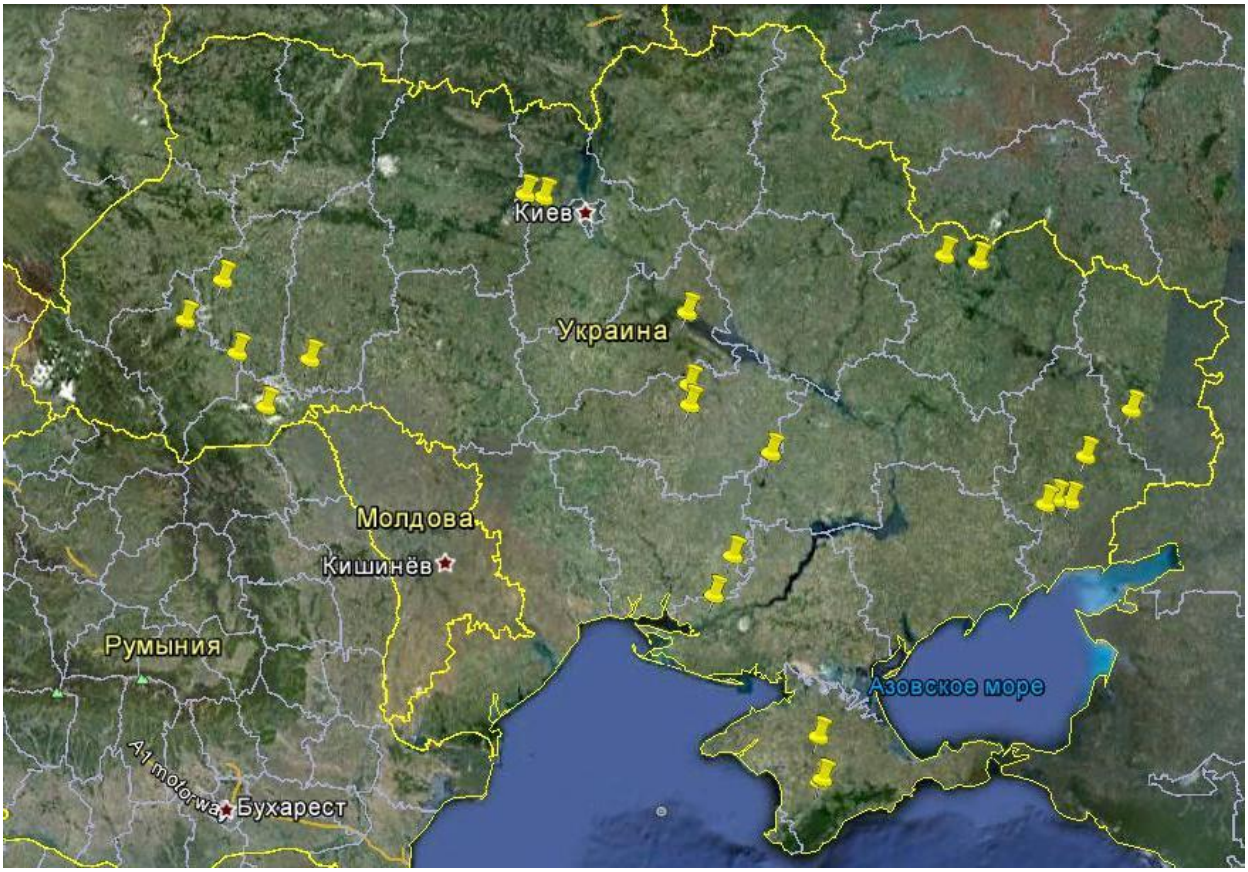

Figure 1. Location of LLC "Agrarian Holding Avangard" facilities, where the project activity was introduced.

A.4.1.3. City/Town/Community etc.:

This project is being implemented in Ukraine at 21 processing facilities and their units[2] (total number of facilities − 30), which are the part of LLC "Agrarian Holding Avangard". To ensure the transparency of the project, to each unit of the facility at which the project is being implemented, identification numbers are assigned. The list of units at which the project has been realized, is presented below.

[2] Units of the facilities are listed in italics.

Table 2. List of units where the project activity has been realized.

Identification #	***Name***	***Facility type/ division***	***Address***	***Geographical coordinates***
1.	Agricultural Limited Liability Company "Donetsk birds"	Egg-laying hens farm	85760, Ukraine, Donetsk Region. Volnovaska District, Rivnopil village, 4 Donetska Str.	47°33'24.46"N 37°13'57.28"E
2.	Public Joint Stock Company Agricultural Company "Avis"	Egg-laying hens farm	32325, Ukraine, Khmelnytsky Region, Kamenets District, Gumentsy village, 1Verbetske Highway Str.	48°45'35.07"N 26°37'33.41"E
3.	Limited Liability Company "Makarivsk Birds"	Egg-laying hens farm	08000, Ukraine, Kyiv Region, Makariv District, Makariv town, 68 Pershotravneva, Building F.	50°27'35.32"N 29°48'53.13"E
4.	Public Joint Stock Company "Kross-Poultry farm "Zorya"	Egg-laying hens farm	62480, Ukraine, Kharkiv Region, Kharkiv District, Khroly village, 25/2 Chervonoarmiyska Mykolaivska Str. interjection.	49°54'4.72"N 36°22'7.13"E
5.	Limited Liability Company "Trading house "Bogodukhivska Poultry Farm"	Egg-laying hens farm	62447, Ukraine, Kharkiv Region, Kharkiv District, Sanjar village, 137 Sportyvna Str.	49°57'39.68"N 35°50'27.38"E
6.	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Egg-laying hens farm	94320, Ukraine, Luhansk Region., Perevalskiy District, Chervony Prapor town, 31 Fabrychna Str.	48°26'7.00"N 38°33'29.00"E
7.	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Egg-laying hens farm	53020, Ukraine, Dnipropetrovsk Region, Kryvyi Rih District, Lozuvatka village, 29 Chkalova Str.	48° 3'39.69"N 33°17'33.83"E
8.	Public Joint Stock Company "Avangard"	Egg-laying hens farm	77450, Ukraine, Ivano-Frankivsk Region., Tysmenytsya District, Zahvizdya village.	48°55'20.93"N 24°39'17.16"E
9.	Public Joint Stock Company "Chornobayivske"	Egg-laying hens farm	75024, Ukraine, Kherson Region, Biloserskyi District, Chornobaivka village.	46°41'49.09"N 32°32'38.65"E
10.	Public Joint Stock Company "Kirovskiy"	Egg-laying hens farm	27640, Ukraine, Kirovohrad Region, Kirovohrad District, Vilne village, 1 Lenina Str.	48°29'42.00"N 32° 7'2.00"E
11.	Public Joint Stock Company "Poultry farm "Pershe	Egg-laying hens farm	19603, Ukraine, Cherkasy Region, Cherkaskyi District, Khutory village, 2 Centralna	49°22'25.01"N 32° 1'52.00"E

	Travnya"		Str.	
12.	Limited Liability Company "Areal-Snigurivka"	Egg-laying hens farm	57300, Ukraine, Mykolaiv Region, Snihurivskyi District, Snihurivka City, 7 Pozamiska Str.	47° 4'34.94"N 32°47'33.82"E
13.	Subsidiary "Rogatynska Poultry farm" of PJSC "Avangard"	Egg-laying hens farm	77000, Ukraine, Ivano-Frankivsk Region, Rohatynskyi District, Zaluzhzhya vaillage.	49°24'14.00"N 24°35'59.00"E
14.	Private Research and Production Company "Interbusiness"	Egg-laying hens farm	83059, Ukraine, Donetsk Region, Donetsk, Kalininsk Disrict, 2 Sechenova Str.	47°59'53.71"N 37°51'34.30"E
15.	Limited Liability Company "Poultry farm "Volnovaska"	Egg-laying hens farm	85735, Ukraine, Donetsk Region, Volnovaskyi District, Rybynske village.	47°34'51.00"N 37°35'46.00"E
16.	Private Joint Stock Company "Chernivetska Poultry farm"	Egg-laying hens farm	60411, Ukraine, Chernivtsy Region, Glybotskyi District, Valya Kuzmyna village, 10 Trudova Str.	48°11'1.00"N 26° 1'6.00"E
17.	Bird Breeding Limited Liability Company "Ptitsekomplex"	Egg-laying hens farm	97034, Ukraine, Autonomous Republic of Crimea, Chervonohvardiyskiy District, Kotelnykove village, A Sovetska Str.	45°21'53.00"N 34° 1'37.00"E
18.	Agribusiness Farm LLC "Yuzhnaya-Holding"	Egg-laying hens farm	97560, Ukraine, Autonomous Republic of Crimea, Simferopol District, Perove village, 9 Shkilna Str.	44°55'30.89"N 34° 3'8.26"E
19.	Subsidiary "Avangard-Agro" of PJSC "Avangard"	Grow-out farms	77450, Ukraine, Ivano-Frankivsk Region, Tysmenytskyi District, Zagvizdya village.	48°55'20.93"N 24°39'17.16"E
20.	*Public Joint Stock Company "Poultry farm "Chervony Prapor"*	*Grow-out farms*	*94320, Ukraine, Lugansk region, Perevalskyi District, Chervonyi Prapor village, 31 Fabrychna Str.*	*48°26'7.00"N 38°33'29.00"E*
21.	Subsidiary "Poultry farm "Chornobayivske" of PJSC "Chornobayivske"	Grow-out farms	75024, Ukraine, Kherson Region, Bilozerskyi District, Chornobaivka village.	46°41'49.09"N 32°32'38.65"E
22.	*Agricultural Limited Liability Company "Donetsk birds"*	*Grow-out farms*	*85760, Ukraine, Donetsk Region, Volnovaskyi District, Rivnopil village, 4 Donetska Str.*	*47°33'24.46"N 37°13'57.28"E*
23.	*Public Joint Stock Company "Poultry farm "Pershe Travnya"*	*Grow-out farms*	*19603, Ukraine, Cherkasy Region, Cherkasy District, Khutory village,2 Centralna Str.*	*49°22'25.01"N 32° 1'52.00"E*
24.	*Public Joint Stock Company "Kross-*	*Grow-out farms*	*62480, Ukraine, Kharkiv Region, Kharkiv District,*	*49°54'4.72"N 36°22'7.13"E*

	Poultry farm "Zorya"		*Khroly village, село Хроли, 25/2 Chervonoarmiyska Mykolaivska Str. interjection..*	
25.	*Agricultural Limited Liability Company "Yuzhnaya – Holding"*	*Grow-out farms*	*97560, Ukraine, Autonomous Republic of Crimea, Simferopol District, Perove village, 9 Shkilna Str.*	*44°55'30.89"N 34° 3'8.26"E*
26.	*Limited Liability Company "Poultry farm "Volnovaska"*	*Grow-out farms*	*85735, Ukraine, Donetsk Region, Volnovaskyi District, Rybynske village.*	*47°34'51.00"N 37°35'46.00"E*
27.	*Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"*	*Grow-out farms*	*53020, Ukraine, Dnipropetrovsk Region, Kryvyi Rih District, Lozuvatka village, 29 Chkalova Str.*	*48° 3'39.69"N 33°17'33.83"E*
28.	LLC "Slov'yany"	Breeder farms	08023, Ukraine, Kyiv Region, Mararіv District, Sadky-Stroivka village, 34 Sadova Str.	50°25'43.38"N 29°32'56.15"E
29.	*Bird Breeding Limited Liability Company "Ptitsekomplex"*	*Breeder farms*	*97034, Ukraine, Autonomous Republic of Crimea, Chervonohvardiyskiy District, Kotelnykove village, 1A Sovetska Str.*	*45°21'53.00"N 34° 1'37.00"E*
30.	*Public Joint Stock Company "Poultry farm "Pershe Travnya"*	*Breeder farms*	*19603, Ukraine, Cherkasy Region, Cherkasy District, Khutory Village, 2 Centralna.*	*49°22'25.01"N 32° 1'52.00"E*

A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):

This project is being implemented in Ukraine at 21 processing facilities and their units[3] (total number of facilities − 30), which are the part of LLC "Agrarian Holding Avangard". The facilities are located in 14 regions of Ukraine. Detailed addresses of poultry farms involved into the project are listed in the Section above.

A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

There are two main types of poultry farms focused on the production of shell eggs: with closed and open cycle of shell egg production. The principal difference between these two types is growing of young birds to recover a commercial chicken stock. Poultry farms of closed cycle include breeder farms for keeping a parent flock, rooms for eggs incubation and young birds breeding zone, while the farms with open cycle purchase already bred young chickens. The "Avangard" Holding allocates the functions when

[3] Units of the facilities are listed in italics.

the farms with an open cycle get young chickens from the farm with a closed cycle. Fundamental schemes of interaction between structural units of poultry farms of closed and open types are shown in Figures 2 and 3.

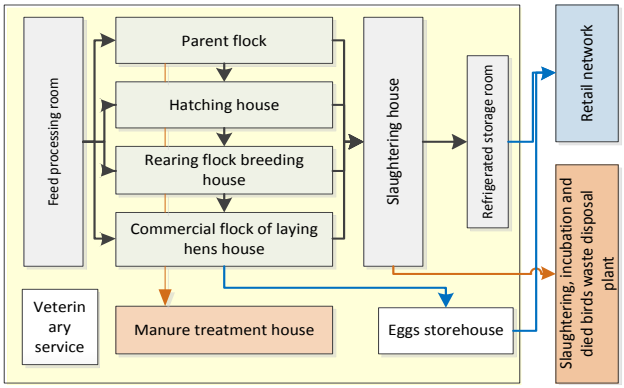

Figure 2. Principle diagram of poultry farm with closed cycle.

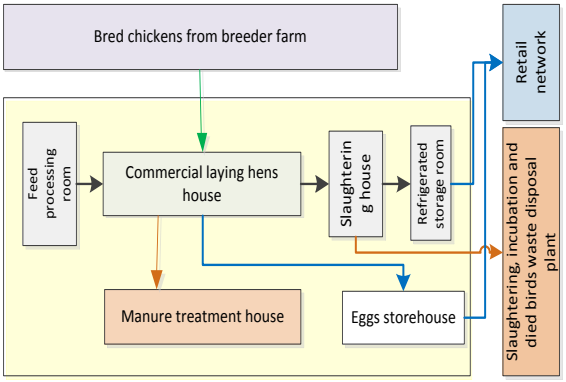

Figure 3. Principal diagram of poultry farm with open cycle.

Project facilities are the farms with cage method of birds housing (Fig. 4). Its advantages lie in the possibility of placing more birds in a smaller area, evenly spaced distribution of birds in the houses, ensuring better sanitary conditions through regular removal of manure, which does not allow pathogenic organisms to grow and accumulate in poultry houses in large quantities which could results in applying of less medicines and disinfectants. Cage batteries are compactly arranged in several layers, their quantity depends on poultry house type. Gages are equipped with devices for eggs collection, feeding, water, manure removal, which are indeed automated at some facilities.

Figure 4. Cage poultry housing.

Figure 5. Automatic egg collection system.

The main factors that determine the efficiency of eggs production are:

- Use of high-egg productive flocks of poultry;
- Feeding birds with complete dry mash;
- Ensuring the required microclimate and differentiated light conditions;
- Proper veterinary preventive measures for poultry preservation;
- Year-round production.

Ventilation, lighting, heating and water supply systems, manure removing and products collection systems are the primary systems to consume electricity at a poultry farm. The houses for keeping and breeding the poultry require a mandatory technical ventilation due to which the microclimate parameters the regulation of which is vital to birds: temperature, humidity, air velocity in the zone of poultry

keeping, its oxygenation, content of harmful gases (ammonia, hydrogen sulfide, carbon monoxide) and dust. Poor ventilation can lead to flock loss that is why poultry farms are often equipped with standby power supply systems and autonomous power generators. Due to the lighting changes, the perception of bird the day and night, periodic turning the light off and on leads to an increase of amount of eggs laying. At modern farms, the "dawn-sunset" system is often used along with a gradual increase/decrease in brightness, which requires special equipment. Water supply to the farms is provided through the use of pumping equipment. Manure is removed with a belt conveyor, which is placed under cages, and which transports manure to the zone of cleaning tape (edge of cage battery), where it is taken outside the poultry house and then transported to the waste repository. Collection of eggs is also performed using the conveyor belt (Figure 5).

After the "Avangard" Holding was establishing in 2007, the implementing of a large-scale modernization program at the Holding owned facilities has begun. Among the other measures, activities that lead to the reduction of greenhouse gases have been implemented:

- Energy efficiency program implementation at the enterprises of "Agrarian Holding Avangard";
- Improving the practice of chicken manure handling.

Energy efficiency measures
During the modernization of the poultry farms owned by "Agrarian Holding Avangard", more modern equipment for production of poultry has been installed. When selecting this new equipment great attention was given to the characteristics of energy consumption, possibilities of its optimization within a particular company, given the total electricity consumption, its operation mode, and other specifications of already installed equipment. The preference was given to the equipment allowing for maximum energy efficiency within the company along with the implementation of energy management systems and implementation of other measures to increase energy efficiency and reduce electricity losses during transmission and its implementation in unproductive work.

Project activity has been implemented in the following areas:

- Energy supply schemes optimization;
- Pumping, compressing and climate equipment modernization, including engines replacement;
- Lighting systems renovation, including replacement of light bulbs with the energy efficient lamps;
- The use of integrated control systems in all production facilities to automate the production process.

Energy supply schemes optimization

The Program foresees several projects implementation, which allow to use electricity more efficiently and to reduce energy losses. Among them:

- replacement or reconstruction of transformers and substations (CTS (KTP in Ukrainian transcription), substations, transformers, autotransformers, distribution substations);
- elimination of energy losses in major networks (PDS (power distribution networks), networks);
- stabilization and support of workloads on optimal levels, including installation of additional equipment (supplied batteries, voltage and current stabilizers, mini power generators, power stations);
- exclusion of inefficient units and replacement with modern and more efficient ones (including heating and lighting elements for incubating equipment);

Transformer is a device used to transfer electrical alternating current of one voltage to an alternating electrical current of another voltage. The transformation is carried out due to the transmission of electric

energy from one induction coil to another. Under actual operating conditions, this energy can be transferred with significant losses caused whether by configuration of windings, or electromagnetic specifications of materials used in transformers. The main causes of energy losses during operation of the transformer are: conductor heating due to the copper resistance and the phenomenon of "skin effect", i.e. penetration of the electromagnetic field inside the conductor at a certain depth, which increases its active resistance and reduces the cross section area of the conductor through which a current flows, and no-load at transformer.

Modernization or replacement of transformers is carried out in order to increase the conversion efficiency of electrical voltage. The following factors were taken into account during reconstruction/replacement of transformers: the use of large core; the use of high quality electrical steel, which reduces the energy consumption while mechanical vibrations during core expansion and contraction; an optimum size of conductors to reduce the skin effect; the use of special sectional windings to reduce leakage inductance.

Another measure was the installation of autotransformers. Autotransformer is a variant of the transformer, where primary and secondary windings are connected directly, and due to this they have not only electromagnetic communication, but also an electric. The reason for installation of autotransformers is higher efficiency since only a part of energy is subjected to transformation. Autotransformer winding has several outputs, by connecting to which an electric current of different voltages can be obtained. Higher efficiency and the ability to use the power of different voltage optimally reduce power loss.

Power network transmission lines and transmission facilities have been also replaced: the use of materials of better quality for conductor and better quality of insulation along with the use of up-to-date transformers reduces electricity losses during its transportation. It should be mentioned that the electric power transmission losses to and within the enterprise are quite small, but the replacement of electrical wiring is a part of an integrated complex of measures aimed at the reduction of energy losses, which is positively reflected in composite indicators.

Installation of automatic voltage regulators allowed reducing the risk of failure of electrical devices, reducing energy losses at peak of uncontrolled power surges.

Pumping, compressing and climate equipment modernization, including engines replacement

Most of the **pumps** (recirculation, drainage, sewage, centrifugal, makeup, water circular, submersible, depth, pumping stations, pneumatic pump stations, pumping units) and electric motors (electric motors, engines, motors, motor gearboxes, compressors, rotary compressors) used at enterprises within the «Agrarian Holding Avangard» group were designed in Soviet times and can be characterized by inability to control power according to actual needs. In addition, reserve capacity principles were used in order to ensure the estimated performance in a lifetime. In practice, this leads to unnecessarily high level of energy consumption, especially in modes when maximum power is not required (about 80% of the time). Within the program, some pumps and engines have been replaced with modern efficient systems equipped with frequency converters. This allows adjusting the power based on actual needs, by flexible regulating the characteristics of current supplied to the unit. Also significant is that the efficiency of present-day pumps is much higher than the pumps that were designed during the Soviet times. Efficiency of the pump consists of three components: mechanical efficiency, hydraulic efficiency and volumetric efficiency. These parameters, except the cost of performance and reliability, were taken into account when choosing a brand of pumps to be installed. For the extraction of water from wells installed new pumps with deep speed power system, this allows more economical use of electricity.

Systems of maintaining an optimal **climate environment and ventilation** in manufacturing plants are very essential in poultry industry. Before the project implementation, inefficient heating systems (during the cold period) and ventilation systems (during the warm period) were applied. After the project implementation energy efficient heating and conditioning systems were installed which are based on inverter climate systems and modern equipment. Among them: boilers, heaters, heat guns, electric heating system, air-heaters, heat exchangers and air conditioning climate system, ventilation system (fans, axial fans, centrifugal fans, ventilation units, brooders, heaters), electric radiators, oil radiators, convectors, infrared heaters, heat generators, dehumidifiers.

Lighting systems renovation, including replacement of light bulbs with the energy efficient lamps

Taking into account the main activity of the "Agrarian Holding Avangard" - poultry - the lighting part in total energy balance is very large. Production facilities require significant area and large number of lamps needed for lighting. Before the Program implementation light bulbs were used the efficiency of which does not exceed 15%. From the other hand, under the Program, energy efficient lamps were used for lighting of production facilities. This allowed saving of approximately 70% of electricity for lighting. Some additional equipment was installed as well, including: lighting controls (such as "dawn-sunset" unit), lighting control units, current rectifiers, current transformers and voltage regulators.

The use of integrated control systems in all production facilities to automate the production process

Energy saving under this measure is a result of "human factor" elimination. It is well known that the use of automation systems for process control allows reducing electricity consumption due to the following factors:

- reduce equipment downtime;
- maintaining of optimal load levels for electricity consuming equipment;
- timely turning off the equipment that is not in operation;
- reduce brakes and emergency offs.

Main technical specifications of project equipment are presented in Appendix 4, "Information on the characteristics of the main technical parameters of the technology used in the project" of this PDD.

Improvement of the manure handling practice

During the production process at the farms, the activity of which relates to poultry, the significant amount of livestock waste, i.e. chicken manure, slaughterhouse waste, and others, are being produced. The poultry farms should have to bury their production waste within the received limits of waste generation paying the prescribed fee. Waste from poultry slaughtering, egg shell and birds' mortality should have to be disposed at the special plants. Chicken manure placed in storage, where it fell in a solid (water content less than 50%), plastic (water content of 50-82%) or liquid (water content over 82%) consistency, which depends on a technological process of a particular plant. Significant accumulation of manure in a storage led to anaerobic conditions of digestion, which resulted in generation of significant amount of methane, which is a greenhouse gas, when storing the chicken manure in liquid substance, methane is generating more intensively.

Manure storages are equipped in accordance with requirements of the Order # 53 of the Chief State Inspector of Veterinary Medicine of Ukraine dated 03/07/2001 "On approval of Veterinary-sanitary rules for poultry farms and their design requirements" and GOST 26074-84 "Liquid manure. Veterinary and sanitary requirements for treatment, storage, transportation and utilization".[4] Manure storages are the ponds in the ground at a depth of about 1.5 m with the protected slopes and bottom of the clay layer to prevent infiltration of decomposed chicken manure into the groundwater. There are no requirements for covering storage with roof or sheeting. The time of chicken manure keeping in the storages is not limited. Since keeping the birds in the cages foresees continuous manure removal from the poultry houses and minimal or no use of litter, there is no time for chicken manure to dry and its moisture content is about 71-73%; so it is transported to storage in liquid consistency, when water is also a product of manure decomposition, and gets to the depository with rain water, so eventually dry manure does not change much. It is accumulated in large amounts, which results in occurring of the anaerobic conditions for manure decomposition under the thick layer, the result of which is methane generation.

[4] http://standartgost.ru/%D0%93%D0%9E%D0%A1%D0%A2%2026074-84

At some farms, the production process involves adding of bedding (straw or sawdust), or a lower frequency of litter removal from the houses, due to which it managed to dry out, or at a lower capacity of the facility, litter has already dried out in the depository because of its small amounts. In such cases, the manure is stored in the solid substance. With it is being stored this way, an access of oxygen is much better, because anaerobic digestion occurs less frequently, which in its turn reduces the amount of methane released into the atmosphere.

Figure 6. Uncovered Anaerobic lagoon.

Figure 7. Solid storage of chicken manure.

Project activity implemented at the "Agrarian Holding Avangard" envisaged:

- Shift to solid chicken manure storage practice at the farms that used to store manure in liquid form;
- Shift to composting or daily removal of chicken manure to the fields at small-capacity farms with a relatively smaller amount of manure produced; or at those farms where due to the aspects of technological process (less frequent removal of manure from a floor house or litter use), solid manure storage was applied in practice.

At some facilities, where the project activity has been implemented usually at the largest ones, at which large quantities of liquid manure are produced, the shift to solid manure storage practice occurred, to which the use of ventilation systems that dries chicken manure at the stage of its collection in the house, when it is being transported by the belt conveyor, and addition of dry biomass to reduce manure moisture content has contributed as well. As a result, after the start of project activity, chicken manure is stored in storage in the solid state.

Poultry farms where smaller amounts of manure is produced and where it was historically stored in solid state in order to stop its excessive accumulation in one place and given to the fact that the chicken manure after being digested becomes a valuable fertilizer, switched to the daily removal of manure to the fields. Manure is being spread at the fields in small portions, which almost completely eliminates the occurrence of anaerobic digestion conditions. Some farms have decided to introduce composting practice, which envisages solid manure being mixed with litter that ensures aeration of the deep layers of manure; addition of special microbiologic specimen that break down the manure into components that can be easily assimilated by plants is also possible. The composting results in significant reduction of the negative effects from a great amount of chicken manure concentrated in one place: bad odor from releasing ammonia, hydrogen sulphide and other products of manure decomposition, pollution of ground water with infiltrate, etc. Therefore fertilizer is obtained that can be used for agricultural enterprise's needs. The method of collection, storage and utilization of chicken manure at each of the facilities in the project scenario is provided in Annex 3 of this PDD.

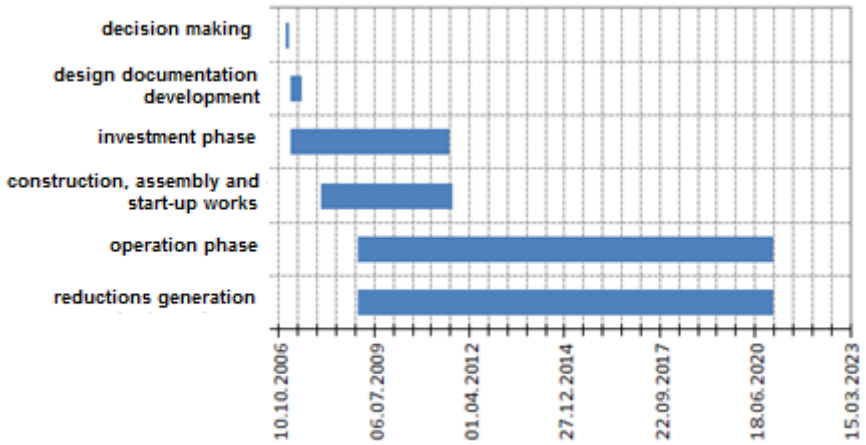

Figure 8. Project implementation schedule.

The project does not require intensive staff training. The required amount of employees can obtain a basic technical training at the project site. Most of the necessary workers such as engineers, veterinaries, agricultural technicians, machine operators, and personnel involved in caring for poultry, packers, power engineers and mechanics, truck drivers are locally available. Local resources meet project maintenance needs: own and hired workers and repair contractor. Project foresees the need for training. All employees must have a valid certificate of vocational education, and periodically pass safety training and exams. Vocational training in all required areas of professional project is available in the educational institution of Ukraine.

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

GHG emissions reduction is achieved due to lower specific energy consumption for production process at "Agrarian Holding Avangard" and by avoiding anaerobic waste fermentation processes leading to methane emissions through changing the manure handling practice.

Reduction of specific energy consumption is due to the energy-efficient power optimization schemes, modernization of pumping and climate equipment and replacement of engines, upgrading of lighting systems, including the replacement of incandescent lamps to energy saving lamps, the introduction of integrated systems of control parameters to automate the production process. In the absence of the proposed project, the reduction of GHG emissions would not be possible because without the replacement of equipment an introduction of energy management techniques, integrated of production process control measures and optimization of energy consumption, the specific energy consumption would remain at the pre-project level, and thus GHG emissions would be the same as before the project realization.

Reduction of methane emissions is achieved by avoiding anaerobic fermentation of chicken manure through changing techniques of waste management: the shift from liquid to solid manure storage and use of composting and manure daily removal to the fields. In the absence of the project, reduction of methane emissions would not occur since the companies are not permitted to store waste in liquid form, given that they will pay the appropriate fee, the amount of which depends on the chemical composition of waste that does not change when the aggregate state of matter is changing. The difference of the fee for storing litter in solid and liquid form is small (the difference arises from water content and manure decomposition products dissolved therein) and does not cover the cost of biomass investment in equipment and additional operations of manure drying. Thus, the company had no incentive, other than reducing greenhouse gas emissions to change the manure handling practice. The same situation applies to composting and removal of manure to the fields.

Detailed description of the baseline scenario and additionality justification is provided in Section B of this PDD.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

Table 3. Estimated amount of emission reductions during the crediting period

	Years
Length of the crediting period	5
Year	Estimate of annual emission reductions in tons of CO_2 equivalent
Year 2008	675 072
Year 2009	984 565
Year 2010	1 320 460
Year 2011	1 436 307
Year 2012	1 470 146
Total estimated emission reductions over the crediting period (tons of CO_2 equivalent)	5 886 550
Annual average of estimated emission reductions over the crediting period (tons of CO_2 equivalent)	1 177 310

Table 4. Estimated amount of emission reductions after the crediting period

	Years
Length of the period after 2012, for which emission reductions are estimated	8
Year	Estimate of annual emission reductions in tons of CO_2 equivalent
Year 2013	1 575 293
Year 2014	1 575 293
Year 2015	1 575 293
Year 2016	1 575 293
Year 2017	1 575 293
Year 2018	1 575 293
Year 2019	1 575 293
Year 2020	1 575 293
Total estimated emission reductions for the relevant period (tons of CO_2 equivalent)	12 602 344
Annual average of estimated emission reductions for the relevant period (tons of CO_2 equivalent)	1 575 293

A.5. Project approval by the Parties involved:

Letter of Endorsement by State Environmental Investment Agency of Ukraine No. 2678/23/7 was obtained on 20/09/2012. Obtaining the Letter of Approval by the Host country is expected after completion of the determination process.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

In accordance with the Guidance on criteria for baseline setting and monitoring (Version 03)[5] (hereinafter referred to as the Guidance), the baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions by sources or anthropogenic removals by sinks of GHGs that would occur in the absence of the proposed project.

In accordance with the Paragraph 9 of the Guidance the project participants may select either a) an approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach); or b) or a methodology for baseline setting and monitoring approved by the Executive Board of the clean development mechanism (CDM); or c) an approach to the setting of baseline and monitoring that has already been applied to comparative JI projects.

Description and justification of the baseline chosen is provided below in accordance with the Guidelines for users of the Joint Implementation Project Design Document Form, version 04[6], using the following step-wise approach

Step 1. Indication and description of the approach chosen regarding baseline setting

To determine the baseline scenario and demonstrate additionality the Combined tool to identify the baseline scenario and demonstrate additionality (Version 04.0.0) has been applied. The recommendations of the Guidelines for objective demonstration and assessment of barriers were also taken into account (Version 01).

Step 2. Application of the approach chosen

Step 0. Determining whether the project activity was the first of its kind
Outcome II: The project activity was not the first of its kind.

Step 1. Identification of alternatives to the project activity

The following plausible alternatives to the implementation of each component of the project activity are identified that (a) were available to the project participants; (b) could not be implemented simultaneously with the project activity and (c) ensure the obtaining of the same result as the project activity had.

Sub-step 1a. Description of alternatives to the project activity

Implementation of energy efficiency measures and reducing energy losses:

E1: Continuation of existing situation that does not require any investment;
According to this alternative the existing equipment is used until its operational lifetime ends up. The alternative does not require any investments and costs, and is unattractive in long-term perspective, because the strategy of "Agrarian Holding Avangard" under favorable conditions foresees future intensive development and growth in output.

E2: Continuation of existing situation, which requires the cost for equipment maintenance;
This alternative envisages the continuation of the same specific power consumption, as well as at the pre-project level. After the equipment failure, its replacement would have been carried out element-by-element to the equipment with similar technical specification that would have not led to the emergence of energy-saving effect due to the lack of systematic approach and limited opportunities for optimizing of energy consumption.

[5] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

[6] http://ji.unfccc.int/Ref/Documents/Guidelines.pdf

E2: Partial implementation of the planned program of energy saving, financed by a project owner;
This alternative foresees a partial implementation of energy efficiency program, implementation of those measures, which do not require significant capital investment and a sound technical upgrade of the facilities. This option requires less money for its implementation. This option would not be appropriate due to the lack of a systematic approach; therefore the resulting effect would be much lower than the result from implementation of project activity. Whereas, while making a decision on the project the future income from the sale of ERUs was taken into account, in this case their volume was insufficient for a positive decision.

E3: Implementation of project activity financed by a third party;
According to this alternative, the introduction of programs aimed at energy efficiency improvement at the facilities of "Agrarian Holding Avangard" would be performed and financed by a third party, i.e. energy service company. These companies offer to install some pieces of equipment and compensate the cost through the savings achieved. Given the large scale of implemented energy efficiency programs, this alternative could not be implemented due to the lack of energy service companies that could complete such a substantial order. In addition, while realizing this alternative, energy saving measures with not substantial effect, which lead to decrease of energy consumption along with the other measures, would not be implemented. Thus, the implementation of this alternative was unrealistic.

E4: Project implementation without JI incentives.
This option includes the implementation of the project activity without registration it as JI project in the absence of additional financial revenues from the sale of ERUs. This option requires significant capital investment and generates the same emissions reductions likewise in the project scenario.

Changing the practice of manure handling:

M1: Continuation of the existing situation;

Chicken manure would have been stored in that substance as it has been produced, with no additional operations aimed at its drying, addition of dry biomass and its subsequent composting. Liquid manure would have been transported to storage facilities, in which it would be placed according to the established limits for waste disposal. This option did not require any additional investment.

M2: Shift to solid storage of manure;

This option foresees the shift to solid storage of chicken manure in storage facilities of poultry farms. It requires an availability or purchase of special equipment for manure drying prior to its collection, and purchase of dry biomass, which when mixed with chicken manure, would absorb moisture.

M3: Shift to daily manure removal to the field;

This option provides the shift to daily removal of chicken manure to the fields. Its implementation increases the operating costs for fuel consumed by vehicles, which are used for distribution of chicken manure in small quantities, and for electricity needs, which is required for collecting and drying of chicken manure in the house.

M4: Composting of chicken manure;

According to this alternative, chicken manure is added with dry biomass (straw, sawdust, peat) and perhaps a special microbiological product; periodically this mixture is stirred for better aeration of the deep layers and avoidance of anaerobic conditions which lead to manure decomposition. As a result, the resulting product can be used by agricultural enterprises as a fertilizer, or its storage can be continued for unlimited period. While composting, aerobic decomposition of organic substances containing in its

simpler compounds is taking place. It loses its unpleasant odor resulting from ammoniotelism, hydrothionuria and other gases release, most pathogenic microorganisms are destructed and it's being washed with rain water that will not result in contamination of groundwater. To implement this alternative remuneration for mixing compost and permanent purchase of dry biomass for mixing with chicken manure was required.

M6: Biogas production of chicken manure and other poultry farm waste;

This option foresees building a methane-tank for controlled anaerobic digestion of poultry waste with the addition of biomass, the installation of special equipment for enrichment and purification of the obtained methane and construction of necessary infrastructure for its combustion to generate heat or electricity (boilers or generators). This option also requires continuous acquisition of biomass, which is used for dilution of manure (straw, corn silage, etc.). As a result, fewer amount of decontaminated waste methane is received, where the potential of methane regeneration is close to zero, and that is buried in storage.

M7: Combustion of manure as a fuel to obtain heat;

To implement this alternative, it is necessary to invest info special equipment for manure drying and achieving its uniform consistency, and into boilers equipped with special burners for combustion this type of fuel. This would allow avoiding the need for a repository for chicken manure, but would increase emissions of harmful substances − products of manure combustion − into the atmosphere.

M8: Chicken manure processing for using it as a cattle feed.

Since about 30% of chicken manure is the remnants of undigested grain, then after special treatment it can be used as a second feed for cattle. Implementation of this alternative would require investment in special equipment to handle manure, personnel to establish production process and set up distribution of output products.

Outcome of Sub-step 1a: The following list of realistic and viable alternatives to the project activity:

E2: Continuation of existing situation, which requires the cost for equipment maintenance;
E4: Project implementation without JI incentives.

Changing the practice of manure handling:

M1: Continuation of the existing situation;
M2: Shift to solid storage of manure;
M3: Shift to daily manure removal to the field;
M4: Composting of chicken manure;
M6: Biogas production of chicken manure and other poultry farm waste;
M7: Combustion of manure as a fuel to obtain heat;
M8: Chicken manure processing for using it as a cattle feed.

Sub-step 1b. Compliance with the present legislation.

Legislation on energy saving in Ukraine serves to create the conditions for implementation of energy efficiency technologies, strengthening the priority of this direction for Ukrainian economy development, supporting of scientific research on energy saving, etc. The main regulatory document is the Law of Ukraine "On energy efficiency". Stipulated penalty fines for excessive use of fuel, though, as the experts

note, due to the lack of appropriate regulations, this rule is not performed.[7] All of the above mentioned alternatives to the project activity comply with the legislation on energy efficiency in Ukraine.

Activities attributed to waste management in Ukraine are governed by the following regulations:

Law of Ukraine "On ensuring sanitary- epidemiological welfare of population", the Law of Ukraine "On wastes"; the Law of Ukraine "On licensing system in economic activity"; the Cabinet of Ministers of Ukraine Decree # 1218 dtd. 03/08/1998 "On approval of the procedure of drafting, approval and revision of waste generation and placement limits", the Cabinet of Ministers of Ukraine Decree # 1109 dtd. 22/06/1999 "On approval of the Statute of the State sanitary and epidemiological surveillance in Ukraine", President of Ukraine Decree # 400/2011 dtd. 06/04/2011 "On state sanitary-epidemiological service of Ukraine".

According to the provisions of this legislative environment, companies must receive from waste management designated executive authorities permits for waste disposal within the established limits in storages equipped in accordance with the applicable standards[8], and by paying the corresponding fee for waste disposal. In accordance with Instruction on procedure of calculation and payment for environmental pollution tax # 162, approved by the Ministry of Environmental Protection and Nuclear Safety of Ukraine and State Tax Administration of Ukraine dtd. 19/07/99, in case of overlimiting waste disposal the fine is paid a five times the amount of the fee for waste disposal. Also, according to Chapter VII of the Tax Code of Ukraine on December 2, 2010 # 2755, enterprises must pay an environmental tax equal to 1,25 UAH per ton of manure, which have no affect whether on waste or its chemical composition.[9]

Thus, the implementation of any of the above mentioned alternatives complies with the legislation subject to following the procedures of waste management.

Outcome of Sub-step 1b: All these realistic and feasible alternatives to the project activities comply with the present current legislation of Ukraine.

Step 2. Barrier analysis.

The main barrier that prevents the implementation of project activities is financial barrier. The total cost of the implemented activities under the project is about 460 500 thousand UAH. This is a significant cost, which the project owner did have at the time of making the decision on implementation of the project activities, and they should be involved in capital market.

Both projects are implemented in terms of investment climate in Ukraine, which is not favorable. Ukraine is a country of high risk for business and investment. The risk of investing in Ukraine is additionally confirmed by the country rating according to international rating agency Moody's and the corresponding risk premium. In the following table risk premium for Ukraine:[10]

Table 5. Total Risk Premium.

Total Risk Premium, %	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Ukraine	11.57	11.59	10.8	10.16	10.04	14.75	12.75	12.5

[7] http://www.epravda.com.ua/columns/2010/03/16/229811/

[8] GOST 26074-84 "Liquid manure. Veterinary and sanitary requirements for treatment, storage, transportation and utilization". http://standartgost.ru/%D0%93%D0%9E%D0%A1%D0%A2%2026074-84

[9] http://news.dtkt.com.ua/show/rus/article/14713.html

[10] Data provided by Aswath Damodaran, Ph.D., Stern School of Business NYU http://pages.stern.nyu.edu/~adamodar/

As discussed during the roundtable of OECD (Organization for Economic Cooperation and Development) on the development of business and investment climate in Ukraine, the existing legal framework is not only inadequate, but significantly sabotages the development of market economy in Ukraine. According to Western press reports, the following conclusion can be made: the tax and legal system reforming has improved the situation by adopting the Commercial Code, Civil Code and Tax Code dated January 1, 2004, but there are still unsatisfactory elements that represent a risk for foreign investors. It is believed that Ukraine is heading in the right direction with the introduction of significant reforms, but it still has a long way to realizing their full potential. Frequent and unpredictable changes in the legal system along with the contradictory and inconsistent Civil and Commercial Codes do not allow transparent and stable legal conditions for business. This is seen by international companies as a source of great uncertainty, which makes risky predictions about future business goals and strategies.

According to various sources and as described above, the investment climate in Ukraine is risky and unfavorable, private capital from domestic or international sources are not available or accessible only at excessively high price because of real and perceived risks of doing business in Ukraine.

Below the influence of economic conditions on the decision regarding the implementation of alternatives to the project activity is considered.

Implementation of energy efficiency measures and reducing of energy losses:

E2: Continuation of existing situation, which requires the cost for equipment maintenance;
Implementation of this alternative does not require an attraction of large amount of funds from capital markets, and could be funded from internal working capital. Thus, the above described financial barriers do not prevent its implementation.

E4: Project implementation without JI incentives.
For the owner of the project it was absolutely impossible to implement the project worth 460 million UAH without attracting outside capital. Thus, the implementation of this alternative was stopped by the existence of financial barriers.

Changing the practice of manure handling:

M1: Continuation of the existing situation;
This option does not require costs more than those necessary to comply with legal requirements and so for there is no financial barrier.

M2: Shift to solid storage of manure;
Implementation of this alternative requires the cost for dry biomass to reduce the humidity of chicken manure and for installation of manure drying equipment at the stage of its collection in the houses. For the farms, at which the process involves the use of litter, these costs are not required.

M3: Shift to daily manure removal to the field;
This option requires higher operating costs for fuel consumed by vehicles used for distribution of chicken manure in small quantities, and for electricity needs, which is required for collecting and drying of chicken manure in the house.

M4: Composting of chicken manure;
To implement this option the funds was required to remunerate works on stirring mixture of manure with straw, sawdust or peat. In addition, microbiological and other additives to the compost have an effect on the cost of the alternative implementation.

M6: Biogas production of chicken manure and other poultry farm waste;
Investment required for implementation of this alternative equals to approximately 80 million UAH per enterprise.

M7: Combustion of manure as a fuel to obtain heat;
Investment required for implementation of this alternative equals to approximately 50 million UAH per enterprise.

M8: Chicken manure processing for using it as cattle feed.
It requires investment in equipment and the availability of consumer for a product obtained which is another barrier for implementation of this alternative.

Outcome: Thus the existence of financial barrier would prevent the implementation of the above listed alternatives to the project activity, but alternatives E2 − "Continuation of existing situation, which requires the cost for equipment maintenance" − and M1− "Continuation of the existing situation", and M2 – "Shift to solid storage of manure" for those farms where the process involves the use of litter. Thus, the continuation of the current situation is the most plausible future scenario that is the baseline.

This baseline scenario has been established according to the criteria outlined in the Guidance by JISC:

1) On a project specific basis;
2) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors. All parameters and data are either monitored by the project participants or are taken from sources that provide a verifiable reference for each parameter. Project participants use approaches suggested by the Guidance and the methodological Tools approved by the CDM Executive Board;
3) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. The above analysis shows that the chosen baseline is the most plausible future scenario, taking into account the current situation of the Donbass coal industry;
4) In such a way that emission reduction units (ERUs) cannot be earned for decreases in activity levels outside the project activity or due to force majeure. According to the proposed approach emission reductions will be earned only when project activity will generate refined oil products, so no emission reductions can be earned due to any changes outside the project activity;
5) Taking account of uncertainties and using conservative assumptions. A number of steps have been taken in order to account for uncertainties and safeguard conservativeness:
    a. If possible, the same approach to calculating the level of baseline and project emissions as specified in the National inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases in the Ukraine are used. The National emissions inventories use country-specific emission factors that are set to meet the IPCC values;
    b. Lower range of parameters is used for calculation of baseline emissions and higher range of parameters is used for calculation of project activity emissions;
    c. Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations.

Baseline emissions
Baseline emissions come from following sources:

- Electricity consumption generated by power plants connected to the United Energy System of Ukraine;
- Anaerobic digestion of poultry waste (chicken manure).

The proposed project involves three functional types of production facilities: egg-laying hens farm, grow-out farms and breeder farms. Specific electricity consumption on egg-lying hens farms is calculated

per unit of production – eggs, and for grow-out farms and breeder farms – per conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure). In cases when the enterprise involved in the project unites different production facilities, specific electricity consumption is calculated separately for each of them (egg-laying hens farm, grow-out farms and breeder farms). Such facilities get their specific identification numbers (see Table 2). Metering of electricity consumption and other parameters is performed separately as well.

Detailed description of the calculation of baseline emissions, applied formulas and emission reductions are given in Annex 2 "Baseline information" of this PDD.

Key information and data used to establish the baseline are provided below in tabular form:

Data/Parameter	$N_{Eggs,i,y}$
Data unit	eggs
Description	Amount of eggs produced at the poultry farm *i* in period *y*
Time of determination/monitoring	To be monitored throughout the monitoring period
Source of data (to be) used	Project poultry farms records in accordance with their internal reporting on egg production
Value of data applied (for ex ante calculations/determinations)	The value of this parameter for each of the farm is included in the calculation of GHG emission reductions due to the project realization (Excel file).
Justification of the choice of data or description of measurement methods	Measured for the commercial purposes on site, using measures and internal procedures of egg production measuring. The collected data are filled in internal egg production reports, used for production process analysis and planning and for official statistical reporting.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Data/Parameter	$N_{Ch,i,y}$
Data unit	per capita (pc)
Description	Average number of birds permanently kept at the poultry farm *i* in period *y*
Time of determination/monitoring	To be monitored throughout the monitoring period
Source of data (to be) used	Project poultry farms records in accordance with their internal reporting on quantity of conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure).
Value of data applied (for ex ante calculations/determinations)	The value of this parameter for each of the farm is included in the calculation of GHG emission reductions due to the project realization (Excel file).
Justification of the choice of data or description of measurement methods	Measured for the commercial purposes on site using measures and internal procedures of egg production measuring. The collected data are filled in internal reporting on quantity of conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure), used for production process analysis and planning and for official statistical reporting.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Data/Parameter	$SEC_{BL,Eggs,i}$
Data unit	MWh/egg
Description	Baseline specific electric energy consumption for eggs production
Time of determination/monitoring	Fixed during determination.
Source of data (to be) used	Calculations are based on project poultry farms records in accordance with their internal reporting on egg production and electricity consumption
Value of data applied (for ex ante calculations/determinations)	Value of this parameter for every farm and the formulae of its calculation are provided in Annex 2 "Baseline information".
Justification of the choice of data or description of measurement methods	Output data for calculation of this parameter are measured for the commercial purposes on site using measures and internal procedures of egg production measuring and electricity consumption metering. The collected data are filled in internal reporting on egg production and electricity consumption, used for production process analysis and planning and for official statistical reporting.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Data/Parameter	$SEC_{BL,Ch,i}$
Data unit	MWh /pc
Description	Baseline specific electric energy consumption for breeding of one head of bird permanently kept at the farm
Time of determination/monitoring	Fixed ex-ante
Source of data (to be) used	Calculations are based on project poultry farms records in accordance with their internal reporting on quantity of conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure) and reports on electricity consumption.
Value of data applied (for ex ante calculations/determinations)	Value of this parameter for every farm and the formulae of its calculation are provided in Annex 2 "Baseline information".
Justification of the choice of data or description of measurement methods	Output data for calculation of this parameter are measured for the commercial purposes on site using measures and internal procedures of egg production measuring and electricity consumption metering. The collected data are filled in internal reporting on quantity of conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure) and electricity consumption, used for production process analysis and planning and for official statistical reporting.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Data/Parameter	VS_{Ch}
Data unit	kg/pc
Description	Amount of volatile solids generated from manure
Time of determination/monitoring	Reference data
Source of data (to be) used	National Inventory Report of Ukraine for 1990-2010, p. 570
Value of data applied (for ex ante calculations/determinations)	0.042

Justification of the choice of data or description of measurement methods	This parameter is measured for a national inventory of greenhouse gases of Ukrainian DFP.
QA/QC procedures (to be) applied	In accordance with the procedures for compiling of the national inventories of GHG emissions.
Any comment	No

Data/Parameter	$B_{0,Ch}$
Data unit	m^3/kg
Description	Maximum potential of methane generation from manure
Time of determination/monitoring	Reference data
Source of data (to be) used	National Inventory Report of Ukraine for 1990-2010, p. 226
Value of data applied (for ex ante calculations/determinations)	0.32
Justification of the choice of data or description of measurement methods	This parameter is measured for a national inventory of greenhouse gases of Ukrainian DFP.
QA/QC procedures (to be) applied	In accordance with the procedures for compiling of the national inventories of GHG emissions.
Any comment	No

Data/Parameter	MCF_n
Data unit	fraction
Description	Annual methane conversion factor for collection, storage and utilization of manure using the method *n*
Time of determination/monitoring	Reference data
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.44. – 10.46. Value for cold climate (average temperature 10 °C and below).
Value of data applied (for ex ante calculations/determinations)	0.66 for anaerobic uncovered lagoons (n=1) 0.02 for solid storage (n=2) 0.005 for composting (n=3) 0.001 for daily removal to the fields (n=4)
Justification of the choice of data or description of measurement methods	This parameter is measured for the purpose of national inventories of greenhouse gases by the Parties of the Framework Convention on Climate Change.
QA/QC procedures (to be) applied	According to IPCC procedures.
Any comment	No

Data/Parameter	$EF_{CO2,EL,y}$
Data unit	$kgCO_2/kWh$ (=tCO_2/MWh)
Description	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052
Time of determination/monitoring	To be monitored throughout the monitoring period
Source of data (to be) used	Orders of the Ukrainian DFP: The National Environmental Investment Agency of Ukraine Order # 62 dtd. 15/04/2011 The National Environmental Investment Agency of Ukraine Order # 63 dtd. 15/04/2011 The National Environmental Investment Agency of Ukraine Order # 43 dtd. 28/03/2011

	The National Environmental Investment Agency of Ukraine Order # 75 dtd. 12/05/2011
Value of data applied (for ex ante calculations/determinations)	**Year** **Value** 2008 1.219 2009 1.237 2010 1.225 2011 1.227 2012 1.227
Justification of the choice of data or description of measurement methods	This value is calculated by Ukrainian DFP and approved by the Order for the compulsory use in JI projects.
QA/QC procedures (to be) applied	According to Ukrainian DFP procedures.
Any comment	No

Data/Parameter	GWP_{CH4}
Data unit	tCO_2e/tCH_4
Description	Global warming potential for methane
Time of determination/monitoring	Reference data
Source of data (to be) used	Climate Change 1995. The Science of Climate Change. Edited by J. T. Houghton and other (1996), p. 22, Table 4[11]
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods	This parameter is measured for the purpose of national inventories of greenhouse gases by the Parties of the Framework Convention on Climate Change.
QA/QC procedures (to be) applied	No
Any comment	No

Data/Parameter	D_{CH4}
Data unit	t/m^3
Description	Methane density
Time of determination/monitoring	Reference data
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.42. Value of methane density is fixed to the standard conditions (temperature 20°C and pressure 101 325 Pa).
Value of data applied (for ex ante calculations/determinations)	0.00067
Justification of the choice of data or description of measurement methods	This parameter is measured for the purpose of national inventories of greenhouse gases by the Parties of the Framework Convention on Climate Change.
QA/QC procedures (to be) applied	According to IPCC procedures.
Any comment	No

B.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 project:

To determine the baseline scenario and demonstrate additionality the Combined tool to identify the baseline scenario and demonstrate additionality (Version 04.0.0) has been used. The recommendations of

[11] http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

the Guidelines for objective demonstration and assessment of barriers (Version 01) were also taken into account.

The proposed JI project is not the first of its kind. The following step-wise approach is used to demonstrate that the project carbon dioxide emissions reductions by sources are additional with respect to any other emissions reductions:

Step 1. Identification of alternatives to the project activity

Alternatives were identified and described in the previous Section B.1. of this PDD while determining the baseline scenario.

Step 2. Barrier analysis

Barrier analysis of identified alternatives was conducted in the previous Section B.1. of this PDD while determining the baseline scenario. As the result of analysis, the following alternatives to project activities have remained that are not project scenario without JI mechanism, which were identified by baseline scenario:

For energy conservation - E2: "Continuation of existing situation, which requires the cost for equipment maintenance"

For waste management: M1: "Continuation of the existing situation", and M2: "Shift to solid storage of manure" for the farms, at which the process involves the use of litter.

As demonstrated in previous Section, the main barrier that prevents the project implementation is financial. As a result of selling greenhouse gas emission reductions expected revenues of about 20.5 million euros or 205 million UAH, representing about 45% required for the project funds that are weighty argument when making decision on the project. Thus, participation in joint implementation mechanism eliminates barriers for the project.

Chance to get additional financing through sale of emission reductions resulting from implementation of the project under Kyoto Protocol was taken into account at the time of decision making about the project.

Therefore, when the requirements of Step 1 and 2 were satisfied, then according to the Combined tool to identify the baseline scenario and demonstrate additionality (Version 04.0.0) it can be preceded to the analysis of common practices.

Step 3: Investment analysis

Not performed according to the Combined tool to identify the baseline scenario and demonstrate additionality (Version 04.0.0).

Step 4: Common practice analysis

Sub-step 4a: The proposed project activities include the activities listed in section with definitions[12] of the "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 04.0.0).

Sub-step 4a(1): Calculation + / 50 percent of production due to proposed project activity

"Avangard" is a leading producer of eggs, which in 2011 produced 6 billion of eggs, which corresponds to the share of 51 percent in market of industrial production of eggs. Alternative +50% means 9 billion of eggs per year, and alternative -50% − 3 billion of eggs per year.

Sub-step 4a(2): Identification of companies that supply the same amount of eggs within a certain range in the corresponding geographic area.

[12] Activities aimed at the avoidance of methane emissions.

The five top producers of eggs in Ukraine, except for "Avangard", include "Inter-Kiev" (10% market share), PJSC "Agricultural company "Berezanska Poultry Farm" (5%), group of companies "Ovostar Union" (5%) and "Landhut Ukraine" (3%) of egg production in 2011, respectively: 1.2, 0.6, 0.6 and 0.4 billion of eggs. Thus, none of these enterprises in terms of production does not fall within the established range, i.e. $N_{all} = 0$.

Since $N_{all} = 0$, the following sub-steps of common practice analysis do not apply, so it can be proceeded directly to the outcome of Step 4.

Outcome of Step 4: The proposed project activity is not a common practice.

Analysis outcome: Since all three steps of analysis were satisfied, the project is additional.

B.3. Description of how the definition of the project boundary is applied to the project:

The project activity is physically limited by territory of the project facilities. Total number of equipment within the project boundaries is presented in Annex 4 of the project design documentation.

The table below shows an overview of all sources of emissions in the baseline and project scenarios. The project boundary is illustrated in accordance with the paragraphs 14, 15, 16 of the Guidance.

Table 6. Sources of emissions in the baseline and project scenarios

	Source	Gas	Included/Excluded	Justification/Explanation
Baseline scenario	Electricity consumption generated by power plants connected to the United Energy System of Ukraine	CO_2	Included	The main source of emissions.
		CH_4	Excluded	Neglected for simplification. Conservatively.
		N_2O	Excluded	Neglected for simplification. Conservatively.
	Anaerobic digestion of poultry waste (chicken manure)	CO_2	Excluded	Neglected for simplification. Conservatively.
		CH_4	Included	The main source of emissions.
		N_2O	Excluded	Neglected for simplification. Conservatively.
Project scenario	Electricity consumption generated by power plants connected to the United Energy System of Ukraine	CO_2	Included	The main source of emissions.
		CH_4	Excluded	Neglected for simplification likewise the baseline scenario.
		N_2O	Excluded	Neglected for simplification likewise the baseline scenario.
	Anaerobic digestion of poultry waste (chicken manure)	CO_2	Excluded	Neglected for simplification likewise the baseline scenario.
		CH_4	Included	The main source of emissions.
		N_2O	Excluded	Neglected for simplification likewise the baseline scenario.

Baseline scenario

The baseline scenario of the proposed project is a continuation of the existing pre-project situation. Specific consumption of electricity by the facilities of the "Avangard" group would remain at the pre-project level, and the handling of chicken manure would also remain unchanged.

In the baseline scenario the emission sources within the project boundaries are:

- CO_2 emissions due to electricity consumption generated by power plants connected to the United Energy System of Ukraine;
- CH_4 emissions due to anaerobic digestion of poultry waste (chicken manure).

Project scenario

Owing to the implemented energy efficiency measures in the "Avangard" group facilities, the reduction of specific energy consumption per unit of output products occurred and the methods of manure handling was introduced, which minimize the possibility of anaerobic fermentation of chicken manure.

In the project scenario the sources of emissions are:

- CO_2 emissions due to electricity consumption generated by power plants connected to the United Energy System of Ukraine;
- CH_4 emissions due to anaerobic fermentation of poultry waste (chicken manure).

Leakage

Leakage is the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project.

Due to the project implementation no leakages are expected.

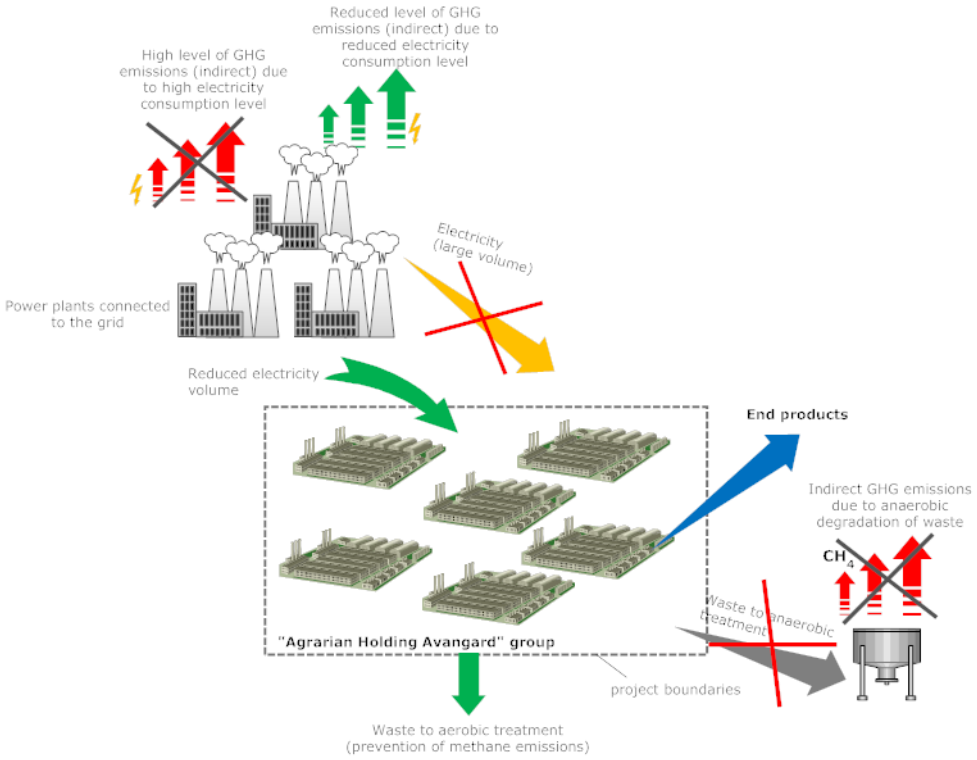

Figure 9. Project boundaries.

B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

Date of baseline setting: 25/06/2012

Name of person/entity setting the baseline:

Analysis of the baseline level was performed by "Company "MT-Invest" LTD that is not a project participant.

Contact information:

"Company "MT-Invest" LTD
Address: 11 Kikvidze Str., Kyiv, Ukraine, 01103
Phone: +38 044 227-66-86, +38 044 253-50-69
Fax: +38 044 254-07-60

Vasylieva Nataliya Vjacheslavivna
E-mail: nataliya.vasylieva@mtinvest.com.ua
Position: Environmental project manager
Phone/fax: +38 044 280 23 50

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of the project is January 12, 2006. This is the date of implementation start of energy efficiency programs for the facilities owned by LLC "Agrarian Holding Avangard".

C.2. Expected operational lifetime of the project:

The expected lifetime of the project is estimated to last until the end of 2020. Thus, the operational lifetime of the project will be 13 years or 156 months.

Emission reductions generation starting date: 01/01/2008

Emission reductions generation ending date: 31/12/2020

C.3. Length of the crediting period:

Start of the first crediting period: 01/01/2008.
End of the crediting period: 31/12/2012.

Length of the first crediting period under the project: 5 years or 60 months (01/01/2008-31/12/2012).

Length of the part of crediting period within the first commitment period of the Kyoto Protocol: 8 years or 96 months (01/01/2013-31/12/2020).

Emission reductions generated after the crediting period may be used in accordance with an appropriate mechanism under the UNFCCC subject to the approval by the Host Party. The crediting period can extend subject to the approval by the Host Party.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

This monitoring plan is established in accordance with appendix B of the JI guidelines and further Guidance on Baseline Setting and Monitoring, Version 03, and Guidelines for Users of the JI PDD Form, Version 04.

The description of the monitoring plan chosen is provided using the following step-wise approach

Step 1. Indication and description of the approach chosen regarding monitoring

Option *a* provided by the Guidelines for the Users of the Joint Implementation Project Design Document Form, Version 04[13] is applied: JI specific approach is used for the monitoring plan.

Step 2. Application of the approach chosen

Baseline scenario

The baseline scenario of the proposed project is a continuation of the existing pre-project situation. Specific consumption of electric power by the facilities of the "Avangard" group would remain at the pre-project level, and the handling of chicken manure would also remain unchanged.

In the baseline scenario the emission sources within the project boundaries are:

- CO_2 emissions due to electricity consumption generated by power plants connected to the United Energy System of Ukraine;
- CH_4 emissions due to anaerobic fermentation of poultry waste (chicken manure).

Project scenario

Owing to the implemented energy saving measures in the "Avangard" group facilities, the reduction of specific energy consumption per unit of output prosycts occurred and the methods of manure handling was introduced, which minimize the possibility of anaerobic fermentation of chicken manure.

In the project scenario the sources of emissions are:

- CO_2 emissions due to electricity consumption generated by power plants connected to the United Energy System of Ukraine;
- CH_4 emissions due to anaerobic fermentation of poultry waste (chicken manure).

[13] http://ji.unfccc.int/Ref/Documents/Guidelines.pdf

Emission reductions occur by decreasing of the specific energy consumption and changes of methane quantity generated during storage of chicken manure.

Data collection and calculations procedure

To calculate the amount of GHG emissions of the project (in baseline and project scenarios) the data of internal standard reporting, which are collected and processed independently from the JI project for commercial purposes of business activity, using the rules and procedures for collecting, processing and carrying out cross-checks will be used. This approach meets good practice of monitoring plans development. The data acquired during the monitoring will be entered into special database and stored electronically and on paper. Electronic versions of monitoring database once in 3 month will be sent to the responsible person from the management of LLC "Agrarian Holding Avangard", who will create a common database of monitoring parameter values, which are to be transferred to the JI project consultant to calculate the emissions reductions and prepare the monitoring reports. Paper versions of monitoring database will be available for examination during onsite visits of accredited independent entity at the request of his representative.

Data and parameters that are not monitored throughout the crediting period, but are determined only once and thus remain fixed throughout the crediting period are listed in the tables below and in Annex 2 "Baseline information".

The proposed project involves three functional types of production facilities: egg-laying hens farm, grow-out farms and breeder farms. Specific baseline electricity consumption on egg-lying hens farms is calculated per unit of production – eggs, and for grow-out farms and breeder farms – per conventional head of bird permanently kept at the farm (taking into account poultry account age and sex-specific structure). In cases when the enterprise involved in the project unites different production facilities, specific electricity consumption is calculated separately for each of them (egg-laying hens farm, grow-out farms and breeder farms). Such facilities get their specific identification numbers (see Table 2). Metering of electricity consumption and other parameters is performed separately as well.

Table 7. List of fixed values used to emissions calculations.

Parameter	***Unit***	***Description***	***Source of data***	***Value***
MCF_1	fraction	Annual methane conversion factor for uncovered anaerobic lagoons	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.51[14]. Value for cold climate (average temperature 10 °C and below).	0.660
MCF_2	fraction	Annual methane conversion factor for solid storage	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.50. Value for cold climate (average temperature 10 °C and below).	0.020
MCF_3	fraction	Annual methane conversion factor for composting	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.52. Value for cold climate (average temperature 10 °C and below).	0.005
MCF_4	fraction	Annual methane conversion factor for daily removal to the fields	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10. 51. Value for cold climate (average temperature 10 °C and below).	0.001
GWP_{CH4}	tCO_2e/tCH_4	Global warming potential for methane	Climate Change 1995. The Science of Climate Change. Edited by J. T. Houghton and other (1996), p. 22, Table 4[15]	21
D_{CH4}	t/m^3	Methane density	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.47. Value of methane density is fixed to the standard conditions (temperature 20°C and pressure 101 325 Pa).	0.00067
$B_{0,Ch}$	m^3/kg	Maximum potential of methane generation from manure	National Inventory Report of Ukraine for 1990-2010, p. 226	0.32
VS_{Ch}	kg/pc per day	Amount of volatile solids generated from manure	National Inventory Report of Ukraine for 1990-2010, p. 570	0.042

[14] http://www.ipcc-nggip.iges.or.jp/public/2006gl/russian/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

[15] http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

The following values of the factors of methane emissions for collection, storage and use of chicken manure are calculated on the basis of indicated in the table above fixed values.

Table 8. Methane emission factors for collection, storage and use of chicken manure.

Parameter	***Unit***	***Description***	***Comment***	***Value***
$EF_{CH4,MS1}$	tCO_2e/pc	Methane emission factor for collection, storage and use of chicken manure using uncovered anaerobic lagoons	Calculation formula is listed in Annex 2 "Baseline information" of this PDD.	0.0456
$EF_{CH4,MS2}$	tCO_2e/pc	Methane emission factor for collection, storage and use of chicken manure for solid storage	Calculation formula is listed in Annex 2 "Baseline information" of this PDD.	0.0014
$EF_{CH4,MS3}$	tCO_2e/pc	Methane emission factor for collection, storage and use of chicken manure for composting	Calculation formula is listed in Annex 2 "Baseline information" of this PDD.	0.0003
$EF_{CH4,MS4}$	tCO_2e/pc	Methane emission factor for collection, storage and use of chicken manure for daily removal to the fields	Calculation formula is listed in Annex 2 "Baseline information" of this PDD.	0.0001

The method of collection, storage and use of chicken manure at each of the poultry farms in the baseline scenario is presented in Annex 2 "Baseline information" and in the project scenario – in Annex 3 "Monitoring plan".

Measuring devices, data processing and archiving

According to the applied approach for monitoring, the following parameters are to be measured: energy consumption by poultry farms, number of eggs produced (laying hens farm) and number of birds kept (grow-out and breeder farms). Energy consumption by each of the farm is measured using special meters of commercial accounting of electricity. The data are cross-checked with the figures provided by electricity supplier. Agreed values are entered into the reports on electricity consumption to be used for the preparation of monitoring reports. Meters are regularly calibrated in accordance with their specifications and requirements of manufacturer.

The number of eggs produced and the number of birds being permanently kept at the farm are determined by automatic or manual accounting. Automated accounting systems are checked in accordance with the terms of the manufacturer, and manual accounting is performed by several people, the results are cross-checked. The data are entered into the production reports that will be used for monitoring reports preparation.

In cases if any errors, fraud or inconsistencies will be identified during the monitoring process special commission will be appointed by project host management that will conduct a review of such case and issue an order that must also include provisions for necessary corrective actions to be implemented that will ensure such situations are avoided in future.

Production reports, reports on energy consumption and other monitoring data required for determination and verification, and any other data relevant to the operation of the project will be kept at least two years after the last transfer of ERUs. If the expected data for monitoring electricity consumption is not available, specific values for the previous period will be used to calculate the level of electricity consumption for the period of missing data. If parameters values are not available that is used to calculate the baseline emissions i.e. the number of eggs produced and number of birds normally kept - these data are not included. This is conservative.

Training of monitoring personnel

Activities that are directly related to the monitoring do not require specific knowledge and skills other than provided in the job descriptions of personnel involved into the monitoring. The facilities at which the project is being implemented, periodic health and safety training are carried out. Control over the perfomance of the rules, detection and correction of violations is assigned to the heads of departments. Thus, the personnel responsible for monitoring, receive appropriate training on procedures and requirements for monitoring. JI projects consultant will provide consultations on the Kyoto Protocol, JI projects and monitoring.

D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be 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)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P-1	$EC_{PJ,i,y}$ Electricity consumption by poultry farm *i* in period *y*	Poultry farm records	MWh	m	continuously with monthly totals	100%	Electronic and paper	-
P-2	$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm *i* in period *y*	Poultry farm records	per capita	m	continuously with monthly totals	100%	Electronic and paper	-
P-3	$EF_{CO2,EL,y}$ Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of	Orders of the Ukrainian DFP	tCO_2/ MWh	c	as provided by Orders of the Ukrainian DFP	100%	Electronic and paper	-

	consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052							

The table above includes data and parameters that are monitored throughout the crediting period.

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Emissions from the project activity are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{AW,y}, \quad \text{(Equation1)}$$

where:

PE_y Project emissions during the period y, tCO_2e[16];

$PE_{EC,y}$ Project CO_2 emissions attributable to the electricity consumption by the poultry farm in period *y*, tCO_2;

$PE_{AW,y}$ Project GHG emissions from anaerobic fermentation of manure at the poultry farm *i* in period *y*, tCO_2e.

[16] 1 tCO_2e = 1 tCO_2

Project CO_2 emissions for electricity consumption by equipment attributable to the project activity are calculated as follows:

$$PE_{EC,y} = \sum_{i=1}^{30} (EC_{PJ,i,y} \times EF_{CO2,EL,y}), \quad \text{(Equation 2)}$$

where:

i	Poultry farm index, dimensionless;
$PE_{EC,y}$	Project CO_2 emissions attributable to the electricity consumption by the poultry farm i in period y, tCO_2;
$EC_{PJ,i,y}$	Electricity consumption by the poultry farm i in period y, MWh [Parameter P-1];
$EF_{CO2,EL,y}$	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052, tCO_2/MWh [Parameter P-3].

Project methane emissions from the poultry waste management system are calculated as follows:

$$PE_{AW,y} = \sum_{i=1}^{30} (N_{Ch,i,y} \times EF_{CH4,MSn}), \quad \text{(Equation 3)}$$

where:

i	Poultry farm index, dimensionless;
n	Index of poultry manure handling method, dimensionless, $n \in (1; 4)$;
$PE_{AW,y}$	Project GHG emissions for anaerobic fermentation of manure at the poultry farm i in period y, tCO_2e;
$N_{Ch,i,y}$	Average number of birds permanently kept at the poultry farm i in period y, birds [Parameter P-2];
$EF_{CH4,MSn}$	Methane emissions factor for collection, storage and utilization of chicken manure applying the waste management method n at the poultry farm i, tCO_2e/head (The values are listed in Table 8, the method n for each of the farms is presented in Annex 3 “Monitoring plan” of this PDD).

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project 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)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B-1	$N_{Eggs,i,y}$ Number of eggs produced at the poultry farm *i* in period *y*	Poultry farm records	eggs	m	continuously with monthly totals	100%	Electronic and paper	-
B-2	$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm *i* in period *y*	Poultry farm records	birds	m	continuously with monthly totals	100%	Electronic and paper	-

B-3	$EF_{CO2,EL,y}$ Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052	Orders of the Ukrainian DFP	tCO_2/ MWh	c	as provided by Orders of the Ukrainian DFP	100%	Electronic and paper	-

The table above provides data and parameters to be monitored throughout the crediting period.

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Baseline emissions are calculated as follows:

$$BE_y = BE_{EC,y} + BE_{AW,y}, \quad \text{(Equation 4)}$$

where:

BE_y Baseline emissions during the period *y*, tCO_2e[17];

$BE_{EC,y}$ Baseline CO_2 emissions attributable to the electricity consumption by the poultry farm *i* in period *y*, tCO_2;

$BE_{AW,y}$ Baseline GHG emissions for anaerobic fermentation of manure at the poultry farm *i* in period *y*, tCO_2e.

Baseline emissions of carbon dioxide due to electricity consumption are calculated as follows:

$$BE_{EC,y} = EF_{CO2,EL,y} \times \left(\sum_{i=1}^{18} N_{Eggs,i,y} \cdot SEC_{BL,Eggs,i} + \sum_{i=19}^{30} N_{Ch,i,y} \cdot SEC_{BL,Ch,i} \right), \quad \text{(Equation 5)}$$

where:

i Poultry farm index, dimensionless. Where $i \in (1;18)$ is the farms for egg-laying hens; if $i \in (19;30)$ -it is a zone for young birds breeding and breeding houses;

$BE_{EC,y}$ Baseline CO_2 emissions attributable to the electricity consumption by the poultry farm *i* in period *y*, tCO_2;

$EF_{CO2,EL,y}$ Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052, tCO_2/MWh [Parameter B-3].

[17] 1 tCO_2e = 1 tCO_2

$N_{Eggs,i,y}$ Amount of eggs produced at the poultry farm *i* in period *y*, eggs [Parameter B-1];

$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm *i* in period *y*, birds [Parameter B-2];

$SEC_{BL,Eggs,i}$ Baseline specific electricity consumption for eggs production, MWh /egg (The value is provided in Annex 2 "Baseline information" of this PDD).

$SEC_{BL,Ch,i}$ Baseline specific electric energy consumption for breeding per capita of bird permanently kept at the farm, MWh /pc (The value is provided in Annex 2 "Baseline information" of this PDD).

$$BE_{AW,y} = \sum_{i=1}^{30} (N_{Ch,i,y} \times EF_{CH4,MSn}), \quad \text{(Equation 6)}$$

where:

i Poultry farm index, dimensionless;

n Index of poultry manure handling method, dimensionless, $n \in (1; 4)$;

$BE_{AW,y}$ Project GHG emissions for anaerobic fermentation of manure at the farm *i* in period *y*, tCO_2e;

$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm *i* in period *y,* birds [Parameter B-2];

$EF_{CH4,MSn}$ Methane emission factor for collection, storage and utilization of manure using the method *n* at the poultry farm *i*, tCO_2e/pc (The values are provided in Table 8, method *n* for each of the farms is indicated in Annex 2 "Baseline information" of this PDD).

D. 1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E):

This section is left blank on purpose

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be 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)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

This section is left blank on purpose.

D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

This section is left blank on purpose.

D.1.3. Treatment of leakage in the monitoring plan:

No leakage emissions are expected after the project implementation.

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:								
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
-	-	-	-	-	-	-	-	-

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

Leakage in year *y* is calculated as follows:

$$LE_y = 0, \quad \text{(Equation 7)}$$

where:

LE_y Leakage due to the project realization in period *y*, tCO_2e.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

The annual emission reductions are calculated as follows:

$$ER_y = BE_y - LE_y - PE_y \quad \text{(Equation 8)}$$

where:

ER_y Emission reduction under JI project in period *y*, tCO_2e;

LE_y Leakage due to the project realization in period *y*, tCO_2e;

BE_y Baseline emissions in period *y*, tCO_2e;

PE_y Project emissions in period *y*, tCO_2e.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

Collection and archiving of the information on the environmental impacts of the project will be done based on the approved EIA in accordance with the Host Party legislation (refer to Section F.1).

D.2. 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.
D.1.1.1. – ID P-1 $EC_{PJ,y}$	Low	The electricity meters are calibrated according to the procedures of the Host Party and the manufacturer requirements. Calibration interval is 4-10 years. More detailed information will be provided in the Monitoring report.
D.1.1.1. – ID P-2 D.1.1.3. – ID B-2 $N_{Ch,y}$	Low	This is one of the main indicators of economic activity of the plant. The value is determined with respect to internal QA/QC procedures of the plant, which is sufficient to ensure high quality of data.
D.1.1.1. – ID P-3 D.1.1.3. – ID B-3 $EF_{CO2,EL,y}$	Low	This is an index calculated by the Ukrainian DFP on the basis of the latest best available data on emissions for electricity consumption by the companies of the United Energy Systems of Ukraine. Application of any additional QA/QC procedures is not required.
D.1.1.3. – ID B-1 $N_{Eggs,y}$	Low	This is one of the main indicators of economic activity of the plant. The value is determined with respect to internal QA / QC procedures of the plant, which is sufficient to ensure high quality of data.

Table 9. List of monitoring equipment (any changes in the monitoring equipment will be reflected in the monitoring reports for the corresponding monitoring period).

Enterprise	Measuring instrument	Unit	Manufacturer	Type	Serial number	Accuracy level
Agricultural Limited Liability Company "Donetsk birds"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	493478	0.5s
Public Joint Stock Company Agricultural Company "Avis"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0057155	±1%
Limited Liability Company "Makarivsk Birds"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0045378	±1%

Public Joint Stock Company "Kross-Poultry farm "Zorya"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0026549	±1%
Limited Liability Company "Trading house "Bogodukhivska Poultry Farm"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	296478	0.5s
Public Joint Stock Company "Poultry farm "Chervony Prapor"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0021789	±1%
Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Electricity meter LZQM 321.02.534	kWh	Elgama-Elektronika	Electronic electricity meter	123429	0.5s
Public Joint Stock Company "Avangard"	Electricity meter EMS 132.11.4	kWh	Elgama-Elektronika	Electronic electricity meter	674641	1
Public Joint Stock Company "Chornobayivske"	Electricity meter LZQM 321.02.534	kWh	Elgama-Elektronika	Electronic electricity meter	334002	0.5s
Public Joint Stock Company "Kirovskiy"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	278978	0.5s
Public Joint Stock Company "Poultry farm "Pershe Travnya"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0033459	±1%
Limited Liability Company "Areal-Snigurivka"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	296478	0.5s
Subsidiary "Rogatynska Poultry farm" of PJSC "Avangard"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0022669	±1%
Private Research and Production Company "Interbusiness"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	334478	0.5s

Limited Liability Company "Poultry farm "Volnovaska"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0032678	±1%
Private Joint Stock Company "Chernivetska Poultry farm"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	456234	0.5s
Bird Breeding Limited Liability Company "Ptitsekomplex"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	335678	0.5s
Agribusiness Farm LLC "Yuzhnaya-Holding"	"SL 7000 Smart"	kWh	Itron (Actaris)	Electronic electricity meter	47852193	0.5s
Subsidiary "Avangard-Agro" of PJSC "Avangard"	"SL 7000 Smart"	kWh	Itron (Actaris)	Electronic electricity meter	56896203	0.5s
Public Joint Stock Company "Poultry farm "Chervony Prapor"	"SL 7000 Smart"	kWh	Itron (Actaris)	Electronic electricity meter	5387993	0.5s
Subsidiary "Poultry farm "Chornobayivske" of PJSC "Chornobayivske"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	334467	0.5s
Agricultural Limited Liability Company "Donetsk birds"	"SL 7000 Smart"	kWh	Itron (Actaris)	Electronic electricity meter	5332443	0.5s
Public Joint Stock Company "Poultry farm "Pershe Travnya"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	324457	0.5s
Public Joint Stock Company "Kross-Poultry farm "Zorya"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0045678	±1%
Agricultural Limited Liability Company "Yuzhnaya – Holding"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	451234	0.5s

Limited Liability Company "Poultry farm "Volnovaska"	Electricity meter LZQM 321.02.534	kWh	Elgama-Elektronika	Electronic electricity meter	345602	0.5s
Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	273458	0.5s
LLC "Slov'yany"	Electricity meter "NIK 2303 ART2T"	kWh	NIK-Elektronika, Ukraine	Electronic electricity meter	0022457	±1%
Bird Breeding Limited Liability Company "Ptitsekomplex"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	291239	0.5s
Public Joint Stock Company "Poultry farm "Pershe Travnya"	Electricity meter EPQS 122.09.04	kWh	Elgama-Elektronika	Electronic electricity meter	190859	0.5s

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

The owner of the project, which will implement the provisions of the monitoring plan into the structure of organization and quality management, is LLC "Agrarian Holding Avangard". The poultry farm management headed by its Director will be responsible for performance monitoring, data collection, registration, visualization, archiving of monitoring data, and periodic inspection of measuring instruments. A responsible person from the Company "Agrarian Holding Avangard" will control this process. Detailed structure of responsible person's interaction will be provided in the Monitoring Report to the initial and the first verification. The following block diagram demonstrates principal scheme of data flow.

Since the monitoring plan does not provide any input of specific data collection procedures, and reduction of greenhouse gas emissions will be calculated using the standardized reporting data, the person from the Company "Agrarian Holding Avangard" will be responsible for sending requests to "Agrarian Holding Avangard" group facilities, the responses processing and making of a common database for monitoring parameters of the project. On the basis of the consolidated database and primary documents (internal production plant accounts and records of electricity consumption) JI project consultant will prepare Monitoring Reports.

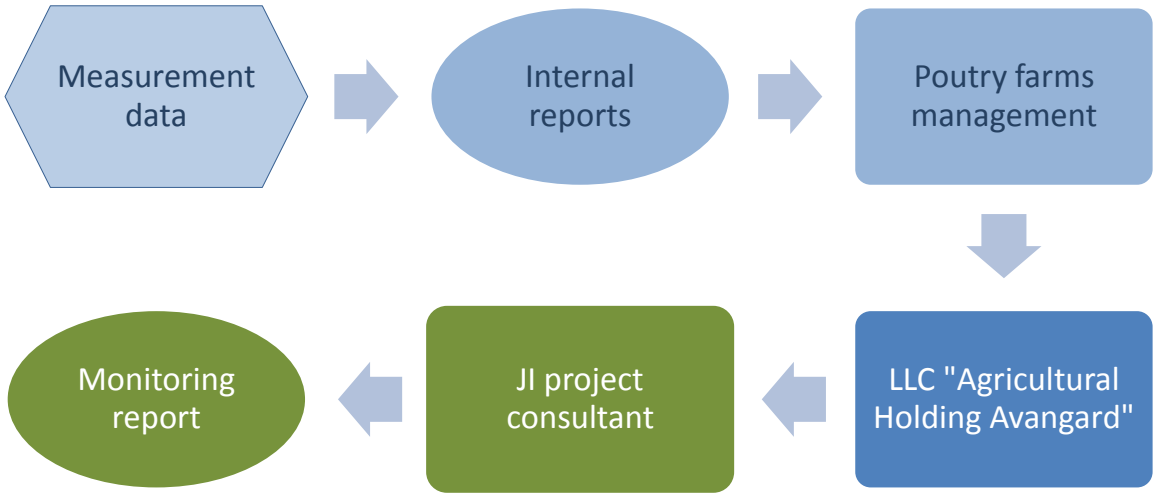

Figure 10. Monitoring flow chart.

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

Monitoring plan is developed by "Company "MT-Invest" LTD that is not a project participant.
Monitoring plant is to be performed by LLC "Agrarian Holding Avangard" that is a project participant.

Contact information:

"Company "MT-Invest" LTD
Address: 11 Kikvidze Str., Kyiv, Ukraine, 01103
Phone: +38 044 227-66-86, +38 044 253-50-69
Fax: +38 044 254-07-60

Vasylieva Nataliya Vjacheslavivna
E-mail: nataliya.vasylieva@mtinvest.com.ua
Position: Environmental project manager
Phone/fax: +38 044 280 23 50

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Table 10. Estimated project emissions during the first crediting period.

	Units	2008	2009	2010	2011	2012	Total
Project emissions for electricity consumption	tCO_2e	79 513	82 762	90 656	95 410	95 410	**443 751**
Project emissions for anaerobic fermentation of manure	tCO_2e	18 919	27 254	35 636	37 242	38 670	**157 721**
Total project emissions during the first crediting period	tCO_2e	**98 432**	**110 016**	**126 292**	**132 652**	**134 080**	**601 472**

Table 11. Estimated project emissions after the first crediting period.

	Per year	Total
Project emissions for electricity consumption	95 410	**763280**
Project emissions for anaerobic fermentation of manure	43 107	**344856**
Total project emissions after the first crediting period	**138 517**	**1108136**

E.2. Estimated leakage:

Table 12. Estimated leakage during the first crediting period.

	Units	2008	2009	2010	2011	2012	Total
Estimated leakage during the first crediting period	tCO_2e	**0**	**0**	**0**	**0**	**0**	**0**

Table 13. Estimated leakage after the first crediting period.

	Per year	Total
Estimated leakage after the first crediting period	**0**	**0**

E.3. The sum of E.1. and E.2.:

Table 14. Estimated total project emissions during the first crediting period

	Units	2008	2009	2010	2011	2012	Total
Total project emissions during the first crediting period	tCO_2e	**98 432**	**110 016**	**126 292**	**132 652**	**134 080**	**601 472**

Table 15. Estimated total project emissions after the first crediting period

	Per year	Total
Total project emissions after the first crediting period	**138 517**	**1 108 136**

E.4. Estimated baseline emissions:

Table 16. Estimated total baseline emissions during the first crediting period

	Units	2008	2009	2010	2011	2012	Total
Baseline emissions for electricity consumption	tCO_2e	182 649	242 462	303 823	387 795	387 795	**1 504 524**
Baseline emissions for anaerobic fermentation of manure	tCO_2e	590 855	852 119	1 142 929	1 181 164	1 216 431	**4 983 498**
Total baseline emissions during the first crediting period	tCO_2e	**773 504**	**1 094 581**	**1 446 752**	**1 568 959**	**1 604 226**	**6 488 022**

Table 17. Estimated total baseline emissions after the first crediting period

	Per year	Total
Baseline emissions for electricity consumption	387 795	**3102360**
Baseline emissions for anaerobic fermentation of manure	1 326 015	**10608120**
Total baseline emissions after the first crediting period	**1 713 810**	**13 710 480**

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

Table 18. Estimated emission reductions during the first crediting period

	Units	2008	2009	2010	2011	2012	Total
Emission reductions during the first crediting period	tCO_2e	**675 072**	**984 565**	**1 320 460**	**1 436 307**	**1 470 146**	**5 886 550**

Table 19. Estimated emission reductions after the first crediting period

	Per year	Total
Total emission reductions after the first crediting period	**1 575 293**	**12 602 344**

E.6. Table providing values obtained when applying formulae above:

Table 20. Estimated balance of emissions under the proposed project during the first crediting period

Year	Estimated project emissions (tons of CO_2 equivalent)	Estimated leakage (tons of CO_2 equivalent)	Estimated baseline emissions (tons of CO_2 equivalent)	Estimated emission reductions (tons of CO_2 equivalent)
Year 2008	98 432	0	773 504	675 072
Year 2009	110 016	0	1 094 581	984 565
Year 2010	126 292	0	1 446 752	1 320 460
Year 2011	132 652	0	1 568 959	1 436 307
Year 2012	134 080	0	1 604 226	1 470 146
Total (tons of CO_2 equivalent)	**601 472**	**0**	**6 488 022**	**5 886 550**

Table 21. Estimated balance of emissions under the proposed project after the first crediting period

Year	Estimated project emissions (tons of CO_2 equivalent)	Estimated leakage (tons of CO_2 equivalent)	Estimated baseline emissions (tons of CO_2 equivalent)	Estimated emission reductions (tons of CO_2 equivalent)
Year 2013	138 517	0	1 713 810	1 575 293
Year 2014	138 517	0	1 713 810	1 575 293
Year 2015	138 517	0	1 713 810	1 575 293
Year 2016	138 517	0	1 713 810	1 575 293
Year 2017	138 517	0	1 713 810	1 575 293
Year 2018	138 517	0	1 713 810	1 575 293
Year 2019	138 517	0	1 713 810	1 575 293
Year 2020	138 517	0	1 713 810	1 575 293
Total (tons of CO_2 equivalent)	**1 108 136**	**0**	**13 710 480**	**12 602 344**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

The Host Party for this project is Ukraine. Environmental Impact Assessment (EIA) is the part of the Ukrainian project planning and permitting procedures. Implementation regulations for EIA are included in the Ukrainian State Construction Standard DBN A.2.2.-1-2003[18] (Title: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures").

Annex F of this standard contains a list of "types of projects or activities which constitute higher environmental risk" for which full EIA is mandatory, and the Ministry of Environment being the competent authority. Project activity related to the construction of livestock complexes with capacity of more than 5000 heads and poultry farms included in this list.

The full scope EIA in accordance with the Ukrainian legislation has been conducted for each of the poultry farms attributed to the proposed project.

In general, the environmental impact of the project activity implementation is positive. Reducing of electricity consumption has an indirect positive impact on the environment through reduction of greenhouse gases and other products of fuel combustion at thermal power plants. Changing the methods of waste management reduces pollution of groundwater with products of chicken manure decomposition during its storage in lagoons and in excavated storage pits that also significantly effects on the conditions for the growth of pathogenic flora that may also spread through groundwater. In addition, less amount of manure anaerobic fermentation products release into the atmosphere, not only methane that in toxicology is classified as industrial poisons, but also ammonia, hydrogen sulfide and carbon monoxide. The applied methods of poultry manure composting can be used as fertilizers, a valuable recovery of soil fertility.

Implementation of the project activity also has a positive social impact through removing of the concentrated odor of chicken manure storage facilities and improving working conditions at poultry farms. Since most of the farms are located in rural areas, where the use of well water is widespread, the reduction of groundwater pollution has positive effects on health of locals.

No transboundary effects are not identified. Impacts that occur in any other country, and caused by the implementation of this project physically located entirely within Ukraine, were not identified.

[18] *State Construction Standard DBN A.2.2.-1-2003: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures" State Committee Of Ukraine On Construction And Architecture, 2004*

F.2. If environmental impacts are considered significant by the project participants or the host Party, 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:

Completion of Environmental Impact Assessment reports and positive Findings of the State Authority of Environment and Natural Resources in the Donetsk Region conclude the procedure of the environmental impact assessment according to the Ukrainian laws and regulations. Each of the project poultry farms has required a working design documentation, which includes the volume of EIA, which passed environmental review and was approved by the Ministry of Environment and Natural Resources of Ukraine or by its regional department. This documentation is available on request of AIE or during visits to the company.

Environmental statistical reporting is performed through filling in and submitting the following forms of statistical reporting: # 2 tp-air: “Air protection report”; # 1-waste “Waste treatment”; # 2-TP (water) “Water use report”

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

No stakeholder consultation process for the JI projects is required by the Host Party. Stakeholder comments will be collected during the time of this PDD publication in the internet during the determination procedure.

The public was informed on plans to build new facilities and departments of the farm, and their substantial reconstruction, by posting information on the company website[19] and though carrying out press conferences about the plans of "Avangard", following which the publications were prepared to be available for public both in print and online. As an example of such publications are the materials in known publications "Delo" [20], "Ekonomichna Pravda"[21], RBK-Ukraine[22] and others. Informing of stakeholders was conducted as a part of mandatory publication of Statement on impact in the local media in accordance with the procedure of preparation and examination of the EIA approved by *the State Construction Standard DBN A.2.2.-1-2003: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures"* State Committee Of Ukraine On Construction And Architecture, 2004.

[19] http://avangard.co.ua/ukr/about/projects/

[20] http://delo.ua/business/avangard-bahmatjuka-zanjal-vtoroe-mesto-v-mire-po-proizvodstvu-ja-169163/

[21] http://www.epravda.com.ua/news/2011/12/5/308266/

[22] http://www.rbc.ua/ukr/newsline/show/agroholding-avangard-otkryl-pervuyu-ochered-stroitelstva-27122011124100

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Project owner:

Organisation:	LLC "Agrarian Holding "Avangard"
Street/P.O.Box:	Shchorsa Str.
Building:	7/9
City:	Kyiv
State/Region:	Kyiv
Postal code:	03150
Country:	Ukraine
Phone:	+38 044 593 2860
Fax:	+38 044 593 2861
E-mail:	office@avangard.co.ua
URL:	http://avangard.co.ua/
Represented by:	
Title:	Director
Salutation:	Ms.
Last name:	Vasylyuk
Middle name:	Romanivna
First name:	Nataliya
Department:	-
Phone (direct):	+38 044 593 2860
Fax (direct):	+38 044 593 2861
Mobile:	-
Personal e-mail:	office@avangard.co.ua

EDRPOU Code (Code in the State Unified Register of Companies and Enterprises of Ukraine):	30406014
KVED types of economic activities:	82.99 Provide other support commercial services; 01.47 Farming of poultry; 46.33 Wholesale of dairy products, eggs, food oils and fats; 47.11 Retail sale in non-specialized stores mainly food, beverages and tobacco; 47.81 Retail sale of stalls and markets of food, beverages and tobacco; 70.22 Consulting on business and management.

Buyer of project emission reduction units:

Organisation:	United Carbon Finance Ltd
Street/P.O.Box:	OMC Chambers, Wickhams Cay 1
Building:	
City:	Road Town
State/Region:	Tortola
Postal code:	
Country:	British Virgin Islands
Phone:	0038 044 4906968
Fax:	0038 044 4906925
E-mail:	
URL:	
Represented by:	
Title:	Chief Representative Officer
Salutation:	Mr
Last name:	Hajizada
Middle name:	
First name:	Kanan
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Project developer.

Organisation:	"Company "MT-Invest" LTD
Street/P.O.Box:	Kikvidze str.
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Postal code:	01103
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Phone:	0038 044 2802350
Fax:	0038 044 2802350
E-mail:	
URL:	http://www.mtinvest.com.ua
Represented by:	
Title:	Environmental project manager
Salutation:	Ms.
Last name:	Vasylieva
Middle name:	Vjacheslavivna
First name:	Nataliya
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Personal e-mail:	nataliya.vasylieva@mtinvest.com.ua

Annex 2

BASELINE INFORMATION

To set a baseline scenario and calculate baseline emissions the specific approach of JI projects are used in accordance with paragraph 9 of the Guidelines on criteria for baseline setting and monitoring (Version 03). To develop methods of calculating emissions on the basis of data, IPCC methodologies are used for preparation of National GHG inventories.

Baseline emissions are calculated as follows:

$$BE_y = BE_{EC,y} + BE_{AW,y}, \quad \text{(Equation 2.1)}$$

where:

BE_y Baseline emissions during the period *y*, tCO_2e[23];

$BE_{EC,y}$ Baseline CO_2 emissions attributable to the electricity consumption by the poultry farm *i* in period *y*, tCO_2;

$BE_{AW,y}$ Baseline GHG emissions from anaerobic fermentation of manure at the poultry farm *i* in period *y*, tCO_2e.

Baseline emissions of carbon dioxide due to electricity consumption are calculated as follows:

$$BE_{EC,y} = EF_{CO2,EL,y} \times \left(\sum_{i=1}^{18} N_{Eggs,i,y} \cdot SEC_{BL,Eggs,i} + \sum_{i=19}^{30} N_{Ch,i,y} \cdot SEC_{BL,Ch,i} \right), \quad \text{(Equation 2.2)}$$

where:

i Poultry farm index, dimensionless. Where $i \in (1;18)$ is the farms for egg-laying hens; if $i \in (19;30)$ -it is a zone for young birds breeding and breeding houses;

$BE_{EC,y}$ Baseline CO_2 emissions for electricity consumption attributable to the electricity consumption by the poultry farm *i* in period *y*, tCO_2;

[23] 1 tCO_2e = 1 tCO_2.

$EF_{CO2,EL,y}$ Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052, tCO_2/MWh (Values are provided in Table 22).

$N_{Eggs,i,y}$ Amount of eggs produced at the poultry farm *i* in period *y*, eggs;

$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm *i* in period *y,* birds;

$SEC_{BL,Eggs,i}$ Baseline specific electricity consumption for eggs production, MWh /egg (Values are provided in Table 24);

$SEC_{BL,Ch,i}$ Baseline specific electric energy consumption for breeding of one head of bird permanently kept at the farm, MWh /pc (Values are provided in Table 24).

$$SEC_{BL,Eggs,i} = \frac{1}{z} \times \sum_{m=1}^{z} \frac{EC_{BL,i,m}}{N_{Eggs,i,m}}, \quad \text{(Equation 2.3)}$$

where:

i Poultry farm index, dimensionless;

$SEC_{BL,Eggs,i}$ Baseline specific electricity consumption for eggs production, MWh /egg (Values are provided in Table 24);

$N_{Eggs,i,m}$ Amount of eggs produced at the poultry farm *i* during baseline year *m*, eggs;

$EC_{BL,i,m}$ Baseline electricity consumption for the production of product type *i* in the base year *m*, MWh.

z Number of years of the base period, dimensionless parameter. Number of years of the base period is determined separately for each enterprise according to the following rule: only years previous to the project implementation should be took into account, the length of the base period is determined by the availability of data and ranges from 4 years to 1 year.

$$SEC_{BL,Ch,i} = \frac{1}{z} \times \sum_{m=1}^{z} \frac{EC_{BL,i,m}}{N_{Ch,i,m}}, \quad \text{(Equation 2.4)}$$

where:

i Poultry farm index, dimensionless;

$SEC_{BL,Ch,i}$ Baseline specific electric energy consumption for breeding of one head of bird permanently kept at the farm, MWh /pc (Values are provided in Table 24);

$N_{Ch,i,m}$ Average number of birds permanently kept at the poultry farm i in baseline year m, birds;

$EC_{BL,i,m}$ Baseline electricity consumption for the production of product type i in the base year m, MWh.

z Number of years of the base period, dimensionless parameter. Number of years of the base period is determined separately for each enterprise according to the following rule: only years previous to the project implementation should be took into account, the length of the base period is determined by the availability of data and ranges from 4 years to 1 year.

$$BE_{AW,y} = \sum_{i=1}^{30} (N_{Ch,i,y} \times EF_{CH4,MSn}), \quad \text{(Equation 2.5)}$$

where:

i Poultry farm index, dimensionless;

n Index of manure handling method, dimensionless, $n \in (1; 4)$;

$BE_{AW,y}$ Project GHG emissions for anaerobic fermentation of manure at the farm i in period y, tCO_2e;

$N_{Ch,i,y}$ Average number of birds permanently kept at the poultry farm i in period y, birds;

$EF_{CH4,MSn}$ Methane emission factor for collection, storage and utilization of manure using the method n at the poultry farm i, tCO_2e/pc (Method n for each of the farms is indicated in Table 23).

Calculation of methane emissions factor for collection, storage and utilization of chicken manure using the method *n* ($n \in (1; 4)$) was conducted using tier 2 method in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, Equation 10.23, p. 10.47[24]. Calculation formula for methane emission factor for collection, storage and utilization of manure using the method n was changed by simplifying for accounting for emissions during collection, storage and utilization of one type of manure, involved in project (poultry manure), by replacing values with parameters "methane density" and "number of days in the period" and by inserting multiplier "global warming potential" to get results in tonnes of CO_2 equivalent.

$$EF_{CH4,MSn} = GWP_{CH4} \times D_{CH4} \times MCF_n \times B_{0,Ch} \times VS_{Ch} \times d, \quad \text{(Equation 5)}$$

where:

n	Index of manure handling method, dimensionless, $n \in (1; 4)$;
$EF_{CH4,MSn}$	Methane emission factor for collection, storage and utilization of manure using the method *n* at the poultry farm *i*, tCO_2e/pc (Method *n* for each of the farms is indicated in Table 23);
GWP_{CH4}	Methane global warming potential, tCO_2e/tCH_4 (Values are provided in Table 22);
D_{CH4}	Methane density, t/m^3 (Values are provided in Table 22);
MCF_n	Methane conversion factor for collection, storage and utilization of manure using the method n, fraction (Values are provided in Table 22);
$B_{0,Ch}$	Maximum potential of methane generation from manure, m^3/kg (Values are provided in Table 22);
VS_{Ch}	Amount of volatile solids generated from manure, kg/per head per day (Values are provided in Table 22);
d	Number of days in the period, days (divisible by number of days in quarter of the year).

[24] http://www.ipcc-nggip.iges.or.jp/public/2006gl/russian/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

Table 22. List of fixed value used for emissions calculations

Parameter	***Unit***	***Description***	***Source of data***	***Value***
$EF_{CO2,EL,y}$	tCO_2/ MWh	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052	Ukrainian National Environment Investment Agency Order # 62 dated 15/04/2011[25]	1.219
$EF_{CO2,EL,y}$	tCO_2/ MWh	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052	Ukrainian National Environment Investment Agency Order # 63 dated 15/04/2011[26]	1.237
$EF_{CO2,EL,y}$	tCO_2/ MWh	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052	Ukrainian National Environment Investment Agency Order # 43 dated 28/03/2011[27]	1.225
$EF_{CO2,EL,y}$	tCO_2/ MWh	Indirect specific carbon dioxide emissions in the period of consumption of electricity by consumers which are classified as 2nd class according to the procedure for determining the classes of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 № 1052	Ukrainian National Environment Investment Agency Order # 75 dated 12/05/2011[28]	1.227

[25] http://www.neia.gov.ua/nature/doccatalog/document?id=127171

[26] http://www.neia.gov.ua/nature/doccatalog/document?id=127172

[27] http://www.neia.gov.ua/nature/doccatalog/document?id=126006

[28] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

MCF_1	fraction	Annual methane conversion factor for uncovered anaerobic lagoons	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.45[29]. Value for cold climate (average temperature 10 °C and below).	0.660
MCF_2	fraction	Annual methane conversion factor for solid storage	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.44. Value for cold climate (average temperature 10 °C and below).	0.020
MCF_3	fraction	Annual methane conversion factor for composting	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.46. Value for cold climate (average temperature 10 °C and below).	0.005
MCF_4	fraction	Annual methane conversion factor for daily removal to the fields	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.45. Value for cold climate (average temperature 10 °C and below).	0.001
GWP_{CH4}	tCO_2e/tCH_4	Global warming potential for methane	Climate Change 1995. The Science of Climate Change. Edited by J. T. Houghton and other (1996), p. 22, Table 4[30]	21
D_{CH4}	t/m^3	Methane density	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, Chapter 10, p. 10.42. Value of methane density is fixed to the standard conditions (temperature 20°C and pressure 101 325 Pa).	0.00067
$B_{0,Ch}$	m^3/kg	Maximum potential of methane generation from manure	National Inventory Report of Ukraine for 1990-2010, p. 226	0.32
VS_{Ch}	kg/pc per day	Amount of volatile solids generated from manure	National Inventory Report of Ukraine for 1990-2010, p. 570	0.042

[29] http://www.ipcc-nggip.iges.or.jp/public/2006gl/russian/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

[30] http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

Table 23. Methane emissions factor due to collection, storage and utilization of manure.

Parameter	***Unit***	***Description***	***Value***
$EF_{CH4,MS1}$	tCO_2e/pc	Methane emissions factor due to collection, storage and utilization of manure with use of anaerobic uncovered lagoons	0.0456
$EF_{CH4,MS2}$	tCO_2e/pc	Methane emissions factor due to collection, storage and utilization of manure with solid storage	0.0014
$EF_{CH4,MS3}$	tCO_2e/pc	Methane emissions factor due to collection, storage and utilization of manure with composting	0.0003
$EF_{CH4,MS4}$	tCO_2e/pc	Methane emissions factor due to collection, storage and utilization of manure with daily removal to the fields	0.0001

Table 24. Specific electricity consumption in the baseline scenario

Parameter	*Unit*	*Name*	*Facility type/ division*	*Arithmetic average*	***2004***	***2005***	***2006***	***2007***
$SEC_{BL,Eggs,i}$	kWh/egg	Agricultural Limited Liability Company "Donetsk birds"	Egg-laying hens farm	0.042	0.048	0.051	0.037	0.034
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company Agricultural Company "Avis"	Egg-laying hens farm	0.060	0.114	0.063	0.048	0.016
$SEC_{BL,Eggs,i}$	kWh/egg	Limited Liability Company "Makarivsk Birds"	Egg-laying hens farm	0.019	0.030	0.020	0.012	0.015
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Kross-Poultry farm "Zorya"	Egg-laying hens farm	0.027	0.036	0.025	0.024	0.025
$SEC_{BL,Eggs,i}$	kWh/egg	Limited Liability Company "Trading house "Bogodukhivska Poultry Farm"	Egg-laying hens farm	0.024	0.025	0.026	0.027	0.020
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Egg-laying hens farm	0.034	0.031	0.034	0.035	0.035
$SEC_{BL,Eggs,i}$	kWh/egg	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Egg-laying hens farm	0.039	0.040	0.040	0.040	0.038
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Avangard"	Egg-laying hens farm	0.080	0.080	0.080	0.080	0.080
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Chornobayivske"	Egg-laying hens farm	0.065	0.100	0.092	0.035	0.033

$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Kirovskiy"	Egg-laying hens farm	0.026	0.031	0.037	0.003	0.031
$SEC_{BL,Eggs,i}$	kWh/egg	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Egg-laying hens farm	0.033	0.041	0.033	0.028	0.028
$SEC_{BL,Eggs,i}$	kWh/egg	Limited Liability Company "Areal-Snigurivka"	Egg-laying hens farm	0.060	0.060	0.060	0.060	0.060
$SEC_{BL,Eggs,i}$	kWh/egg	Subsidiary "Rogatynska Poultry farm" of PJSC "Avangard"	Egg-laying hens farm	0.112	0.170	0.150	0.110	0.017
$SEC_{BL,Eggs,i}$	kWh/egg	Private Research and Production Company "Interbusiness"	Egg-laying hens farm	0.045	0.042	0.047	0.038	0.054
$SEC_{BL,Eggs,i}$	kWh/egg	Limited Liability Company "Poultry farm "Volnovaska"	Egg-laying hens farm	0.099	0.110	0.105	0.090	0.091
$SEC_{BL,Eggs,i}$	kWh/egg	Private Joint Stock Company "Chernivetska Poultry farm"	Egg-laying hens farm	0.080	0.080	0.080	0.080	0.080
$SEC_{BL,Eggs,i}$	kWh/egg	Bird Breeding Limited Liability Company "Ptitsekomplex"	Egg-laying hens farm	0.095	0.095	0.095	0.095	0.095
$SEC_{BL,Eggs,i}$	kWh/egg	Agribusiness Farm LLC "Yuzhnaya-Holding"	Egg-laying hens farm	0.039	0.050	0.050	0.034	0.021
$SEC_{BL,Ch,i}$	kWh/egg	Subsidiary "Avangard-Agro" of PJSC "Avangard"	Grow-out farms	0.800				0.800
$SEC_{BL,Ch,i}$	kWh/egg	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Grow-out farms	1.081				1.081
$SEC_{BL,Ch,i}$	kWh/egg	Subsidiary "Poultry farm "Chornobayivske" of PJSC "Chornobayivske"	Grow-out farms	3.458				3.458
$SEC_{BL,Ch,i}$	kWh/egg	Agricultural Limited Liability Company	Grow-out farms	0.800				0.800

		"Donetsk birds"						
$SEC_{BL,Ch,i}$	kWh/egg	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Grow-out farms	1.244				1.244
$SEC_{BL,Ch,i}$	kWh/egg	Public Joint Stock Company "Kross- Poultry farm "Zorya"	Grow-out farms	0.753				0.753
$SEC_{BL,Ch,i}$	kWh/egg	Agricultural Limited Liability Company "Yuzhnaya – Holding"	Grow-out farms	2.505				2.505
$SEC_{BL,Ch,i}$	kWh/egg	Limited Liability Company "Poultry farm "Volnovaska"	Grow-out farms	1.831				1.831
$SEC_{BL,Ch,i}$	kWh/egg	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Grow-out farms	14.543				14.543
$SEC_{BL,Ch,i}$	kWh/egg	LLC "Slov'yany"	Breeder farms	0.546				0.546
$SEC_{BL,Ch,i}$	kWh/egg	Bird Breeding Limited Liability Company "Ptitsekomplex"	Breeder farms	1.831				1.831
$SEC_{BL,Ch,i}$	kWh/egg	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Breeder farms	2.505				2.505

Table 25. Method of collection, storage and utilization of manure by each of poultry farms in the baseline scenario.

Identification #	*Name*	*Facility type/ division*	*Method*	*Value of n ($n \in (1; 4)$)*
1.	Agricultural Limited Liability Company "Donetsk birds"	Egg-laying hens farm	Solid storage	2
2.	Public Joint Stock Company Agricultural Company "Avis"	Egg-laying hens farm	Solid storage	2
3.	Limited Liability Company "Makarivsk Birds"	Egg-laying hens farm	Solid storage	2
4.	Public Joint Stock Company "Kross-Poultry farm "Zorya"	Egg-laying hens farm	Anaerobic uncovered lagoons	1
5.	Limited Liability Company "Trading house "Bogodukhivska Poultry Farm"	Egg-laying hens farm	Solid storage	2
6.	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Egg-laying hens farm	Anaerobic uncovered lagoons	1
7.	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Egg-laying hens farm	Solid storage	2
8.	Public Joint Stock Company "Avangard"	Egg-laying hens farm	Anaerobic uncovered lagoons	1
9.	Public Joint Stock Company "Chornobayivske"	Egg-laying hens farm	Solid storage	2
10.	Public Joint Stock Company "Kirovskiy"	Egg-laying hens farm	Solid storage	2
11.	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Egg-laying hens farm	Solid storage	2
12.	Limited Liability Company "Areal-Snigurivka"	Egg-laying hens farm	Solid storage	2
13.	Subsidiary "Rogatynska Poultry farm" of PJSC "Avangard"	Egg-laying hens farm	Solid storage	2
14.	Private Research and Production Company "Interbusiness"	Egg-laying hens farm	Solid storage	2
15.	Limited Liability Company "Poultry farm "Volnovaska"	Egg-laying hens farm	Anaerobic uncovered lagoons	1
16.	Private Joint Stock Company "Chernivetska Poultry farm"	Egg-laying hens farm	Solid storage	2

17.	Bird Breeding Limited Liability Company “Ptitsekomplex”	Egg-laying hens farm	Anaerobic uncovered lagoons	1
18.	Agribusiness Farm LLC “Yuzhnaya-Holding”	Egg-laying hens farm	Anaerobic uncovered lagoons	1
19.	Subsidiary “Avangard-Agro” of PJSC “Avangard”	Grow-out farms	Anaerobic uncovered lagoons	1
20.	Public Joint Stock Company “Poultry farm “Chervony Prapor”	Grow-out farms	Anaerobic uncovered lagoons	1
21.	Subsidiary “Poultry farm “Chornobayivske” of PJSC “Chornobayivske”	Grow-out farms	Solid storage	2
22.	Agricultural Limited Liability Company “Donetsk birds”	Grow-out farms	Solid storage	2
23.	Public Joint Stock Company “Poultry farm “Pershe Travnya”	Grow-out farms	Anaerobic uncovered lagoons	1
24.	Public Joint Stock Company “Kross- Poultry farm “Zorya”	Grow-out farms	Anaerobic uncovered lagoons	1
25.	Agricultural Limited Liability Company “Yuzhnaya – Holding”	Grow-out farms	Anaerobic uncovered lagoons	1
26.	Limited Liability Company “Poultry farm “Volnovaska”	Grow-out farms	Anaerobic uncovered lagoons	1
27.	Subsidiary Poultry farm “Lozuvatska” of Public Joint Stock Company with limited liability “Avangardko investment public limited”	Grow-out farms	Solid storage	2
28.	LLC “Slov’yany”	Breeder farms	Anaerobic uncovered lagoons	1
29.	Bird Breeding Limited Liability Company “Ptitsekomplex”	Breeder farms	Anaerobic uncovered lagoons	1
30.	Public Joint Stock Company “Poultry farm “Pershe Travnya”	Breeder farms	Solid storage	2

Annex 3

MONITORING PLAN

For the monitoring plan please refer to section D of this PDD.

Table 26. Method of collection, storage and utilization of manure by each of poultry farms in the project scenario

Identification #	*Name*	*Facility type/ division*	*Method*	*Value of n ($n \in (1; 4)$)*
1.	Agricultural Limited Liability Company "Donetsk birds"	Egg-laying hens farm	Composting	3
2.	Public Joint Stock Company Agricultural Company "Avis"	Egg-laying hens farm	Composting	3
3.	Limited Liability Company "Makarivsk Birds"	Egg-laying hens farm	Daily removal of manure to the fields	4
4.	Public Joint Stock Company "Kross-Poultry farm "Zorya"	Egg-laying hens farm	Solid storage	2
5.	Limited Liability Company "Trading house "Bogodukhivska Poultry Farm"	Egg-laying hens farm	Daily removal of manure to the fields	4
6.	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Egg-laying hens farm	Solid storage	2
7.	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Egg-laying hens farm	Daily removal of manure to the fields	4
8.	Public Joint Stock Company "Avangard"	Egg-laying hens farm	Solid storage	2
9.	Public Joint Stock Company "Chornobayivske"	Egg-laying hens farm	Composting	3
10.	Public Joint Stock Company "Kirovskiy"	Egg-laying hens farm	Daily removal of manure to the fields	4
11.	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Egg-laying hens farm	Daily removal of manure to the fields	4
12.	Limited Liability Company "Areal-Snigurivka"	Egg-laying hens farm	Daily removal of manure to the fields	4
13.	Subsidiary "Rogatynska Poultry farm" of PJSC "Avangard"	Egg-laying hens farm	Daily removal of manure to the fields	4
14.	Private Research and Production Company "Interbusiness"	Egg-laying hens farm	Daily removal of manure to the fields	4
15.	Limited Liability Company "Poultry farm "Volnovaska"	Egg-laying hens farm	Solid storage	2

16.	Private Joint Stock Company "Chernivetska Poultry farm"	Egg-laying hens farm	Daily removal of manure to the fields	4
17.	Bird Breeding Limited Liability Company "Ptitsekomplex"	Egg-laying hens farm	Solid storage	2
18.	Agribusiness Farm LLC "Yuzhnaya-Holding"	Egg-laying hens farm	Solid storage	2
19.	Subsidiary "Avangard-Agro" of PJSC "Avangard"	Grow-out farms	Solid storage	2
20.	Public Joint Stock Company "Poultry farm "Chervony Prapor"	Grow-out farms	Solid storage	2
21.	Subsidiary "Poultry farm "Chornobayivske" of PJSC "Chornobayivske"	Grow-out farms	Composting	3
22.	Agricultural Limited Liability Company "Donetsk birds"	Grow-out farms	Composting	3
23.	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Grow-out farms	Solid storage	2
24.	Public Joint Stock Company "Kross- Poultry farm "Zorya"	Grow-out farms	Solid storage	2
25.	Agricultural Limited Liability Company "Yuzhnaya – Holding"	Grow-out farms	Solid storage	2
26.	Limited Liability Company "Poultry farm "Volnovaska"	Grow-out farms	Solid storage	2
27.	Subsidiary Poultry farm "Lozuvatska" of Public Joint Stock Company with limited liability "Avangardko investment public limited"	Grow-out farms	Daily removal of manure to the fields	4
28.	LLC "Slov'yany"	Breeder farms	Solid storage	2
29.	Bird Breeding Limited Liability Company "Ptitsekomplex"	Breeder farms	Solid storage	2
30.	Public Joint Stock Company "Poultry farm "Pershe Travnya"	Breeder farms	Daily removal of manure to the fields	4

Annex 4

Information on the characteristics of the main technical parameters of the technology used in the project

#	Equipment	The main technical parameters of the technology used in the project
1	**PDN 0.4-10 kV**	Power Lines Voltage: 400 V - 10 000 V Type: Air and Cable lines
2	**Transformers**	Models and types of transformers: FTM-180, TM 180 \ 10, TM-160 TM-400, TM-630, TM-250, TM-1000/10, TM-630/10, ZTP, PTS-380, DHC-630, TS-628, 250/10 TP-377, FTE-680, TM 250 kVA, TM-140 TM-630-10-04, TP-249-680 400-10 FTE Power of transformers: 140 kVA, 160 kVA, 180 kVA, 250 kVA, 380 kVA, 630 kVA, 680 kVA, 1000 kVA
4	**Pumps**	Models and types of pumping equipment: ETSV 6-10-140, ECW-6-10-140, ECW 6-6.5-120, ECW 6-6.5-140, deep pump-6 ECW, SAER VR-5; SDF 54/30ECV380 -415/50; VC-QDX/WX; MD 16/10 1.5 / 1500, DS 25/14 3/1500, TOP-S 30\10 DM; BTSPO 07.04 A; EVTS 8-25-230; EVTS 8-25-300 etc. Power of pumping equipment: 4 to 60 kW
5	**Engines**	Models and types: electric motors, motor-reducers and others. Power rating: from 1.1 to 200 kW
6	**Compressors**	Models and types of compressor equipment: MIOL TNT; TM540-270 (Power of: 4 kW); Pole Position 241; GM (COSMOS); RM-3148, 05 and others. Power rating: from 4 to 25 kW
8	**Lamps**	Models and types of lighting equipment: fluorescent, LED, bulbs Power rating: from 60 W to 400 W
9	**Heaters**	Models and types of air heaters: Fixtures, convection, infrared, etc.. Power rating: from 1 kW to 360 kW
10	**Conditioners and climate systems**	Models and types of air conditioners: tunnel, Roof-top systems, split systems, built, etc. .. Power rating: from 9 kW to 48 kW

#	Equipment	The main technical parameters of the technology used in the project
12	**Fans**	Models and types of fans: axial fans 50 "and others. Power rating: from 1.1 kW to 2.2 kW
13	**Stabilization equipment**	Models and types of stabilization equipment: rectifiers, regulators and others. Power rating: from 100 kVA to 2000 kVA
14	**Auxiliaries**	Models and types of regulators: Dimmer URZ-40 control unit "Dawn-Sunset " Efficiency of equipment from 98%

Quantitative characteristics of equipment used in the Project

#	Compamy	Replaced														
										Climate equipment						
		PDN 0.4-10 kV, km	Trans-for-mers, units	Substa-tions, units	Pumps, units	Engines, units	Comp-ressors, units	Boilers, units.	Lamps, units	Heaters, units	Conditi-oners, units	Cli-mate sys-tems, units	Fans, units	Incu-bators, units.	Stabili-zation equip-ment, units	Auxil-liaries, units
1	Agricultural Limited Liability Company «Donetsk birds»	7.8	9	1	10	1	6	3	1133	15	7	2	32	-	9	18
2	«Public Joint Stock Company Agrofirm «Avis»	-	1	-	14	2	1	-	560	3	2	-	-	-	-	-
3	LLC «Makarivska Birds»	-	-	-	3	16	1	-	-	-	-	-	5	-	-	1
4	Public Joint Stock Company «Kross- Poultry farm «Zorya»	-	-	12	5	26	5	2	321	69	-	-	74	-	2	33
5	LLC «Trading house «Bogodukhivska Birds»	4.5	-	1	6	2	2	-	12655	33	8	-	-	-	1	-
6	Public Joint Stock Company «Poultry farm «Chervony Prapor»	-	1	2	42	-	6	3	12204	14	12	4	-	-	-	-

#	Compamy	Replaced														
		PDN 0.4-10 kV, km	Trans-for-mers, units	Substa-tions, units	Pumps, units	Engines, units	Comp-ressors, units	Boilers, units.	Lamps, units	Climate equipment				Incu-bators, units.	Stabili-zation equip-ment, units	Auxil-liaries, units
										Heaters, units	Conditi-oners, units	Cli-mate sys-tems, units	Fans, units			
7	Subsidiary Poultry farm «Lozuvatska» of PJSC «Avangardko investment public limited»	-	8	-	19	-	2	-	705	46	-	21	9	-	-	-
8	Public Joint Stock Company « Avangard»	11	5	13	26	12	1	-	10	12	4	-	2	35	4	-
9	Public Joint Stock Company «Chornobayivske»	-	-	4	15	-	-	-		-	-	10	5	-	3	-
10	Public Joint Stock Company «Kirovskiy»	-	-	3	6	1	-	-	247	12	5	1	-	-	2	-
11	Public Joint Stock Company «Poultry farm «Pershe Travnya»	-	-	-	25	-	-	-	10546	18	28	2	11	8	-	-
12	LLC «Areal-Snigurivka»	-	-	-	4	13	-	2	50	5	-	-	1	-	-	-
13	Subsidiary «Rogatynska Poultry farm» of PJSC «Avangard»	-	-	-	3	4	-	-	-	-	1	-	-	-	-	-
14	Private Research and Production Company «Interbusiness»	-	1	1	13	5	1	-	-	8	4	-	-	-	3	-
15	LLC Poultry farm «Volnovaska»	-	-	4	2	-	-	-	788	1	-	-	-	-	-	-
16	Private Joint Stock Company «Chernivetska Poultry farm»	-	1	-	22	1	2	5	384	13	2	-	-	-	6	-
17	Bird Breeding LLC «Ptitsekomplex»	-	-	-	2	-	2	1	-	55	1	3	2	32	-	-
18	Agribusiness Farm LLC «Yuzhnaya-Holding»	-	26	-	3	3	1	-	15907	40	45	27	-	-	-	-
19	Subsidiary «Avangard-Agro» of PJSC «Avangard»	-	-	-	1	3	-	-	49	-	-	-	-	-	-	-
20	Subsidiary «Poultry farm «Chornobayivske» of PJSC «Chornobayivske»	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-

#	Compamy	Replaced														
		PDN 0.4-10 kV, km	Trans-for-mers, units	Substa-tions, units	Pumps, units	Engines, units	Comp-ressors, units	Boilers, units.	Lamps, units	Climate equipment				Incu-bators, units.	Stabili-zation equip-ment, units	Auxil-liaries, units
										Heaters, units	Conditi-oners, units	Cli-mate sys-tems, units	Fans, units			
21	LLC «Slov'yany»	-	-	-	13	-	-	-	11824	4	4	2	-	1	-	-
The total number of equipment of all project participants:		**23.3**	**52**	**41**	**234**	**89**	**30**	**17**	**67383**	**348**	**123**	**72**	**141**	**76**	**30**	**52**

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