JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: June 15, 2006

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

"Reconstruction and modernization of main-line electrical grids of NPC "Ukrenergo"

Sectoral Scopes:

1. Sectoral scope 2 – **"**Energy distribution".

The version number of the document: 02.

Date: 15/06/2011.

A.2. Description of the project:

Purposes of project activity: The main purpose of the Joint Implementation Project (hereinafter JIP) "Reconstruction and modernization of main-line electrical grids of NPC "Ukrenergo" is the implementation of the program on the technical improvement of electrical networks and equipment, advanced technologies implementation, the transition to a higher level of organisation of transmission and distribution of electric energy.

Implementation of the measures under the project will allow for improvement of the reliability and efficiency of electricity transmission main-lines of Ukrenergo, this in turn will help reduce the amount of electricity that is lost during transport thereof to the distribution electrical grids, so the production of electricity at thermal power plants will decrease and correspondingly emissions of GHG gases will decrease in comparison to current practice.

Historical details of the State enterprise National Power Company "Ukrenergo", (hereinafter - NPC "Ukrenergo")

In 1995, during Ukrainian power industry restructuring 8 power production associations (PPA) were liquidated and 27 power supply companies, 4 thermal power generating companies, two hydro generating company, state power company "Ukrelektroperedacha" and the Ukraine National Dispatch Center (NDC) were created. The structure of NDC includes 8 regional dispatch centers and the newly created unit "Energorynok". State Electric Company "Ukrelektroperedacha" was formed on (PPA) structures that served the power transmission lines 220-750 kV.

To coordinate activities with the development and operation of power transmission lines, and to improve operational and technological management of united power system (UPS) the State enterprise National Power Company "Ukrenergo" was created by joining the National Dispatch Center of Ukraine and the State Electric Company Ukrelektroperedacha by the order of Ukraine Ministry of Energy as of April 15, 1998 № 1954.

Description of conditions whereon the project will be implemented.

Electrical grid is a complex of electrical equipment and devices for electricity transmission and distribution. The electrical grids relate to complex technical systems in terms of their structure, organization of operation and the principles of managing.

Technical state of the main-line electrical grids at NPC "Ukrenergo" is getting worse due to lack of necessary funds to implement energy-efficient equipment and a natural deterioration factor plays a crucial role in this process. At the same time a problem of maintaining at the required level of reliability of the electricity supply systems for electric energy consumers is getting more acute. Extensive main-line grids often work under

severe conditions of pollution, moisture, frequent dynamic and thermal overloads, and the average operating life of most of the major equipment in the electrical grids significantly exceeds the standard lifetime.
By the beginning of the project (May 2004) NPC "Ukrenergo" had only carried out measures aimed at maintaining electrical grids in operational state. In most cases, these measures included repairs intended to correct defects arising during the operation of the electrical grids.
Most equipment that operated at that time in the grids of NPC "Ukrenergo" was already morally and physically obsolete, but because of insufficient funding and operational reserve of existing equipment, it could further be exploited. In addition, changing of the existing situation was possible on condition of not only changes of the technical provision of the grid, but also improvement of organizational structures, and this also required financial and human resources.

Project scenario

The basis of the JIP is the introduction of new energy-efficient equipment and activities:

- organizational measures of methodological support,
- organizational and technical measures,
- technical measures that aim to eliminate energy losses when transporting thereof to the distribution electrical grids.

Measures to be implemented under the project (see Section A.4.2 below), as well as application and implementation of ongoing monitoring of possible sources of loss and preventing from their occurrence would significantly reduce energy losses in the electrical grids of NPC "Ukrenergo".

Historical details of "Reconstruction and modernization of main-line electrical grids of NPC "Ukrenergo" Joint ImplementationPproject development

The management of NPC "Ukrenergo" made a decision to implement the JI project "Reconstruction and modernization of main-line electrical grids of NPC "Ukrenergo" at the enterprise during a board meeting on December 25, 2003.

05/01/2004 is a commencement date of elaboration of project design documentation for reconstruction and modernization of the main-line electrical distribution grids at NPC "Ukrenergo".
05/2004 is a commencement date of implementation of new energy efficient equipment according to the project documents.
20/04/2011 - preparation of project proposal and justification for the reduction of anthropogenic greenhouse gases to the State Environmental Investment Agency.
04/06/2011 - a letter of endorsement was issued by the State Environmental Investment Agency.

The baseline scenario provides for the further use of existing equipment and routine repairs and recovery work without significant investment. Losses of electricity in the electrical grids would remain at the same level, leading to greenhouse gases emissions due to burning of fossil fuels at electricity generating companies in the pre-project years. Justification of the baseline scenario is provided in Section B.

The project may promote sustainable development of NPC "Ukrenergo" in the following aspects:

- Reduced load and improved working conditions at overloaded electricity generating companies;

- Decrease of national economy's dependence on import of energy and increase of country's energy security;

- High rates of labor and health protection;

- Improvement of the global ecology state (counteraction in response to global climate change by means of reduction of carbon dioxide emissions into the atmosphere);
- Creation of jobs in the course of reconstruction and modernization of main-line electrical grids.

A.3. 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)	NPC "Ukrenergo"	No
Switzerland	• "VEMA S.A."	No

A.4. Technical description of the project:

A.4.1. Location of the project:

The JI Project is implemented on the territory of Ukraine.

Figure 1. The map of Ukraine.

A.4.1.1. Host Party(ies):

NPC "Ukrenergo"provides the integrity of the integrated Power System of Ukraine. Ukraine is a country in the East of Europe. It is situated in the South-West part of East European Plain. Ukraine borders Poland, Slovakia and Hungary, Romania and Moldova on the west, Belarus on the north, the Russian Federation on the east and northeast, and the Black Sea and the Sea of Azov on the south. Ukraine ratified the Kyoto Protocol to the UN Framework Convention on February 4, 2004, is listed as Annex 1 country, and meets the criteria for participation in JI projects.

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

The JI project will be implemented at 8 of electric power systems of NPC "Ukrenergo": Dniprovska, Donbaska, Zakhidna, Krymska, Pivdenna, Pivdenno-Zakhidna, Pivnichna and Tsentralna electric power systems, which consist of 24 regions: Vinnytsia region, Volyn region, Dnipropetrovsk region, Donetsk region, Zhitomyr region, Zakarpattia region, Zaporizhia region, Ivano-Frankivsk region, Kyiv and Kyiv region, Kirovohrad region, Lugansk region, Lviv region, Mykolayiv region, Odesa region, Poltava region, Rivne region, Ternopil region, Sevastopol, Sumy region, Ternopil region, Kharkiv region, Kherson region, Khmelnytsky region, Cherkasy region, Chernivtsi region, Chernihiv region and Autonomous Republic of Crimea

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

The joint implementation project includes all the administrative - territorial units of Ukraine where the main-line electrical grids of NPC "Ukrenergo" are situated.

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

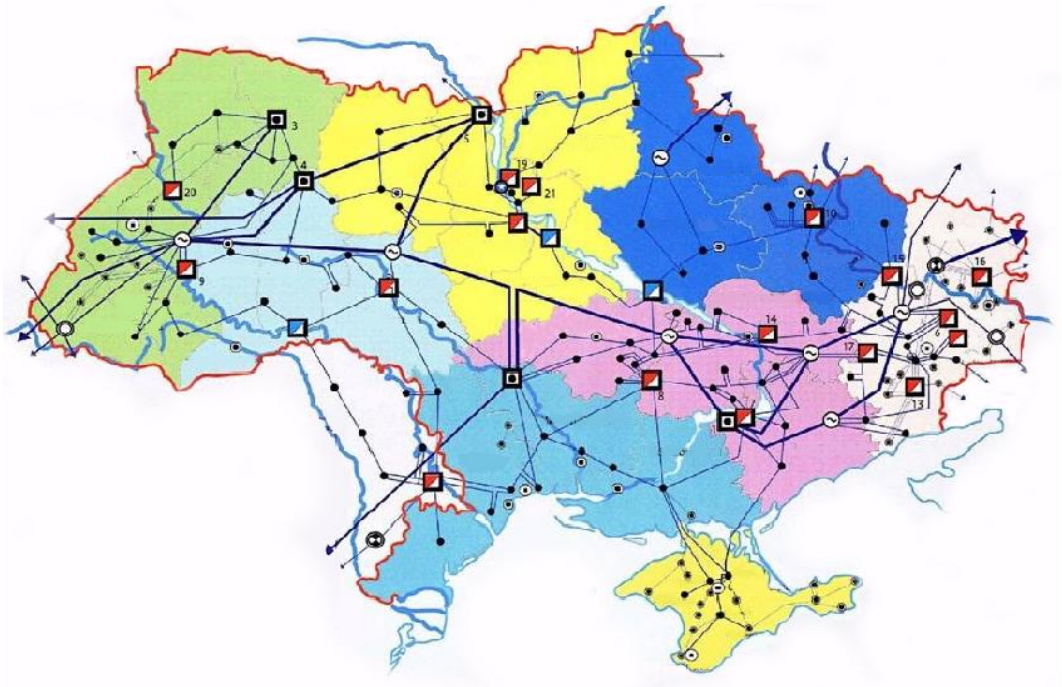

Figure. 1.Location of the main-line electrical grids of NPC "Ukrenergo" on the map of Ukraine.

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

Introduction of new equipment that aims to reduce technical losses of electricity (hereinafter - TLE) in the main-line electrical grids of NPC "Ukrenergo" and complex of organizational and technical measures that aims to reduce TLE are the basic elements of the JI Project, which in turn includes:

- Modernization and rehabilitation works in electrical grids and introduction of new energy efficient equipment;

- Improvement of the reliability of electricity supply to electricity consumers;

- Introduction of automated systems of electricity consumption commercial records (ASECCR) in the perimeter of energy supply company, ASECCR of consumers and subplants;

- Introduction of a complex Program on technical losses of electricity decrease;

- Modernization of existing facilities within investment programs of electrical grids development.

In the framework of the Project it is provided to form the TLE management system (energy rate setting, energy audit and energy management) in the Company for effective implementation of a number of organizational and technical measures as well as measures on developing and improving the methodological provision of TLE reduction during implementation of licensed activities on electricity transmission and distribution. Lists of these activities are listed below:

1. Organizational measures of methodological support

1.1 The external energy audit as well as organization of works of constant internal energy audit of electric energy transmission processes (the electrical grids systems and electricity metering systems as well as systems of identification and management of electric energy flows and electricity balances);

1.2. Technical data base formation (list and descriptions of items and patterns and normal modes of operation) of the Company's electrical grids, that is consistent with annual and monthly reports on technical and production ratios;

1.3. The introduction of a program system of pofidernic (element based) calculation, analysis and optimization of TLE in grid elements to locate unacceptable TLE;

1.4. Developing of system for planning, organization and control (monitoring) for performing administrative and technical measures on TLE reduction during electricity supplying process realization;

1.5. Establishment and operation of separate structural units in the company that specialize in activities associated with management and implementation of measures aimed at reducing TLE during electricity transmission process implementation (*Department of electric energy audit and electricity metering, measuring laboratory and others)*;

1.6. Introduction of institutional mechanisms of collective and individual responsibility of Company employees for TLE reducing in the Company grids by an objective principle;

1.7. Introduction of motivational mechanisms of economic and moral incentives for Company employees to perform assignments on technical component of TLE reducing;

1.8. Other measures for improving of TLE management for electricity transmission process;

2. Organizational and technical measures

2.1. Turning off transformers with seasonal load;

2.2. Regular monitoring and adjustment of phase loads in electrical grids;

2.3. Modernization of program and technical measures on automatization of operational and dispatch management of operational and information complex (OIC), system of remote metering, telesignaling to the dispatch centers of the Company;

2.4. Optimization of schemes of normal mode of electrical grids operation;

2.5. Reduction of time of sub-optimal schemes operation of electricity distribution and supply by reducing the duration of repairing and restoration works;

2.6. Reduction of power consumption for subdivision's needs of the company;

2.7. Reduction of power consumption for the company's own needs;

2.8. Cleanout of lanes from underbrush and shrubs;

2.9. Other measures of reducing TLE for electricity transmission processes;

3. Technical measures:

3.1. Insulators upgrading;

3.2. Measurement of short circuit currents and changing inconsistent with standards switching devices and safety devices;

3.3. Bringing to standards of: contact connections, remote contact connections temperature control and insulation using thermal visions and pyrometers.

3.4. Instalation of longitudinal cross-reactive power compensation in electrical grids and reducing the higher harmonics level;

3.5. Introduction of automated systems of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants;

3.6. Implementation of new energy efficiency technical equipment, a description of the main measures is provided below:

3.6.1. Installation of circuit breakers that are able to conduct and switch on and switch off the current, switchers designed for occasional switches, and also to protect cables and end-users from overloading and short circuits. Brief description of equipment is listed below, and on equipment seller's site[1].

[1] http://www.abb.ua/

Fig. 3. Circuit breaker

Switchers consist of sequentially connected compression arc chutes, which are concluded in aluminum and / or steel containers. Switchers poles consist of sequentially connected compression arc chutes, spring-hydraulic drive, current transformers, constructed in factory and installed under the switcher hood and power supply terminals of the transformer control cabinet.

3.6.2. Installation of transformers, that have lower power losses and increased efficiency. Specifications of transformers are listed below, and on the equipment seller's site[2].

Figure 4. Transformer

Transformers are designed for electricity transformation in power networks and for supplying electricity to different consumers in AC networks.

Transformers are suitable for indoor and outdoor installation and for the following conditions:

- Altitude under 1000 m;

- In areas of mild and cold climates

- Operating temperature range is from -60 ° C to +40 ° C.

[2] http://www.uer.com.ua/Default.aspx

The transformers are able to regulate voltage with a regulation range of 5% of nominal voltage. Switching the transformer to another regulation level happens in non-operating condition.

Transformers are completed with:

- Thermometers (for transformer with capacity of 1000 kVA and above);

- Relay for visual control of the working substance, and also for the selection of samples thereof (for transformers with capacity of 1600 kVA and above);

- Facility for pumping in the longitudinal and transverse direction (for a transformer capacity of 1000 kVA and above);

- Contact clamps, to connect the transformer, from a lower voltage.

Transformers consist of active parts, coatings and a weld rectangular tank. On the cover there are inputs for high and low voltage.

3.6.3. Replacing of wires of overhead transmission lines from aluminum to steel-aluminum , steel-aluminum enforced. Specifications of overhead listed in Table 2 and on equipment seller's site[3].

Figure 5. Self-supporting insulated wire.

[3] tehtorg-sm.ru

Table 1. Characteristics of wires of overhead lines

Nominal cross section, mm^2	Diameter mm	DC at 20oC, Ohm / km	Efforts to rupture, H, not less	Weight, kg
10	4,5	2,76630	3790	43
16	5,6	1,800934	6220	65
25	6,9	1,1759	9300	100
35	8,4	0,7897	13500	148
50	9,6	0,60298	17110	195
70	11,4	0,42859	24130	276
95	13,5	0,30599	33370	385
120	15,2	0,24917	41520	471
150	16,8	0,19919	46310	554
150	17,1	0,19798	52280	599
185	18,8	0,15701	58080	705
185	18,9	0,16218	62060	728
240	21,6	0,12060	75050	921
240	21,6	0,12428	80900	952
240	22,4	0,12182	98250	1106
300	24,0	0,09747	90570	1132
300	24,1	0,09983	100620	1186
300	24,5	0,10226	126300	1313
500	29,4	0,06129	112550	1537
500	30,6	0,06040	148260	1852
600	33,2	0,05091	183840	2170
800	39,7	0,03586	260070	3092
1000	42,4	0,02936	224050	3210

3.6.4 Installation of glass and polymer insulators. Specifications of transformers are listed below, and on the equipment seller's site.

Figure 6. Glass insulator PSD70E[4]

[4] http://elfarfor.com.ua/

Figure 7. Polymer insulator [5]

The main specifications of polymer insulators:

Rated voltage of contact system, 27.5 kV

The test voltage of industrial frequency, not less, kV

- in the dry state 200

- in the rain 160

The level of interference at the test voltage of 30kV, max, 15 dB

Weight, not more than 2.7 kg

Materials

Insulating part - glass and plastic with ribbed protective shell of organic silicon rubber. Tops - steel, hot galvanized coating method.

3.6.5. Installing and modernization of towers of overhead power lines. Towers specifications are below, as well as on equipment seller's site.[6]

[5] http://izoplast.biz/izolator2.html

[6] http://www.enzp.ru/

Figure 8. Towers of overhead power lines

Table 2. Technical characteristics of towers of overhead power lines

Type	Height to the bottom of crossarm, m	Weight without zinc coating, kg	Weight with zinc coating, kg
Anchor angular towers for OL of 110 kW			
US110-7	10,5	7438	7729
US 110-7+5	15,5	9450	9819
US 110-7+9	19,5	11115	11550
US 110-7+14	24,5	14368	14930
US 110-8	10,5	12068	12540
Anchor angular towers for OL of 500 kW			
U1	17,0	14279	14837
U2	17,0	15315	15914
U2k	17,0	16490	17135

3.6.6. Replacement of meters with meters with a higher accuracy (meters of accuracy classes 0,2, 0,5, 1,0) the characteristics thereof is given in Table 3, the exterior appearance is shown in the Figure 9 and also on equipment seller's site[7]

Figure 9. Three-phase multi-tariff, multi-function energy meter

[7] www.telecard.odessa.ua

Table 3. Technical characteristics of three-phase multi-tariff, multi-function energy meters

Accuracy class	1,0; 0,5S; 0,2S
Rated current H5 (H6)	10A (40A)
Maximum current H5 (H6)	40A (100A)
Temperature range	from -40°C to +55°C
Thresholds of sensitivity	6,25 mA
System of self-diagnostics	availabe
Integration period, min	0.25, 0.5, 1, 3, 5, 10, 30, 60
Inspection interval	6 years

Purchase of equipment and components, as well as fulfilment of design and commissioning installation works carried out by contractors are organized on a competitive basis through tenders according to the established order in Ukraine. In addition to equipment prices and the cost of works - the main criterion for equipment selection is its quality and reliability, and for performers - professionalism and compliance with ISO 9001. Equipment suppliers are domestic and foreign manufacturers who have proven themselves in the energy sector.

Project milestones

Table 4. Schedule of reconstruction and modernization of the main-line electrical grids at NPC "Ukrenergo"

Main-line electrical grids system at NPC "Ukrenergo"									
Name of measures	Date of implementation								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
2. 1. Organizational measures of methodological support									
1.1.*									
1.2.									
1.3.									
1.4.									
1.5.									
1.6.									
1.7.									
1.8.									
2. Organizational and technical measures									
2.1.									
2.2.									
2.3.									
2.4.									
2.5.									
2.6.									
2.7.									
2.8.									

2.9.	
3. Technical measures.	
3.1.	
3.2.	
3.3.	
3.4.	
3.5.	
3.6.	
** - description of measures according to paragraphs 1.1.-1.8, 2.1.-2.9, 3.1.-3.6. see section A.4.2.*	

At the beginning of the project (May 2004) NPC "Ukrenergo" performed only measures aimed at maintaining electrical grids in operational condition. Basically, these measures included repairs to correct defects arising in the operation of electrical grids, as well as replacement of faulty old equipment by similar one, due to the cheapness of the latter. The project provides for the implementation of new energy-efficient equipment with consideration of the latest trends in the energy sector.

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:

The project aims at introducing measures to reduce energy losses in main-line electrical grids of NPC "Ukrenergo". Correspondingly the use of fossil fuels to produce electricity at power generating plants will reduce. Fuel savings will reduce GHG emissions.

There are several main reasons which make the implementation of the project without the mechanism of joint implementation unlikely to happen:

- No significant changes in the legislation of Ukraine in the energy sphere, which could force the company to give up the existing practices of operation, modernization and reconstruction of main-line electrical grids, are expected;
- Currently, there are no restrictions for Ukrainian enterprises regarding GHG emissions, and they are unlikely to be imposed by 2012;
- In the absence of the project additional, very risky, investments and financial risks associated with the operation of new equipment might have been avoided;
- According to Ukrainian legislation the company will not receive any financial benefits from reduced electricity losses during its transportation (more details are given in Section B2).

Most equipment that operated at that time in the grids of NPC "Ukrenergo" was already morally and physically obsolete, but because of insufficient funding and operational reserve of existing equipment, it could further be exploited. In addition, changing of the existing situation was possible on condition of not only changes of the technical provision of the grid, but also improvement of organizational structures, and this also required financial and human resources.

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

Table 5. Estimated amount of emission reductions before the first commitment period

	Years
Length of the crediting period	3
Years	Estimated annual emission reductions in tonnes of CO_2 equivalent
2005	20 217
2006	267 684
2007	261 769
Total estimated emission reductions over the crediting period of 2005-2007 (tonnes of CO_2 equivalent)	**549 670**
Annual average of estimated emission reductions over the crediting period of 2005-2007 (tonnes of CO_2 equivalent)	183 223

Table 6. Estimated amount of emission reductions during the first commitment period

	Years
Length of the crediting period	5
Years	Estimated annual emission reductions in tonnes of CO_2 equivalent
2008	389 711
2009	350 703
2010	357 715
2011	356 374
2012	356 374
Total estimated emission reductions over the crediting period of 2008-2012 (tonnes of CO_2 equivalent)	**1 810 877**
Annual average of estimated emission reductions over the crediting period of 2008-2012 (tonnes of CO_2 equivalent)	362 175

Table 7. Estimated amount of emission reductions after the first commitment period

	Years
Length of the crediting period	8
Years	Estimated annual emission reductions in tonnes of CO_2 equivalent
2013	356 374
2014	356 374
2015	356 374
2016	356 374
2017	356 374
2018	356 374
2019	356 374
2020	356 374
Total estimated emission reductions over the crediting period of 2013-2020 (tonnes of CO_2 equivalent)	**2 850 992**
Annual average of estimated emission reductions over the crediting period of 2013-2020 (tonnes of CO_2 equivalent)	356 374

More detailed information is given in the Accompanying Document 1.

Description of formulae used for preliminary estimation of emission reductions is given in Sections D.1.4.

A.5. Project approval by the parties involved:

National Environmental Investment Agency of Ukraine issued a Letter of Endorsement for the Joint Implementation project.
After analyzing the project, the PDD and Determination report will be submitted to the National Environmental Investment Agency of Ukraine to obtain a Letter of Approval.

SECTION B. Baseline

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

Dynamic baseline was chosen in accordance with JI Guidance on criteria for baseline setting and monitoring, version 02[8]. According to Guidelines for users of the JI PDD form, version 04, step by step approach was used for description and justification of selected baseline:

Step 1. Identification and description of the approach to establishing the baseline.

A specific approach based on the requirements of Joint Implementation in accordance with paragraph 9 (a) of JI Guidance on criteria for baseline setting and monitoring, Version 02 is used to describe and justify the baseline chosen in the project design documents.

The baseline is determined by the choice of the most plausible scenario from a list and by description of probable future scenarios based on conservative assumptions.
The following steps were applied to determine the most probable baseline scenario:
1. Identification of possible alternatives that could be baseline scenario
2. Justification of exclusion from consideration of alternatives, that are unlikely to take place from a technical and / or economic points of view

We've described and analyzed all alternatives and selected the most plausible thereof as the baseline scenario.

To establish the baseline and to further justify additionality in section B.2. we've directly took into account:
- State policy and applicable law in the energy sector;
- Economic situation in the energy sector in Ukraine;
- Technical aspects of management and operation of electrical grids;
- Availability of capital (including investment barriers), that are typical for NPC "Ukrenergo";
- Local availability of technology / equipment;
- Price and availability of fuel.

Step 2. Application of the chosen approach

Choosing the plausible baseline scenario is based on an assessment of alternative options for transportation of electrical energy, which potentially could have occurred at the beginning of 2004.
These options are the following alternatives:

Alternative 1.1: Continuation of the current situation, without JI project implementation.
Alternative 1.2: The proposed project activity without the use of Joint Implementation mechanism.
Alternative 1.3: Partial project activities (to implement not all project equipment) without the use of the Joint Implementation Mechanism.

The detailed analysis of each alternative is stated below.

Alternative 1.1
Continuation of existing practice with the introduction of minimum repairs on the background of the overall deterioration in electricity supply systems.
The state of the energy sector of Ukraine.

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

In the baseline period the state and tendencies of development of the energy sector of Ukraine were quite unsatisfactory. This was due to unsound principle of pricing for services ("Retail electricity tariffs for consumers"[9]) that does not ensure the development of business in power sector and inflow of investments into the sector (lack of cost-effective modernization)[10]. To change this situation National security and defense council of Ukraine analyzed and gave the decision of 5 June 2009 about "On the market development of energy resources within the Energy Strategy of Ukraine till 2030"[11], in this decision it described in detail the status of the State support of the development of the electricity sector.

The introduction of a new model of competitive electricity market in Ukraine is slower than it was provided for by the Concept of functioning and development of the wholesale electricity market of Ukraine, approved by the Cabinet of Ministers of Ukraine of 16 November 2002, # 1789, because the main efforts of the executive authorities and market players during 2003-2006, were aimed at creating certain pre-conditions stipulated by the Concept for transition to market bilateral sales contracts on electricity – ensuring of settlement payments for the consumption of electricity in full, partial solution to the problem of debt, implementing appropriate information systems, accounting systems and so on.

Under the existing model electricity market could not fully ensure effective competition among manufacturers and suppliers of electricity and formation of prices for electricity that would encourage energy companies to increase efficiency and increase investment in the energy sector. Neither existing market mechanisms, nor direct administrative measures ensured the necessary modernization of existing production facilities and power supply companies. A limited number of projects to upgrade and reconstruct power plants and power grids was accepted for execution. The situation is especially critical given the growth in the near future of need for shunting facilities, lack of which threatens the safe operation of power system of Ukraine. In recent years, the practice to solve the current economic problems by supporting certain categories of consumers and certain areas by means of the electricity industry through the mechanisms of cross-subsidies and benefits became popular. Unreasonable restraint of low tariffs for certain consumer groups, including the population, resulting in increased cross-subsidization of some consumers by consumers in other regions. In particular, the share of grant certificates in the wholesale price for electricity today is more than 25 percent and it continues to grow, that becomes an obstacle for introduction of economic instrumentsthat would regulate power market. Introduced in connection with the Order of the Cabinet of Ministers of Ukraine of 15 August 2005 № 745 "On the transition to unified tariffs on electricity sold to consumers" and deepen cross-subsidization with subsidy certificates are the economic barriers to implementation of new model of electricity market. Imperfect tariff policy also leads to increases in accounts payable of generating companies, causing their bankruptcy or non-transparent privatization. State investment programs in most cases are directed to the administrative and organizational implementation[12].

As described in National Electricity Regulation Commission of Ukraine (hereinafter - NERC) Order of 03.25.2002, № 289 "On approval of the report on the activities of NERC in 2001", the main causes of increased energy losses during its transportation to consumers are: low technical condition of grids; inconformity of electrical grids with existing levels of load, inconformity of a number of parameters of electricity with applicable standards of quality, shortcomings in the existing metering of electricity supplied to the electric grid and electricity consumed. Addressing the negative effects that cause energy losses in electric grids, requires considerable investments to modernize electrical systems and change existing metering systems of electricity consumed, practical implementation of which will help reduce both technological and above

[9] *http://www.nerc.gov.ua/control/uk/publish/article/main?art_id=33153&cat_id=32004*

[10] *http://www.er.energy.gov.ua/doc.php?p=1041*

[11] *http://www.rainbow.gov.ua/documents/243.html?PrintVersion*

[12] *http://www.ukrenergo.energy.gov.ua/ukrenergo/control/uk/publish/archive?&cat_id=33495&stind=1*

standard losses of electricity. Debt issues of the wholesale electricity market (WEM) subjects and issues of their imbalance arise when implementing measures on reduction of technical electricity losses.[13] There is a lack of conditions for the inflow of investments from both domestic and foreign investors.
This alternative is most probable baseline scenario as it:
- Allows you to transport electricity by means of existing facilities;
- Does not require investment in new equipment.

Accordingly, *Alternative 1.1* can be viewed as the most plausible baseline.

Alternative 1.2
The project activities without the use of joint implementation mechanism.
In this case there are two barriers: investment barrier (see more details in Section B2) because this scenario requires further substantial investment and has a very big payback period and high risks, so it is attractive for investors, and also technological barrier because the new equipment will require additional training of personnel. Reconstruction of equipment to improve energy efficiency is not a common practice in Ukraine. Comprehensive implementation of project activities will help reduce the loss of electricity during its transmission.
This alternative is the least probable scenario of the baseline as there is a need to invest in new technological equipment and it is characterized by lack of qualified personnel for servicing the equipment, therefore, *Alternative 2.1* can not be regarded as the probable baseline.

Alternative 1.3
Partial project activities (to implement not all project equipment) without the use of joint implementation mechanism.
Alternative 1.3 provides for elimination from the project boundary any not any key measures under the project, such as exclusion from the introduction of thermovision control, etc. However, the partial implementation of the measures will not achieve a considerable reduction in electricity in the main-line electrical grids, in addition *Alternative 1.3* requires requires invest in new technological equipment and it is characterized by lack of qualified personnel for servicing the equipment, therefore,
Alternative 1.3 may not be considered a probable baseline.

Analysis of the alternatives described above shows that *Alternative 1.1* is the most probable, and *Alternative 1.2* as well as *Alternative 1.3* are the least probable

Results of investment analysis (see Section B.2) showed that the *Alternative 1.2 and Alternative 1.3* could not be considered as the most attractive from a financial point of view. Substantiation of this conclusion is given in Section B.2.
As a results of the analysis made in accordance with "Tools for the demonstration and assessment of additionality "(Version 5.2) in the B2 show that the project scenario is additional.

Description of the baseline scenario

The base scenario assumes a continuation of existing practice with the introduction of minimum repairs on the background of the overall deterioration of electricity supply systems. In case the proposed project is not

[13] *http://www.ukrenergo.energy.gov.ua/ukrenergo/control/uk/publish/archive?cat_id=35046*

implemented electrical energy will still be transported with considerable losses in the grid. This is a common practice in Ukraine.

Determination of the baseline will be performed by a specific approach for joint implementation projects for each year when emissions trading will take place to adjust the volume of substituted fossil fuels which will show the volume of emissions of greenhouse gases in the project year in the absence of the JI project.
Details are given in Section D.1.

To determine the baseline the following indicators are used:

- $Q^{y}_{p,a,s}$ - Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario;
- $Q^{j}_{b,a,s}$ - Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario;
- $Q^{j}_{b,c,s}$ - Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario;
- $Q^{j}_{b,a,z}$ - Total volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario;
- $V^{j}_{b,z}$ - Total volume of electricity corona losses in the main-line electricity grid in period «j», in the baseline scenario;
- CEF - CO_2e emission factor for the united power system (UPS) of Ukraine.

$[y]$ - relates to the project scenario;
$[j]$ - relates to the baseline period (2001-2003);
$[b]$ - relates to the baseline scenario;
$[a]$ - relates to electricity coming into the main-line electrical grid;
$[c]$ - relates to electricity coming into the distribution electrical grid;
$[s]$ - relates to net volume of electricity;
$[z]$ - relates to total volume of electricity;

Baseline emissions are analysed in detail in **Sections D and E as well as in Appendix 2.**

Key information for baseline setting is stated in the tables given below:

Data/Parameter	$Q^{y}_{p,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-

	line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[14]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$Q^{j}_{b,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001p.**: 116 326 188 ths. kWh; **2002p.**: 117 791 973 ths. kWh; **2003p.**: 121 300 485 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
A/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine "On metrology and metrological activity"[15]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline

[14] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

[15] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	scenario

Data/Parameter	$Q^{j}_{b,c,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001**: 111 871 000 ths. kWh; **2002**: 113 442 000 ths. kWh; **2003**: 116 945 000 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
QA/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[16]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Дані / Параметр	$Q^{j}_{b,a,z}$
Одинця виміру	ths. kWh
Опис	Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario
Періодичність виміру/ моніторингу	Daily
Джерело даних що було (буде) застосоване	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Значення даних (для ex-ante обчислень/визначень)	**2001р.**: 188 501 337 ths. kWh; **2002р.**: 191 268 209 ths. kWh; **2003р.**: 196 313 390 ths. kWh
Підтвердження вибору даних або	To determine the volume of electricity that came into the main-line

[16] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

опис методу і процедур вимірювання що були (будуть) застосовані	electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
Процедури управління якості / забезпечення якості вимірів, що були (будуть) застосовані	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[17]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Коментарі	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$V_{b,z}^{j}$
Data unit	ths. kWh
Description	Total volume of electricity corona losses in the main-line electricity grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Monthly
Source of data (to be) used	Monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001**: 923 048 ths. kWh; **2002**: 835 545 ths. kWh; **2003**: 781 250 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Values were determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog. Detailed description and example of calculation are given in appropriate branch normative and technical documents: - "Methodology for Determination of energy losses in transformers and power lines", approved by the Deputy Minister of Energy sector of Ukraine, the chief state inspector of Ukraine on Energy Oversight V.A. Darchuk on February 18, 1998[18]; - Methods of preparation of electricity balance structure in electric power networks, analysis of its components and ratioing of electricity technological losses. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p. [19]
QA/QC procedures (to be) applied	Calculations were made using officially approved methods and programs. "Departmental Reporting Form 1B-TBE DAEK electricity balance structure and electricity technological losses

[17] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

[18] http://www.uazakon.com/big/text957/pg1.htm

[19] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

	(ETL) during transmissioning in electric power networks" was made up monthly and approved at the state level by National Electricity Regulation Commission of Ukraine.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	CEF
Data unit	tCO_2/MWh
Description	Carbon emission factor when electricity is generated for the national power grid of Ukraine
Time of determination/monitoring	Annually
Source of data (to be) used	Carbon dioxide emission factors for 2005 are taken from the document "Operational Guidelines for Project Design Documents of Joint Implementation Projects Volume 1: General guidelines" (ERUPT) [20] - Carbon dioxide emission factors for 2006-2007 are taken from the document "Carbon dioxide emission factors (for energy consumption according to the methodology "Ukraine - Assessment of new calculation of CEF", approved by TUV SUD 17.08.2007) [21]; - Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine (hereinafter - NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[22]"; - Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009" [23]; - Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide emission factors in 2010"[24]; - Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[25];
Value of data applied (for ex ante calculations/determinations)	**2005**: 0,740; **2006-2007**: 0,807; **2008**: 1,055; **2009**: 1,068; **2010**: 1,067; **2011**: 1,063
Justification of the choice of data or description of measurement methods and procedures (to be) applied	When developing the joint implementation project national carbon dioxide emission factors are used, in case of their absence factors for 2005 are taken from ERUPT, factors for 2006-2007 are taken form the document carbon dioxide emission factor approved TUV SUD
QA/QC procedures (to be) applied	Only officially approved factors are used for calculations.

[20] http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/index.html

[21] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514

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

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

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

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

Any comment	Researches don't take into consideration production of energy by nuclear power plants

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:

Anthropogenic emissions of greenhouse gases in the project scenario will decrease due to complex modernization of electricity grids through the implementation of the technologies proposed in the project activity as described above, including:

- Modernization and rehabilitation works in electrical grids and introduction of new energy efficient equipment;

- Improvement of the reliability of electricity supply to electricity consumers;

- Introduction of automated systems of electricity consumption commercial records (ASECCR) in the perimeter of energy supply company, ASECCR of consumers and subplants;

- Introduction of a complex Program on technical losses of electricity decrease;

- Modernization of existing facilities within investment programs of electrical grids development.

Additionality of the project

The additionality of the project activity is demonstrated and assessed by using the "Tool for the demonstration and assessment of additionality" [26] (Version 05.2). This manual was elaborated in original for CDM projects, but it may be also applied to JI projects.

STEP 1. Identification of alternatives to the project activity and their conformity with current laws and regulations

Step 1a: Define alternatives to the project activity

There are three alternatives to this project. (that were described in Section B1)

Alternative 1.1: Continuation of the current situation, without JI project implementation.

Alternative 1.2: The proposed project activity without the use of Joint Implementation mechanism.

Alternative 1.3: Partial project activities (to implement not all project equipment) without the use of the Joint Implementation Mechanism.

Conclusion on Step 1a: Three realistic alternatives to the project activity were identified.

Step 1b: Consistency of the alternatives with mandatory laws and regulations

Alternative 1.1: Existing legal documents do not obligate NPC "Ukrenergo" to pursue the modernization of electricity main-line electrical grids. According to the Law of Ukraine "On Electric Energy Sector"[27] Article 5. *State policy in the energy sector is based on following principles:*

[26] *http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf*

[27] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=575%2F97-%E2%F0

- Regulation of activities in the energy sector;
- Creating conditions for safe operation of power facilities;
- To ensure efficient consumption of fuel and energy;
- Adherance to uniform state regulations and standards by all subjects of relations connected with the production, transmission, supply and use of energy;
- Creating conditions for development and improvement of the technical level of energy sector;
- Improvement of the environmental safety of energy facilities;
- Protection of the rights and interests of consumers of energy;
- Maintaining of the integrity and ensurance of the safe and efficient operation of unified power system of Ukraine, unified dispanch control (operational and technological) thereof;
- Promotion of a competitive market for electricity;
- Providing training to prepare qualified specialists for energy sector;
- Creating conditions for prospective scientific research;
- Ensuring a stable financial state of energy sector;
- Ensuring accountability of energy suppliers and consumers.

The current practice of reducing losses in the main-line electrical grid complies with all applicable laws and regulations of Ukraine. The legislation allowed for the losses in the electrical mains. Standards set only the frequency with which energy supplying organizations must carry out calculation of regulatory power losses in the electrical grid. Monitoring of compliance with regulations is made by the calculation of normative losses once a year.

Alternative 1.2: Reconstruction and modernization without the JI mechanism is consistent with mandatory laws and regulations, detailed analysis of consistency with the law was made for *Alternative 1.1,* which is similar to consistency mandatory laws and regulations for *Alternative 1.2.*

Alternative 1.3: Reconstruction without the use of JI mechanism and with the exclusion of some key project activities is in line with mandatory laws and regulations, detailed analysis of consistency with the law was made for *Alternative 1.1,* which is similar to consistency mandatory laws and regulations for *Alternative 1.3.*

Conclusion on Step 1b: Under such conditions one may say that all scenarios don't contradict with current laws and regulatory acts. Hence, the Step 1 is satisfied.

According to the document the "Tool for the demonstration and assessment of additionality" [28] (Version 05.2) further justification of additionality is used by means of investment analysis.

STEP 2. Investment analysis

Step 2a: Determine appropriate analysis method

According to the art. 191 of the Civil Code of Ukraine[29] state (communal) fixed prices (tariffs) shall be established for products (services) that are manufactured by business entities-monopolists and are of great social importance for population. By virtue of the authority granted by the Law of Ukraine "On Electric Energy Sector"[30] and the Order of the President of Ukraine as of 14.03.95 № 213/95 "On measures to support the activity of the National Commission for Electric energy Regulation of Ukraine "[31], National Electricity

[28] *http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf*

[29] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=436-15&p=1302268052983958

[30] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=575%2F97-%E2%F0

[31] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=213%2F95

Regulation Commission of Ukraine forms and ensures the implementation of unified state policy for development and operation of the wholesale electricity market, carries out price and tariff policy in the electricity sector. According to the Resolution of the Cabinet of Ministers of Ukraine of 15.08.2005 № 745 "On the transition to unified tariffs for electric energy that is released to consumers"[32], Resolution of the NERC of Ukraine of 10.03.1999 № 309 "On electricity tariffs, which is released to the population and settlements"[33] (Edition: № 343 of March 17, 2011.), Resolution of NERC of Ukraine of 22.01.2001 № 47 "On approval of the procedure for formation of retail tariff for electricity to consumers (except population and population settlements) by the licensees that supply electricity at regulated rates"[34] national tariffs for households and settlements, the tariffs that consider threshold levels for legal entities, limits of tariff zones are established. The components of the tariff are a wholesale price, average price for the purchase electricity, tariff for the supply of electricity, tariff for electricity transmission and standard technical electricity losses in grids. The main component is the rate of technical losses. Rate setting of electricity technological losses in the electricity transmission power grids (TPG) is based on the balance of power in the previous year according to the reporting forms and technical data base of electricity grids.
The procedure for the approval of standardized technical losses for the company provides for:

a) calculation of the standardized technological energy losses in electricity grids of NPC “Ukrenergo”;
b) verification of calculations by JSC “LvivORHRES" and JSC "DonORHRES”;
c) the approval of the prime data and the results of calculations of standardized technological losses of electricity in NPC “Ukrenergo” ower distribution companies with the Ministry of Energy;
g) approval of standardized technological losses of electricity by NERC after following procedures "a", "b" and "c".

Rate setting of technological electricity losses should be implemented according to guidelines "Rate setting of technological electricity losses in transmission grids. Calculation of standardazed values of losses differs from the calculation of technical losses because the standardized characteristics apply not factual but standardized values of regime parameters, including: medium operating voltage electricity, the rate of uneven load distribution in phases, nominal frequency etc. When formating retail electricity prices the electricity losses, which are determined using the regime parameters outside the standardized values, are not used. According to NERC regulations of 25.05.2006 № 654 "On approval of the procedure for filing, determination and approval of economic factors of standardized technical electricity losses"[35] decisions on compensation or absence of compensation to a licensee for loss of electricity by distribution third-party organizations, is made by NERC following discussion with stakeholders and formalization of a protocol. Compensation of standardized electricity technical losses is carried out by their consideration in the determining of the electricity supply to the grids of the licensee to transfer to other licensees.

Thus, NPC “Ukrenergo” has no right to set prices (tariffs) for services provided: transmission and supply of electricity and due to the existing Procedure for the tariffs for electricity transmission and supply formation, reducing energy losses will not bring any additional income to the enterprise as reducing electricity losses, according to this procedure leads to a reduction of the level of standardized losses and absence of compensation from the state.
Since the Project does not bring any other financial or economic benefits, but for the revenue from the Project, which can be obtained under the mechanism established by Article 6 of the Kyoto Protocol to the UN Framework Convention on Climate Change, to come to the conclusion that the proposed implementation of

[32] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=745-2005-%EF

[33] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0151-99

[34] http://www.nerc.gov.ua/control/uk/publish/article?showHidden=1&art_id=100901&cat_id=34446

[35] http://www.nerc.gov.ua/control/uk/publish/article/main?art_id=45694&cat_id=34446&

the project is less economically feasible in the absence of such revenue, according to the additionality tool, a simple cost analysis is used.

All project activities require large investments. Without ERU selling the project will not be economically feasible for the Applicant, that makes it impossible to implement most of the activities. More cost-effective and realistic scenario without selling CO_2 credits is the baseline scenario of very slow reconstruction. However, taking into account the degradation of the whole system and reduced efficiency at other facilities, the total actual emissions of the Applicant will stay at the same level. This scenario is less attractive in terms of environment in the future (including the period of 2004-2012), when Applicant's emissions will be at the same or even higher level, but from an economic point of view such scenario is more attractive. Accelerated implementation of the project activities not only requires high costs, but also provides significant reductions of greenhouse gases, and proves that the project is additional.

The following steps have been made according to the additionality tools of the CDM Executive Committee "Tool for the demonstration and assessment of additionality[36]" (version 05.2).

Step 2b Alternative I. Application of simple cost analysis

Project implementation will require costs in addition to existing costs for modernization of the electricity supply system. Additional costs of Project implementation include the costs of:

- Modernization and rehabilitation works in electrical grids and introduction of new energy efficient equipment;
- Improvement of the reliability of electricity supply to electricity consumers;
- Introduction of automated systems of electricity consumption commercial records (ASECCR) in the perimeter of energy supply company, ASECCR of consumers and subplants;
- Introduction of a complex Program on technical losses of electricity decrease;
- Modernization of existing facilities within investment programs of electrical grids development.

Expenses as to implementation and realization of the "Reconstruction and modernization of main-line electrical grids of NPC "Ukrenergo" consist of:

- Organisational measures, EUR 138 623 383;
- Technical measures, EUR 231 222 203;
- Consulting, personnel trainin, other activities, EUR 97 036 368;
- Other expenses, EUR 41 587 015;

Total amount to be spent EUR 508 468 969;

Equipment used in this project is the best in terms of Efficiency Factor, quality of execution and applied technical solutions among the materials and equipment available on Ukrainian market. Availability of spare parts in Ukraine was an important parameter of equipment selection.

As a result of current practice all losses of electric energy are borne by end consumers that is why NPC "Ukrenergo" has not incentive to introduce power efficient equipment.

At the moment of the project's beginning the company uses old equipment manufactured mainly in the USSR.

Application of Kyoto mechanisms to this project makes these measures economically efficient and is the only way for their implementation.

[36] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

As emission reduction does not bring any economic benefit to NPC "Ukrenergo", except for the benefit achieved under the Joint Implementation Project (JIP), we can make a conclusion that Project implementation without receiving proceeds under the JI project is impossible as there appear obstacles for investments.

Conclusion on Step 2b:
In connection therewith it is obvious that this project is economically unattractive without registration of the project as JI project, which proves additionality of this project.
Therefore Step 2 is satisfied.

STEP 4: Common practice analysis

Step 4a. Analysis of other alternatives similar to proposed project activities

Analysis of project activity similarity demonstrated absence of similar projects in Ukraine.
Existing practice of equipment maintenance represented in the variant of baseline chosen for this Project is customary for Ukraine. Due to current practice all losses of electric energy are borne by end consumers; that is why the companies engaged in electricity supply don't have incentives for energy effective projects implementation.
Conclusion on Step 4a: As there are no similar projects in Ukraine, there is no need to make analysis of other alternatives similar to proposed project activities.
According to "Tool for the demonstration and assessment of additionality[37]" (version 05.2) all steps are satisfied, but still there are some obstacles.

One of these obstacles is additional costs of Project implementation on:

- Modernization and rehabilitation works in electrical grids and introduction of new energy efficient equipment;
- Improvement of the reliability of electricity supply to electricity consumers;
- Introduction of automated systems of electricity consumption commercial records (ASECCR) in the perimeter of energy supply company, ASECCR of consumers and subplants;
- Introduction of a complex Program on technical losses of electricity decrease;
- Modernization of existing facilities within investment programs of electrical grids development.

The obstacle is connected with the structure of existing tariffs for electric energy; they are regulated by the state and don't take into consideration amortization and investment needs of electric energy suppliers. This situation leads to a constant shortage of funds and inability to timely complete major repairs, provide equipment operation, investment in modernization and development.

Also due to financial problems, repair works have been carried out not in full recently, and aimed mostly to maintain equipment in working condition, without taking into account economic performance. At the same time, many equipment units require replacement. Given the complexity of the implementation of the new highly effective energy saving equipment qualifications of staff may be insufficient . To overcome this obstacle training of employees is required.

NPC "Ukrenergo" has no experience in managing the implementation of JI projects, including: international negotiations, deremination, verification, registration, monitoring etc.

[37] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

We can make a conclusion that the abovementioned facts may prevent implementation of the proposed project as well as other alternatives - reconstruction without the use of JI mechanism and reduction of project activities with the exception of any project key activities.
However one of the alternatives is continuation of "business as usual". Since the obstacles identified above directly relate to investment into modernization of the electrical grids, NPC "Ukrenergo" doesn't have any obstacles for subsequent exploitation of grids at the previous level. Therefore the identified obstacles can not impede introduction of at least one alternative scenario – continuation of «business as usual».

CONCLUSION
Based on the above analysis one may make a conclusion that the proposed project is additional.

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

Equipment that is included in the project boundaries is provided in the table:

Parameter	Data unit	Total
Total length of electrical grids:	**km**	**21285,406**
800 kV	km	98,54
750 kV	km	4120,541
500 kV	km	374,76
400 kV	km	338,95
330 kV	km	12784,757
Total power of transformers:	**MVA**	**77582,6**
220 kV	MVA	9644,2
330 kV	MVA	47963,4
400 kV	MVA	1609
500 kV	MVA	1753
750 kV	MVA	16613
Total amount of substantions:	**unit**	**133**
220 kV	unit	34
330 kV	unit	87
400 kV	unit	2
500 kV	unit	2
750 kV	unit	8

Sources of greenhouse gases and boundaries of the baseline scenario

Electricity transportation in the main-line electrical grids to the distribution electrical grids is associated with the following GHG emissions:
• CO_2 - as a result of electricity losses during thransportation that was obtained in the process of fossil fuel combustion at heat power plant.
Table 8. The table below shows an overview of all sources of emissions in the baseline scenario

Source of emissions	Emissions	Included or excluded	Explanations
Baseline emissions			
Combustion of fossil fuel at heat power plants	CO_2	Included	Only CO_2 emissions due to electricity losses in the grid

Sources of greenhouse gases and boundaries of the project scenario

Figure 9 shows the boundaries of the project scenario (outlined with blue line)

Table 9. The table shows an overview of all sources of emissions in the project scenario

Source of emissions	Emissions	Included or excluded	Explanations
Activity under the project			
Combustion of fossil fuel at heat power plants	CO_2	Included	Only CO_2 emissions due to electricity losses in the grid

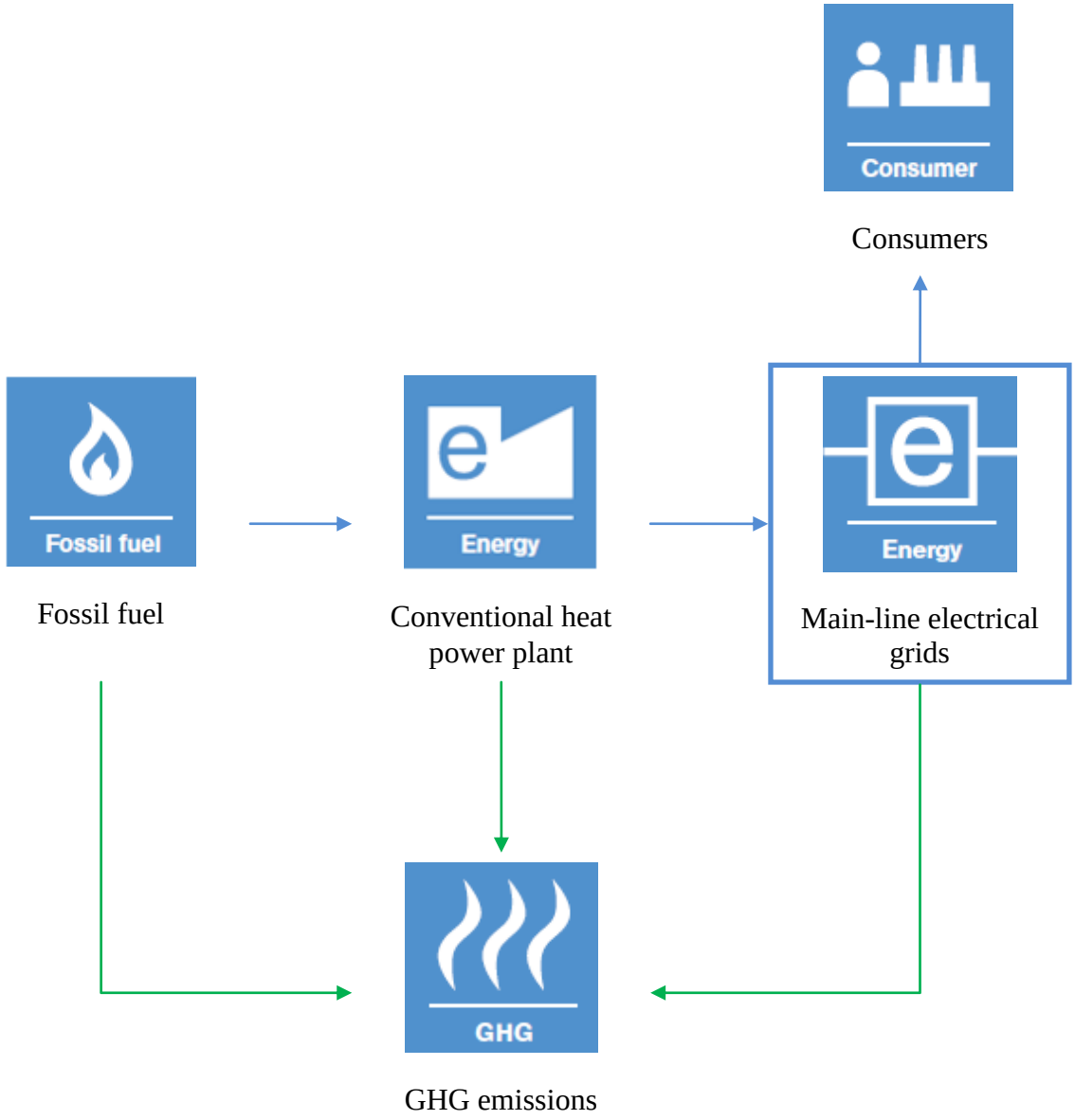

Figure 9. The scheme of boundaries for the project scenario

Currently in the energy sector, hexafluoride circuit breakers and current transformers are used to transport electric energy in high voltage main-line electricity grids.
They are characterized by high reliability, durability, simplicity of construction and installation as well as safety. A distinquishing feature of hexafluoride circuit breakers and current transformers is the fact that sulfur hexafluoride (electrical and technical gas) fulfils the function of arc control and heat insulating medium. Sulfur hexafluoride (SF_6) is a greenhouse gas whose density under normal conditions is five times higher than density of air.
Since this equipment provides for a system of leak-proofness control and equipment manufacturers guarantee its smooth operation for 25 years, we can conclude that leakages of SF_6 are absent and excluded from the project boundaries.
Indirect extraneous leakage of CO_2, CH_4, N_2O from fuel production and its transportation are excluded. Leakages are not controlled by the project's developer (it is impossible to estimate quantity of leakages), due to this they were excluded.

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 determination: 15/06/2011
Baseline was determined by VEMA S.A., the project developer, and NPC "Ukrenergo"

State Entity National Power Company "Ukrenergo"
Timchenko Vitaliy Grygorovych
Acting director
Telephone: +38 (044) 238-32-64
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E-mail: kanc@nec.energy.gov.ua
State Entity National Power Company "Ukrenergo" is the project participant (stated in Annex 1).

VEMA S.A.:
Kyiv, Ukraine.
Fabian Knodel,
Director
Telephone: +38 (044) 594 48 10
Fax: +38 (044) 594 48 19
e-mail: info@vemacarbon.com
VEMA S.A. is the project participant (stated in Annex 1).

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

25/12/2003 - NPC "Ukrenergo" management made a decision on the start of implementation of JI project at the company.

C.2. Expected operational lifetime of the project:

May 1, 2004 – December 31, 2020 (16 years and 7 months (199 months) on condition of proper maintenance

C.3. Length of the crediting period:

01/01/2005 – 31/12/2007 (3 years or 36 months), continuation 01/01/2008- 31/12/2012 (5 years or 60 months), continuation 01/01/2013- 31/12/2020 (8 years or 96 months)

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The proposed project uses a specific approach for JI projects on the basis of Guidance on criteria for baseline setting and monitoring, version 2 JISC (Joint Implementation Supervisory Committee – JISC[38]) which meets the requirements of Decision 9/CMP.1, Appendix «B» «Criteria for setting the baseline and monitoring". The monitoring plan is designed for accurate and clear greenhouse gas emissions measurements and calculation and conducted according to practices established at NPC "Ukrenergo" to measure the transmitted and consumed electricity. Monitoring of the project does not require changes in existing metering and data collection system. All relevant data are calculated and recorded and will be stored within two years after emission reduction units generated by the project are delivered.

The actual loss of electricity during its transmission has four components[39] and is equal to the difference between electricity which is supplied into the main-line electrical grid, and electricily that comes into the distribution electrical grid.

1. Technical losses of electricity are caused by physical processes that occur during its transmission electricity grids and are expressed by converting its part to heat in the element of grid;
2. Consumption of electricity for company's own substations is needed to ensure the operation of technical equipment of substations;
3. The loss of electricity is caused by the test equipment and tools (instrumental losses);
4. Higher than standard losses are caused by the theft of electricity, disparity of payment by consumers, delayed payments, non-payment of bills and other causes. In regard to the specifics of transporting electricity to the electricity distribution grids over-norm electricity losses in the main-line grids are absent;

There are also corona active power losses (corona discharge) in the overhead lines of EHV. These losses depend largely on weather conditions (in dry weather the losses are lower and in rain or snow, these losses increase) and splitting of wire in phases of line. As the corona discharge depends on the tension on the surface of wire, splitting of phases is applied to reduce this tension in the overhead lines of EHV. So instead of one wire two or more wires are used in phase. These wires are situateded at equal distance from each other. Thus the equivalent radius of split phase reduces the tension on a separate wire, which in turn reduces the corona loss.

Calculation of electricity losses is elaborated quarterly by NPC "Ukrenergo" with preparing of an electricity balance of technological electricity losses "1B-TVE"

Calculation of "1B-TVE" balance is based on following legal and technical documents:

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

[39] Zhelezko U. Rate setting of technological losses of electricity in grids – new calculation methodology. / / Electric technology news. Informational edition. № 5 (23), 2003.

- "Methods of determining the energy losses in transformers and electrical grids" approve by Deputy of Minister of energy sector in Ukraine, chief state inspector of Ukraine on elergy supervision, V.A. Darchuk on February 18, 1998[40];
- Technical requirements for automated systems of commercial accounting of the wholesale electricity market of Ukraine Annex 7 (4) to the Agreement Between the Members of the Wholesale Electricity Market of Ukraine.: Kyiv, 2005[41];
- The concept of building automation systems of accounting electric power in energy market. – Approved by a joint order of Ministry of Energy, NERC, State Committee for State Standard, State Building and State industrial policy of Ukraine of 17.04.2006 № 32/28/28/276/75/54 - Kyiv[42];
- Methods of compiling the balance of power structure in electrical networks of 0.38-150 kW, analysis of its components and electricity technological losses rate setting. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p[43].

Thus the monitoring plan includes a set of activities (metering, maintenance, registration and calibration) which must be carried out to satisfy the requirements of the chosen monitoring methodology and ensure the possibility to verify calculations of GHG emission reductions. The main stages of the monitoring plan is described below.

Data and parameters that are not controlled during the crediting period but are identified only once and are available at the PDD development stage:

$Q_{b,a,s}^{j}$	Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario (ths. kWh)
$Q_{b,c,s}^{j}$	Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario (ths. kWh)
$Q_{b,a,z}^{j}$	Total volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario (ths. kWh)
$V_{b,z}^{j}$	Total volume of electricity corona losses in the main-line electricity grid in period «*j*», (ths. kWh)

[40] http://www.uazakon.com/big/text957/pg1.htm

[41] http://www.er.gov.ua/doc.php?f=27

[42] http://forca.com.ua/instrukcii/energonaglyad/koncepciya-pobudovi-avtomatizovanih-sistem-obliku-elektroenergii-v-umovah-energorinku.html

[43] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

$[j]$ - relates to the baseline period (2001-2003);
$[b]$ - relates to the baseline scenario;
$[a]$ - relates to electricity coming into the main-line electrical grid;
$[c]$ - relates to electricity coming into the distribution electrical grid;
$[s]$ - relates to net volume of electricity;
$[z]$ - relates to total volume of electricity;

Data and parameters that are not controlled during the crediting period but are identified only once and are not available at the PDD development stage: none

Data and parameters that are controlled during the crediting period:

$Q^{y}_{p,a,s}$	Net volume of electricity coming into the main-line electrical grid in period «*y*» (ths. kWh)
$Q^{y}_{p,c,s}$	Net volume of electricity coming into the distribution electrical grid in period «*y*», in the project scenario (ths. kWh)
$Q^{y}_{p,a,z}$	Total volume of electricity coming into the main-line electrical grid in period «*y*» (ths. kWh)
$V^{y}_{p,z}$	Total volume of electricity corona losses in the main-line electricity grid in period «*y*», (ths. kWh)
CEF	CO_{2e} emission factor for the unified power grid of Ukraine for the period "y" (tCO_2/MWh)

$[y]$ - relates to the project period;
$[p]$ - relates to the project scenario;
$[a]$ - relates to electricity coming into the main-line electrical grid;
$[c]$ - relates to electricity coming into the distribution electrical grid;
$[s]$ - relates to net volume of electricity;
$[z]$ - relates to total volume of electricity;

Table of parameters that will be included in the process of monitoring and examination for ERU calculation are given in Sections **D.1.1.1** and **D.1.1.3.**

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:

Data/Parameter	$Q^{y}_{p,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[44]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.

[44] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$Q^{y}_{p,c,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the distribution electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[45]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

[45] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

Data/Parameter	$Q^{y}_{p,a,z}$
Data unit	ths. kWh
Description	Total volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[46]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$V^{y}_{p,z}$
Data unit	ths. kWh
Description	Total volume of electricity corona losses in the main-line electricity grid in period «*y*», in the project scenario
Time of	Monthly

[46] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

determination/monitoring	
Source of data (to be) used	Monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Values were determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog. Detailed description and example of calculation are given in appropriate branch normative and technical documents: - "Methodology for Determination of energy losses in transformers and power lines", approved by the Deputy Minister of Energy sector of Ukraine, the chief state inspector of Ukraine on Energy Oversight V.A. Darchuk on February 18, 1998[47]; - Methods of preparation of electricity balance structure in electric power networks, analysis of its components and ratioing of electricity technological losses. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p. [48]
QA/QC procedures (to be) applied	Calculations were made using officially approved methods and programs. "Departmental Reporting Form 1B-TBE DAEK electricity balance structure and electricity technological losses (ETL) during transmissioning in electric power networks" was made up monthly and approved at the state level by National Electricity Regulation Commission of Ukraine.
Any comment	Data which allows to calculate the GHG emissions in the project scenario

[47] http://www.uazakon.com/big/text957/pg1.htm

[48] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

Data/Parameter	*CEF*
Data unit	tCO_2/MWh
Description	Carbon emission factor when electricity is generated for the national power grid of Ukraine
Time of determination/monitoring	Annually
Source of data (to be) used	Carbon dioxide emission factors for 2005 are taken from the document «Operational Guidelines for Project Design Documents of Joint Implementation Projects Volume 1: General guidelines" (ERUPT) [49] - Carbon dioxide emission factors for 2006-2007 are taken from the document "Carbon dioxide emission factors (for energy consumption according to the methodology "Ukraine - Assessment of new calculation of CEF", approved by TUV SUD 17.08.2007) [50]; - Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine (hereinafter - NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[51]"; - Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009" [52]; - Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide emission factors in 2010"[53]; - Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[54];

[49] http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/index.html

[50] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514

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

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

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

Value of data applied (for ex ante calculations/determinations)	2005: 0,740; 2006-2007: 0,807; 2008: 1,055; 2009: 1,068; 2010: 1,067; 2011: 1,063
Justification of the choice of data or description of measurement methods and procedures (to be) applied	When developing the joint implementation project national carbon dioxide emission factors are used, in case of their absence factors for 2005 are taken from ERUPT, factors for 2006-2007 are taken form the document carbon dioxide emission factor approved TUV SUD
QA/QC procedures (to be) applied	Only officially approved factors are used for calculations.
Any comment	Data which allows to calculate the GHG emissions in the project scenario

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 of the project, according to the actual monitoring values (calculated for a specific approach for Joint Implementation):

$$PE_p^y = ((Q_{p,a,s}^y - Q_{p,c,s}^y) - V_{p,s}^y) * \tilde{N}EF \quad (1)$$

PE_p^y - GHG emissions from burning of fossil fuels for production of electricity that is lost in the main-line electrical grids in period «*y*» under the project scenario, (tCO_{2e});

$Q_{p,a,s}^y$ Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario (ths. kWh)

$Q_{p,c,s}^y$ Net volume of electricity coming into the distribution electrical grid in period «*y*», in the project scenario (ths. kWh)

CEF - CO_{2e} emission factor for the unified power grid of Ukraine for the period "y" (tCO_2/MWh);

$V_{p,s}^y$ - Net volume of electricity corona losses in the main-line electricity grid in period «*y*», in the project scenario, (ths. kWh)

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

$$V_{p,s}^{y} = \frac{Q_{p,a,s}^{y} * V_{p,z}^{y}}{Q_{p,a,z}^{y}} \quad (2)$$

$Q_{p,a,z}^{y}$ - Total volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario (ths. kWh)

$V_{p,z}^{y}$ - Total volume of electricity corona losses in the main-line electricity grid in period «*y*», in the project scenario, (ths. kWh)

$[y]$ - relates to the project period;
$[p]$ - relates to the project scenario;
$[a]$ - relates to electricity coming into the main-line electrical grid;
$[c]$ - relates to electricity coming into the distribution electrical grid;
$[s]$ - relates to net volume of electricity;
$[z]$ - relates to total volume of electricity;

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:

Data/Parameter	$Q_{p,a,s}^{y}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the

	transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[55]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the project scenario

Data/Parameter	$Q^{j}_{b,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period

[55] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

measurement methods and procedures (to be) applied	(«j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
A/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[56]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$Q^{j}_{b,c,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of

[56] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

procedures (to be) applied	determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
QA/QC procedures (to be) applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[57]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Дані / Параметр	$Q^{j}_{b,a,z}$
Одинця виміру	ths. kWh
Опис	Total volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario
Періодичність виміру/ моніторингу	Daily
Джерело даних що було (буде) застосоване	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Значення даних (для ex-ante обчислень/визначень)	N/A
Підтвердження вибору даних або опис методу і процедур вимірювання що були (будуть) застосовані	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers

[57] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
Процедури управління якості / забезпечення якості вимірів, що були (будуть) застосовані	Measurements are performed by regularly calibrated and verified meters according to quality management procedure "On metrology and metrological activity"[58]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Коментарі	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$V_{b,z}^{j}$
Data unit	ths. kWh
Description	Total volume of electricity corona losses in the main-line electricity grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Monthly
Source of data (to be) used	Monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Values were determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog. Detailed description and example of calculation are given in appropriate branch normative and technical documents: - "Methodology for Determination of energy losses in transformers and power lines", approved by the Deputy Minister of Energy

[58] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	sector of Ukraine, the chief state inspector of Ukraine on Energy Oversight V.A. Darchuk on February 18, 1998[59]; - Methods of preparation of electricity balance structure in electric power networks, analysis of its components and ratioing of electricity technological losses. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p. [60]
QA/QC procedures (to be) applied	Calculations were made using officially approved methods and programs. "Departmental Reporting Form 1B-TBE DAEK electricity balance structure and electricity technological losses (ETL) during transmissioning in electric power networks" was made up monthly and approved at the state level by National Electricity Regulation Commission of Ukraine.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	*CEF*
Data unit	tCO_2/MWh
Description	Carbon emission factor when electricity is generated for the national power grid of Ukraine
Time of determination/monitoring	Annually
Source of data (to be) used	Carbon dioxide emission factors for 2005 are taken from the document «Operational Guidelines for Project Design Documents of Joint Implementation Projects Volume 1: General guidelines" (ERUPT) [61] - Carbon dioxide emission factors for 2006-2007 are taken from the document "Carbon dioxide emission factors (for energy

[59] http://www.uazakon.com/big/text957/pg1.htm

[60] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

[61] http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/index.html

<table>
<tr><td></td><td>consumption according to the methodology "Ukraine - Assessment of new calculation of CEF", approved by TUV SUD 17.08.2007) [62];
- Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine (hereinafter - NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[63]";
- Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009" [64];
- Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide emission factors in 2010"[65];
- Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[66];</td></tr>
<tr><td>Value of data applied
(for ex ante calculations/determinations)</td><td><table>
<tr><th>2005</th><th>2006-2007</th><th>2008</th><th>2009</th><th>2010</th><th>2011</th></tr>
<tr><td>0,740</td><td>0,807</td><td>1,055</td><td>1,068</td><td>1,067</td><td>1,063</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>When developing the joint implementation project national carbon dioxide emission factors are used, in case of their absence factors for 2005 are taken from ERUPT, factors for 2006-2007 are taken form the document carbon dioxide emission factor approved TUV SUD</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Only officially approved factors are used for calculations.</td></tr>
<tr><td>Any comment</td><td>Researches don’t take into consideration production of energy by nuclear power plants</td></tr>
</table>

[62] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514

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

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

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

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

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

$$BE_b^y = (Q_{p,a,s}^y * PPER * \tilde{N}EF) \quad (3)$$

BE_b^y - GHG emissions from burning of fossil fuels for production of electricity that is lost in the main-line electrical grid in period «*y*» under the baseline scenario,(tCO_2e);

$Q_{p,a,s}^y$ - Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario (ths. kWh);

$PPER$ - Pre-project efficiency ratio of the electricity grid for the period «j», in the baseline scenario;

CEF - Carbon CO_{2e} emission factor for the unified power grid of Ukraine for the period "y" (tCO_2/MWh).

$$PPER = \frac{\sum\left(\frac{((Q_{b,a,s}^j - Q_{b,c,s}^j) - V_{b,s}^j)}{Q_{b,a,s}^j}\right)}{3} \quad (4)$$

$Q_{b,a,s}^j$ Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario (ths. kWh);

$Q_{b,c,s}^j$ Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario (ths. kWh)

$V_{b,s}^{j}$ - Net volume of electricity corona losses in the main-line electricity grid in period «*j*», in the baseline scenario (ths. kWh);

$$V_{b,s}^{j} = \frac{Q_{b,a,s}^{j} * V_{b,z}^{j}}{Q_{b,a,z}^{j}} \quad (5)$$

$Q_{b,a,z}^{j}$ - Total volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario (ths. kWh);

$V_{b,z}^{j}$ - Total volume of electricity corona losses in the main-line electricity grid in period «*j*», in the baseline scenario (ths. kWh);

$[y]$ - relates to the project period;
$[j]$ - relates to the baseline period;
$[b]$ - relates to the baseline scenario;
$[p]$ - relates to the project scenario;
$[a]$ - relates to electricity coming into the main-line electrical grid;
$[c]$ - relates to electricity coming into the distribution electrical grid;
$[s]$ - relates to net volume of electricity;
$[z]$ - relates to total volume of electricity;

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

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

N/A

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):

N/A

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

Increase in GHG emissions outside the project boundary which might be caused by the project are not expected..

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

N/A

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

N/A

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):

Estimation of emissions for the project activity (calculated for a specific approach for Joint Implementation):

$$ER^y = BE_b^y - PE_p^y \quad (4)$$

ER^y – emission reduction due to the project activity, during the monitoring period «*y*», tCO_2e;

BE_b^y – GHG emissions from burning fossil fuels for production of electricity that is lost in the main-line electrical grid in period «*y*» under the baseline scenario, (tCO_2e);

PE_p^y - GHG emissions from burning fossil fuels for production of electricity that is lost in the main-line electrical grid in period «*y*» under the project scenario, (tCO_2e);

$[y]$ - relates to monitoring period;
$[b]$ - relates to baseline scenario;
$[p]$ - relates to project scenario.

Accompanyin document 1 contains the calculation of baseline and project emissions and emission reductions under the project for each year of the monitoring period.

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:

The Project provides for replacement of electrical grids, transformers, meters and other equipment that is used in the process of electricity transmission. Equipment that will be put out from operation within the project will be written off and dismantled. “Acts of the write-off OZ-3” will be executed by a Commission and this Commission will also prepare an opinion of impossibility to further use this equipment because there are no spare parts thereto, it is damaged by corrosion and so on.
The equipment is taken to the warehouse and according to the decree #408 of Cabinet of Ministers of Ukraine (dated 16/03/1999) "On the system of collection, sorting, transporting, processing and recycling of used packaging and municipal solid waste"[67] it will further be sold to companies that deal with metal waste utilization. At the enterprise there is no monitoring of solid waste utilization.

[67] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=408-99-%EF

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.
$Q^{y}_{p,a,s}$	Low	Net volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[68]. The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.
$Q^{y}_{p,c,s}$	Low	Net volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity». The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.
$Q^{y}_{p,a,z}$	Low	Total volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity». The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.
$V^{y}_{p,z}$	Medium	Total volume of electricity corona losses in the main-line electricity grid in period «*y*». Values are determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog.
$Q^{j}_{b,a,s}$	Low	Net volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according Ukrainian to quality management procedure "On metrology and metrological activity". The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.
$Q^{j}_{b,c,s}$	Low	Net volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity». The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.
$Q^{j}_{b,a,z}$	Low	Total volume of electricity coming into the main-line electrical grid in the period «*y*». Data of regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity». The final results are written down in the official reports which are submitted to state bodies where they are additionally checked.

[68] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

$V_{b,z}^{j}$	Medium	Total volume of electricity corona losses in the main-line electricity grid in period «*j*». Values are determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog.

To ensure conservativeness of the parameters of medium and high level of uncertainty permanent regular calibration of metering equipment and use of the latest editions of the normative and technical documentation is provided for.

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

Operational structure includes Supplier's (NPC "Ukrenergo") operational departments (repair-and-renewal operations, etc.) and personnel for operation of the main-line electrical grids.
Management structure includes administration departments of the Supplier and project's specialists-developers (VEMA S.A.).
Detailed operation management structure and administration structure is provided in Figure 10.
Scheme of data collection using automated system of electricity consumption commercial records (ASECCR) in the perimeter of the energy supply company is listed in Figure 11.
Scheme of data collection to implementation of the automated system of electricity consumption commercial records (ASECCR) is shown in Figure 12.

Measures on control of the electrical energy that is transported by NPC "Ukrenergo":
1. During the settlement period (settlement month is determined by the terms of the contract on supply of electric power) the current control of the metering of electric energy is carried out;
2. On a day, stipulated by a contract, usually at 0h. 00min. on the first day of the month following the settlement month, a chief of a district or a representative authorized by him shall take the readings with the help of ASECCR of the of electric energy meters (electric energy meters are the devices, which passed state certification, registered under contractual conditions and sealed with the execution of a sealing Act);
3. "Report on electric energy meters readings" shall be made according to the readings of electric energy meters;
4. Following the "Report on electric energy meters readings the "Act of supplied electric energy" is made and approved by the company's round seal;
5. NPC "Ukrenergo" submits the approved "Act of supplied electric energy" to the SE "Energorynok", wherein it obtains invoices for payment;
6. All invoices are stored in the archive of NPC "Ukrenergo" in paper form.

Recording and archiving of data
A responsible person for the joint implementation project, designated by the project owner, monitors data in electronic and paper form. Electronic documents must be printed and saved.
Project owner shall retain copies of the transmitted electricity.
All data and documents in paper form should be archived and a backup copy should be transferred to project coordinator.
All data should be kept for two years after the transfer of emission reduction units generated by the project.

Study
Before the beginning of work on the project and during the project period VEMA S.A. employees will consult people responsible for the development of monitoring at NPC “Ukrenergo”.

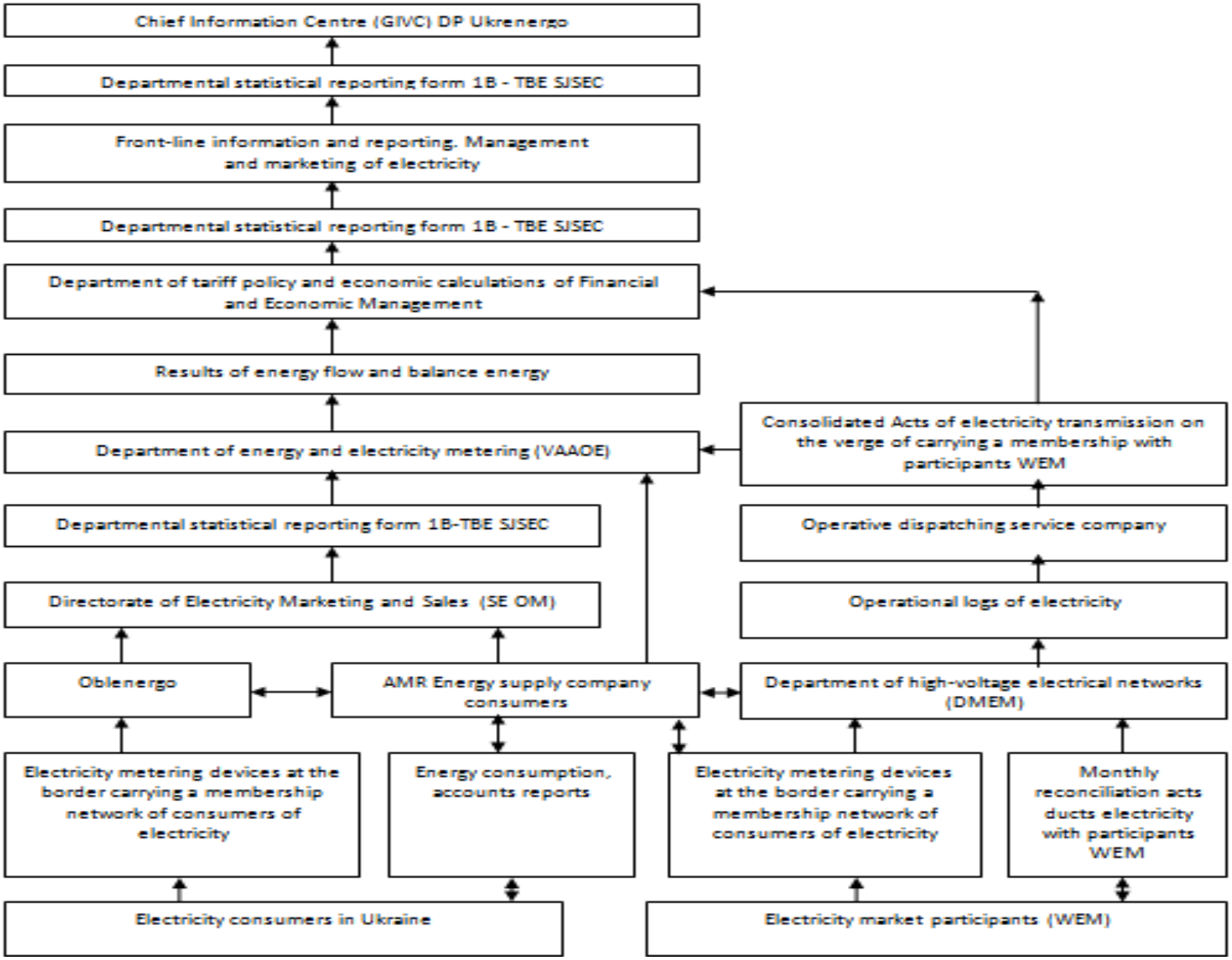


Figure 10. Operation management structure and administration structure.

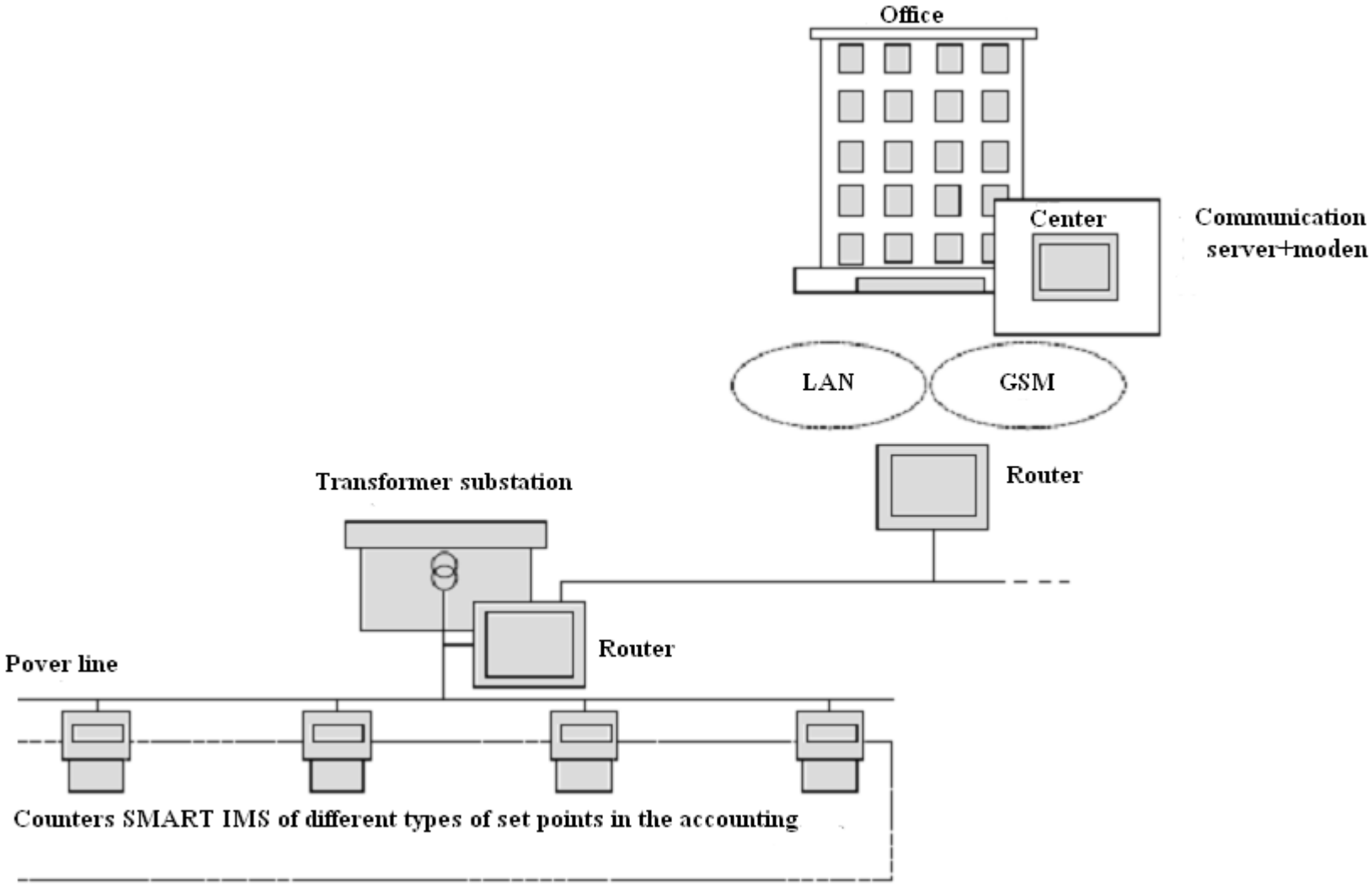
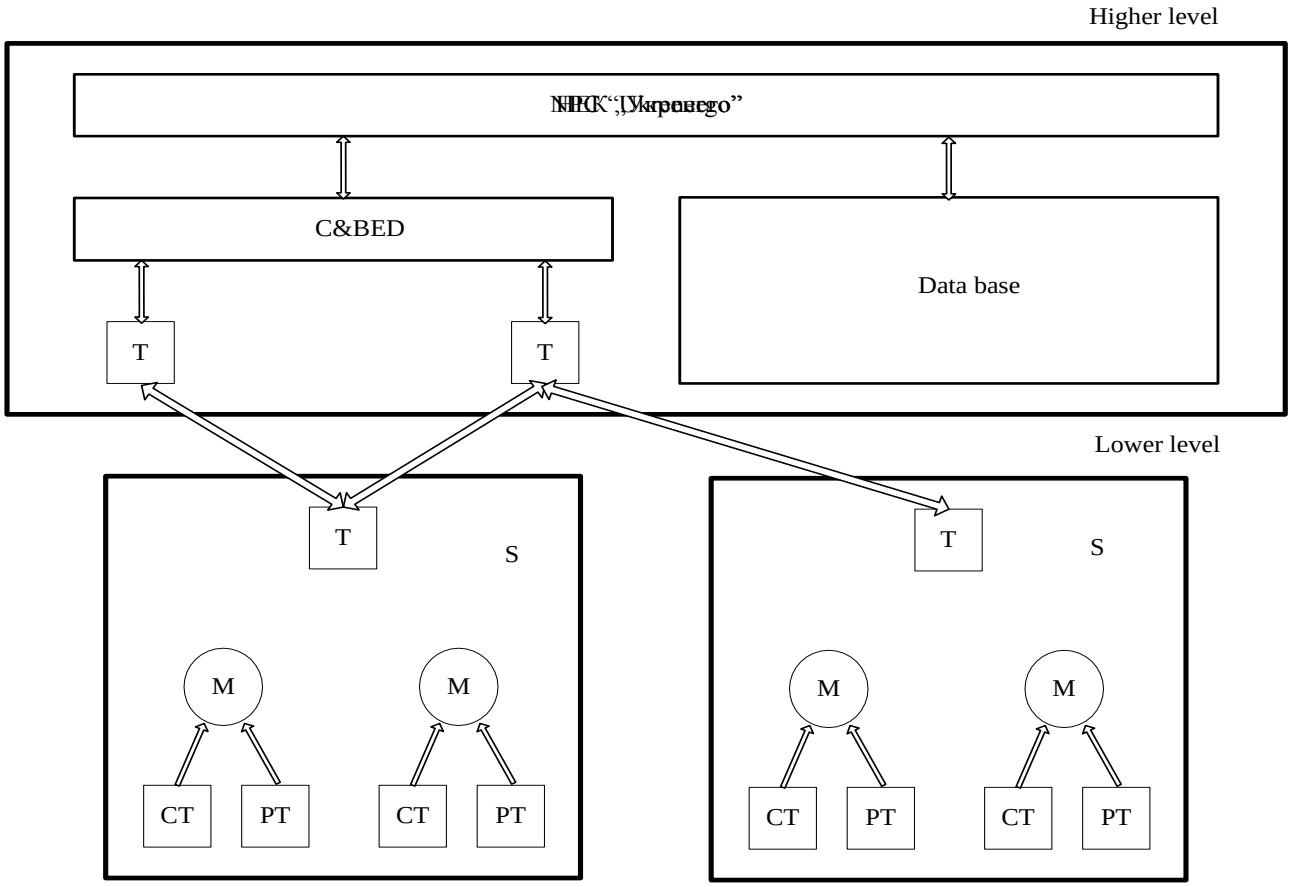


Figure 11. Scheme of data collection using automated system of electricity consumption commercial records (ASECCR) in the perimeter of the energy supply company



Legend

T - telephone;
CT - current transformer;
PT – power transformer;
S - Substation;
M - meter;
C&BED – Calculations and the balance of electricity department

Data of energy meters at the substation are taken by on-duty personnel.

Figure 12. Scheme of data collection to implementation of the automated system of electricity consumption commercial records (ASECCR)

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

Monitoring plan is determined by VEMA S.A., project's developer, and NPC "Ukrenergo", supplier of the project.

State Entity National Power Company "Ukrenergo"
Timchenko Vitaliy Grygorovych
Acting director
Telephone: +38 (044) 238-32-64
Fax: +38 (044) 287-71-60
E-mail: kanc@nec.energy.gov.ua
State Entity National Power Company "Ukrenergo" is the project participant (stated in Annex 1).

VEMA S.A.:
Kyiv, Ukraine
Telephone: +38 (044) 594-48-10
Fax: +38 (044) 594-48-19
e-mail: info@vemacarbon.com
VEMA S.A is a project participant (Annex 1)

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Estimated project emissions were calculated in accordance with the formulae specified in section D.1.1.2. Results are given in the tables below. Calculations are given in the accompanying document 1, attached to the PDD.

During the period of 2005-2010 estimated project emissions are calculated relying on the actual data on the amount of transmitted electricity in the main-line electrical grids of NPC "Ukrenergo", and for the period of 2011-2020 - predicted by the strategic plan of energy industry development.

Table 10. Estimated project emissions for the period from January 1, 2005 to December 31, 2007

Year	Project emissions (tCO_2 equivalent)
2005	2 991 101
2006	3 173 290
2007	3 305 266
Total estimated emission reductions over the crediting period of 2005-2007 (tonnes of CO_2 equivalent)	**9 469 657**

Table 11. Estimated project emissions for the period from January 1, 2008 to December 31, 2012

Year	Project emissions (tCO_2 equivalent)
2008	4 185 215
2009	3 775 266
2010	4 108 090
2011	4 092 690
2012	4 092 690
Total estimated emission reductions over the crediting period of 2008-2012 (tonnes of CO_2 equivalent)	**20 253 951**

Table 12. Estimated project emissions for the period from January 1, 2013 to December 31, 2020

Year	Project emissions (tCO_2 equivalent)
2013	4 092 690
2014	4 092 690
2015	4 092 690
2016	4 092 690
2017	4 092 690
2018	4 092 690
2019	4 092 690
2020	4 092 690
Total estimated emission reductions over the crediting period of 2013-2020 (tonnes of CO_2 equivalent)	**32 741 520**

E.2. Estimated leakage:

There are no expected leakages.

E.3. Sum E.1 and E.2.:

Since there are no leakages the sum of emissions from leakages and from the project activity is equal to the emissions from the project activity. The results are given in tables below.

Table 13. Table contain the sum of emissions from leakage and the project activity before the first commitment period.

Year	Expected project emissions (t CO_2e)	Expected leakage (t CO_2e)	Expected emission reductions (t CO_2e)
2005	2 991 101	0	2 991 101
2006	3 173 290	0	3 173 290
2007	3 305 266	0	3 305 266
Total emission reductions (t CO_2e)	**9 469 657**	0	**9 469 657**

Table 14. Table contain the sum of emissions from leakage and the project activity during the first commitment period.

Year	Expected project emissions (t CO_2e)	Expected leakage (t CO_2e)	Expected emission reductions (t CO_2e)
2008	4 185 215	0	4 185 215
2009	3 775 266	0	3 775 266
2010	4 108 090	0	4 108 090
2011	4 092 690	0	4 092 690
2012	4 092 690	0	4 092 690
Total emission reductions (t CO_2e)	**20 253 951**	0	**20 253 951**

Table 15. Table contain the sum of emissions from leakage and the project activity after the first commitment period.

Year	Expected project emissions (t CO_2e)	Expected leakage (t CO_2e)	Expected emission reductions (t CO_2e)
2013	4 092 690	0	4 092 690
2014	4 092 690	0	4 092 690
2015	4 092 690	0	4 092 690
2016	4 092 690	0	4 092 690
2017	4 092 690	0	4 092 690
2018	4 092 690	0	4 092 690
2019	4 092 690	0	4 092 690
2020	4 092 690	0	4 092 690
Total emission reductions (t CO_2e)	**32 741 520**	0	**32 741 520**

E.4. Estimated baseline emissions:

Estimated baseline emissions were calculated in accordance with the formulae specified in section D.1.1.2.

Results are given in the tables below. Calculations are given in the accompanying document 1, attached to the PDD.

During the period of 2005-2010 estimated baseline emissions are calculated relying on the actual data on the amount of transmitted electricity in the main-line electrical grids of NPC "Ukrenergo", and for the period of 2011-2020 - predicted by the strategic development of the energy industry multiplied by the factor of pre-project efficiency of the main-line electrical grids in the historical period.

Table 16. Estimated baseline emissions for the period from January 1, 2005 to December 31, 2007

Year	Estimated baseline emissions (tCO_2 equivalent)
2005	3 011 318
2006	3 440 974
2007	3 567 035
Total estimated baseline emissions over the crediting period of 2005-2007 (tonnes of CO_2 equivalent)	**10 019 327**

Table 17. Estimated baseline emissions for the period from January 1, 2008 to December 31, 2012

Year	Estimated baseline emissions (tCO_2 equivalent)
2008	4 574 926
2009	4 125 969
2010	4 465 805
2011	4 449 064
2012	4 449 064
Total estimated baseline emissions over the crediting period of 2008-2012 (tonnes of CO_2 equivalent)	**22 064 828**

Table 18. Estimated baseline emissions for the period from January 1, 2013 to December 31, 2020

Year	Estimated baseline emissions (tCO_2 equivalent)
2013	4 449 064
2014	4 449 064
2015	4 449 064
2016	4 449 064
2017	4 449 064
2018	4 449 064
2019	4 449 064
2020	4 449 064
Total estimated baseline emissions over the crediting period of 2013-2020 (tonnes of CO_2 equivalent)	**35 592 512**

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

Emission reductions are calculated according to formula (4) described in section D.1.4. Results are given in the tables below. Calculations are given in the accompanying document 1, attached to the PDD.

Table 19. Estimated emission reductions for the period from January 1, 2005 to December 31, 2007

Year	Estimated emission reductions (t CO_2 equivalent)
2005	20 217
2006	267 684
2007	261 769
Total estimated emission reductions over the crediting period of 2005-2007 (tonnes of CO_2 equivalent)	**549 670**

Table 17. Estimated emission reductions for the period from January 1, 2008 to December 31, 2012

Year	Estimated emission reductions (t CO_2 equivalent)
2008	389 711
2009	350 703
2010	357 715
2011	356 374
2012	356 374
Total estimated emission reductions over the crediting period of 2008-2012 (tonnes of CO_2 equivalent)	**1 810 877**

Table 18. Estimated emission reductions for the period from January 1, 2013 to December 31, 2020

Year	Estimated emission reductions (t CO_2 equivalent)
2013	356 374
2014	356 374
2015	356 374
2016	356 374
2017	356 374
2018	356 374
2019	356 374
2020	356 374
Total estimated emission reductions over the crediting period of 2013-2020 (tonnes of CO_2 equivalent)	**2 850 992**

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

Table 22. Table providing results of emission reduction estimation for the period January 1, 2005 – December 31, 2007.

Year	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2005	2 991 101	0	3 011 318	20 217
2006	3 173 290	0	3 440 974	267 684
2007	3 305 266	0	3 567 035	261 769
Total calculated reductions (t CO_2e)	**9 469 657**	0	**10 019 327**	**549 670**

Table 23. Table providing results of emission reduction estimation during the period of January 1, 2008 – December 31, 2012.

Year	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2008	4 185 215	0	4 574 926	389 711
2009	3 775 266	0	4 125 969	350 703
2010	4 108 090	0	4 465 805	357 715
2011	4 092 690	0	4 449 064	356 374
2012	4 092 690	0	4 449 064	356 374
Total calculated reductions (t CO_2e)	**20 253 951**	0	**22 064 828**	**1 810 877**

Table 24. Table providing results of emission reduction estimation for the period January 1 2013-December 31, 2020.

Year	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2013	4 092 690	0	4 449 064	356 374
2014	4 092 690	0	4 449 064	356 374
2015	4 092 690	0	4 449 064	356 374
2016	4 092 690	0	4 449 064	356 374
2017	4 092 690	0	4 449 064	356 374
2018	4 092 690	0	4 449 064	356 374
2019	4 092 690	0	4 449 064	356 374
2020	4 092 690	0	4 449 064	356 374
Total calculated reductions (t CO_2e)	**32 741 520**	0	**35 592 512**	**2 850 992**

SECTION F. Environmental Impacts

F.1. Documentation regarding analysis of project impact on the environment, including transboundary impacts, in accordance with procedures required by the host Party.

Under the legislative framework of Ukraine "On Environmental Protection"[69] and DBN A.2.2-1-2003[70] "Structure and Content of Environmental Impact Assessment (EIA) when Designing and Constructiing Factories, Buildings and Structures" NPC "Ukrenergo" is not obliged to carry out Environmental Impact Assessment for this type of project.
Environmental effect will be caused only by dismantled equipment. It will further be used as secondary raw material.

Implementation of this project will allow for improvement of servicing the consumers of electricity services. Experienced staff of NPC "Ukrenergo" and compliance with the regulations "On electric energy sector"[71] will allow for minimization of the potential emergency situations in the process of the project implementation.

Transboundary impacts from the project activity according to their definition in the text of "Convention on transboundary long-range pollution", ratified by Ukraine, will not take place.

The Project does not assume any detrimental effects on the environment.
NPC "Ukrenergo" has all necessary permits and licenses for maintenance and operation of electrical grids.

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:

As mentioned above, when analyzing environmental impact it is clear that the project does not make any significant negative environmental impact, but rather has a positive effect on the environment.

[69] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1264-12

[70] http://www.budinfo.com.ua/dbn/8.htm

[71] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=v8_73800-98

SECTION G. Stakeholders' comments

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

Since the project activities do not imply any negative environmental impact and negative social effect, special public discussions were not necessary. Consultations with stakeholders were held at meetings with local authorities.
TLE reduction program in the company regularly covered in media and on television.
There have been numerous publications of Company employees in specialized national magazines. Based on NPC "Ukrenergo" repeatedly conducted specialized workshops and seminars under the Ministry of Fuel and Energy of Ukraine auspices, Ukraine NERC which directly related to technology and of electric power systems introduction for electricity commercial metering.
Information of TLE reduction work is covered on the official website Ukrenergo »http://www.ukrenergo.energy.gov.ua

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation	State Enterprise National Power Company "Ukrenergo"
Street/P.O.Box	Kominternu
Building	25
City	Kyiv
State/Region	
Postal code	01032
Country	Ukraine
Phone	+38 (044) 238-32-64
Fax	+38 (044) 287-71-60
E-mail	kanc@nec.energy.gov.ua
Website	
Represented by	
Title	Acting director
Salutation	
Last name	Timchenko
First name	Vitaliy
Middle name	Grygorovych
Department	
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Phone (direct)	+38 (044) 287-71-60
Cell phone	
Personal e-mail	

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Building	45
City	Geneva
State/Region	
Postal code	PC 170 CH-1222
Country	Switzerland
Phone	+38 (044) 594 48 10
Fax	+38 (044) 594 48 19
E-mail	info@vemacarbon.com
Website	www.vemacarbon.com
Represented by	
Title	director
Salutation	
Last name	Knodel
First name	Fabian
Middle name	
Department	
Fax (direct)	
Phone (direct)	+380 (44) 206 84 43
Cell phone	
Personal e-mail	

Annex 2

BASELINE INFORMATION

Calculation of the dynamic baseline

Calculation of the dynamic baseline was carried out as per specific approach for Joint Implementation (JI), relying on the "Criteria for selecting the baseline and monitoring".
When choosing a baseline for a JI project a specific approach that meets the requirements specified in Regulation 9/CMP.1. was used.
Dynamic baseline is defined as the product of average losses in the electricity network in the period 2001 to 2003 and design of electric power coming into the network. If fewer transported electricity in the project year, the loss reduction in electric power network will take place. Thus there is a dependence between loss reduction of electricity during its transmission from quantity of electricity transported networks of NPC "Ukrenergo". The specific approach provides a procedure to determine the following parameters:

Data/Parameter	$Q^{y}_{p,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Time of determination/monitoring	Every 30 minutes
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The main method of determination is automated system of electricity consumption commercial records (ASECCR) in boundaries of energy supply company, ASECCR of customers and subplants.
QA/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[72]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$Q^{j}_{b,a,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid

[72] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001p.**: 116 326 188 ths. kWh; **2002p.**: 117 791 973 ths. kWh; **2003p.**: 121 300 485 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
A/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[73]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$Q^{j}_{b,c,s}$
Data unit	ths. kWh
Description	Net volume of electricity coming into the distribution electrical grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Daily
Source of data (to be) used	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001**: 111 871 000 ths. kWh; **2002**: 113 442 000 ths. kWh; **2003**: 116 945 000 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)

[73] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

QA/QC procedures (to be) Applied	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[74]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Дані / Параметр	$Q^{j}_{b,a,z}$
Одинця виміру	ths. kWh
Опис	Net volume of electricity coming into the main-line electrical grid in period «*j*», in the baseline scenario
Періодичність виміру/ моніторингу	Daily
Джерело даних що було (буде) застосоване	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Значення даних (для ex-ante обчислень/визначень)	**2001р.**: 188 501 337 ths. kWh; **2002р.**: 191 268 209 ths. kWh; **2003р.**: 196 313 390 ths. kWh
Підтвердження вибору даних або опис методу і процедур вимірювання що були (будуть) застосовані	To determine the volume of electricity that came into the main-line electrical grid before the project implementation a historical period («j») from 2001 to 2003 was chosen. The main method of determining was Operational information complex (OIC) which operated on the perimeter of Energy Supply Company, customers and substations. Backup method for the determination was automated system of electricity consumption commercial records (ASECCR)
Процедури управління якості / забезпечення якості вимірів, що були (будуть) застосовані	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[75]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Коментарі	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	$V^{j}_{b,z}$
Data unit	ths. kWh
Description	Total volume of electricity corona losses in the main-line electricity grid in period «*j*», in the baseline scenario
Time of determination/monitoring	Monthly
Source of data (to be) used	Monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of

[74] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

[75] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	electricity (TLE) in the transfer in the electrical grids"
Value of data applied (for ex ante calculations/determinations)	**2001**: 923 048 ths. kWh; **2002**: 835 545 ths. kWh; **2003**: 781 250 ths. kWh
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Values were determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog. Detailed description and example of calculation are given in appropriate branch normative and technical documents: - "Methodology for Determination of energy losses in transformers and power lines", approved by the Deputy Minister of Energy sector of Ukraine, the chief state inspector of Ukraine on Energy Oversight V.A. Darchuk on February 18, 1998[76]; - Methods of preparation of electricity balance structure in electric power networks, analysis of its components and ratioing of electricity technological losses. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p.[77]
QA/QC procedures (to be) applied	Calculations were made using officially approved methods and programs. "Departmental Reporting Form 1B-TBE DAEK electricity balance structure and electricity technological losses (ETL) during transmissioning in electric power networks" was made up monthly and approved at the state level by National Electricity Regulation Commission of Ukraine.
Any comment	Data which allows to calculate the GHG emissions in the baseline scenario

Data/Parameter	CEF
Data unit	tCO_2/MWh
Description	Carbon emission factor when electricity is generated for the national power grid of Ukraine
Time of determination/monitoring	Annually
Source of data (to be) used	Carbon dioxide emission factors for 2005 are taken from the document «Operational Guidelines for Project Design Documents of Joint Implementation Projects Volume 1: General guidelines" (ERUPT)[78] - Carbon dioxide emission factors for 2006-2007 are taken from the document "Carbon dioxide emission factors (for energy consumption according to the methodology "Ukraine - Assessment of new calculation of CEF", approved by TUV SUD 17.08.2007)[79]; - Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine

[76] http://www.uazakon.com/big/text957/pg1.htm

[77] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

[78] http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/index.html

[79] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514

<table>
<tr><td></td><td>(hereinafter - NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[80]";
- Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009" [81];
- Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide emission factors in 2010"[82];
- Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[83];</td></tr>
<tr><td>Value of data applied
(for ex ante calculations/determinations)</td><td><table><tr><th>2005</th><th>2006-2007</th><th>2008</th><th>2009</th><th>2010</th><th>2011</th></tr><tr><td>0,740</td><td>0,807</td><td>1,055</td><td>1,068</td><td>1,067</td><td>1,063</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>When developing the joint implementation project national carbon dioxide emission factors are used, in case of their absence factors for 2005 are taken from ERUPT, factors for 2006-2007 are taken form the document carbon dioxide emission factor approved TUV SUD</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Only officially approved factors are used for calculations.</td></tr>
<tr><td>Any comment</td><td>Researches don’t take into consideration production of energy by nuclear power plants</td></tr>
</table>

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

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

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

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

Annex 3

MONITORING PLAN

The proposed project uses a specific approach for JI projects on the basis of Guidance on criteria for baseline setting and monitoring, version 2 JISC (Joint Implementation Supervisory Committee – JISC[84]) which meets the requirements of Decision 9/CMP.1, Appendix «B» «Criteria for setting the baseline and monitoring". The monitoring plan is designed for accurate and clear greenhouse gas emissions measurements and calculation and conducted according to practices established at NPC "Ukrenergo" to measure the transmitted and consumed electricity. Monitoring of the project does not require changes in existing metering and data collection system. All relevant data are calculated and recorded and will be stored within two years after emission reduction units generated by the project are delivered.

The monitoring plan includes the following measures:

1. Identify all potential sources of emissions in the project.
2. Gathering information on greenhouse gas emissions within the project for "crediting" period.
3. Evaluation of project schedule.
4. Gathering information on test equipment, the date it's of inspection.
5. Collection and archiving information on the impact of project activities on the environment.
6. Data archiving
7. Determination of the structure responsible for monitoring the project.
8. Analysis of performance of staff training.

Monitoring data and parameters:

Data/Parameter	$Q^{y}_{p,a,s}$
Data unit	Ths. kWh
Description	Net volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Data source	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Method of monitoring	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[85]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Frequency of examination	Every 30 minutes
Approving documents	- Forms of state statistical observation N 23-N "balance of production

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

[85] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	and distribution of electric energy " (V0274202-2002, va423202-06). - Departmental reporting form 1B-TBE DAEK balance structure of power and technological losses of electricity (TBE) transmission over power grids of NPC "Ukrenergo"

Data/Parameter	$Q^{y}_{p,c,s}$
Data unit	Ths. kWh
Description	Net volume of electricity coming into the distribution electrical grid in period «*y*», in the project scenario
Data source	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Method of monitoring	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[86]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Frequency of examination	Daily
Approving documents	- Forms of state statistical observation N 23-N "balance of production and distribution of electric energy " (V0274202-2002, va423202-06). - Departmental reporting form 1B-TBE DAEK balance structure of power and technological losses of electricity (TBE) transmission over power grids of NPC "Ukrenergo"

Data/Parameter	$Q^{y}_{p,a,z}$
Data unit	Ths. kWh
Description	Total volume of electricity coming into the main-line electrical grid in period «*y*», in the project scenario
Data source	Data of energy meters installed at the entrance to the electric main-line grid, data of meters is entered into the monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TBE) in the transfer in the electrical grids"
Method of monitoring	Measurements are performed by regularly calibrated and verified meters according to quality management procedure, law of Ukraine «On metrology and metrological activity»[87]. The final results are written down in the official reports which are submitted to state bodies were they are additionally checked.
Frequency of examination	Every 30 minutes
Approving documents	- Forms of state statistical observation N 23-N "balance of production and distribution of electric energy " (V0274202-2002, va423202-06).

[86] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

[87] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1765-15

	- - Departmental reporting form 1B-TBE DAEK balance structure of power and technological losses of electricity (TBE) transmission over power grids of NPC "Ukrenergo"

Data/Parameter	$V_{p,z}^{y}$
Data unit	Ths. kWh
Description	Total volume of electricity corona losses in the main-line electricity grid in period «*y*», in the project scenario
Data source	Monthly report "Departmental Reporting Form 1B-TBE DAEK balance structure of electricity and technological losses of electricity (TLE) in the transfer in the electrical grids"
Method of monitoring	Values were determined by calculations using the factors of duration of weather types during the settlement period. Thus periods of fine weather include periods when humidity is less than 100% and glaze ice, periods of humid weather include the periods of rain, sleet, fog. Detailed description and example of calculation are given in appropriate branch normative and technical documents: - "Methodology for Determination of energy losses in transformers and power lines", approved by the Deputy Minister of Energy sector of Ukraine, the chief state inspector of Ukraine on Energy Oversight V.A. Darchuk on February 18, 1998[88]; - Methods of preparation of electricity balance structure in electric power networks, analysis of its components and ratioing of electricity technological losses. GND 34.09.104-2003-K.: GRIFRE, 2004. - 164 p. [89]
Frequency of examination	Monthly (written down in a monthly report 1B-TVE)
Approving documents	Departmental Reporting Form 1B-TBE DAEK electricity balance structure and electricity technological losses (ETL) during transmissioning in electric power networks of NPC "Ukrenergo"

Data/Parameter	CEF
Data unit	tCO_2/MWh
Description	CO2 emission factor when electricity is generated for the national power grid of Ukraine
Data source	Carbon dioxide emission factors for 2005 are taken from the document «Operational Guidelines for Project Design Documents of Joint Implementation Projects Volume 1: General guidelines" (ERUPT) [90] - Carbon dioxide emission factors for 2006-2007 are taken from the document "Carbon dioxide emission factors (for energy consumption according to the methodology "Ukraine - Assessment of new calculation of CEF", approved by TUV SUD 17.08.2007) [91]; - Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine (hereinafter -

[88] http://www.uazakon.com/big/text957/pg1.htm

[89] http://forca.com.ua/instrukcii/energonaglyad/metodika-skladannya-strukturi-balansu-elektroenergii-v-elektrichnih-merezhah-038-150-kv.html

[90] http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/index.html

[91] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514

	NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[92]"; - Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009"[93]; - Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide emission factors in 2010"[94]; - Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[95];
Method of monitoring	When developing the joint implementation project national carbon dioxide emission factors are used, in case of their absence factors for 2005 are taken from ERUPT, factors for 2006-2007 are taken form the document carbon dioxide emission factor approved TUV SUD
Frequency of examination	Annually
Approving documents	Widely spread practice is to use such factors when developing JI projects.

Control and metering devices for installing

Data from all points of electricity records, in which the counters installed, are taken in automatic mode using an automated system of electric power (ASOE) with intervals which are set to the Rules WEM (Wholesale Electricity Market of Ukraine). Structure ASOE NPC "Ukrenergo" is a three-level (supplied) and includes:

- local level - technical means of data collecting and processing and the means and procedures for data reading and transmission on 133 ПС backbone networks with voltage AC 220 V - 750 kV;
- regional level - the technical means of data collecting and processing in eight of the EC, which are Ukrenergo departments, accounting system;
- the central level - the technical means of data collecting and processing directly central office management DP NPC "Ukrenergo" (TSSOE).

Scheme of control over information flows is given in Figure 13.

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

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

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

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

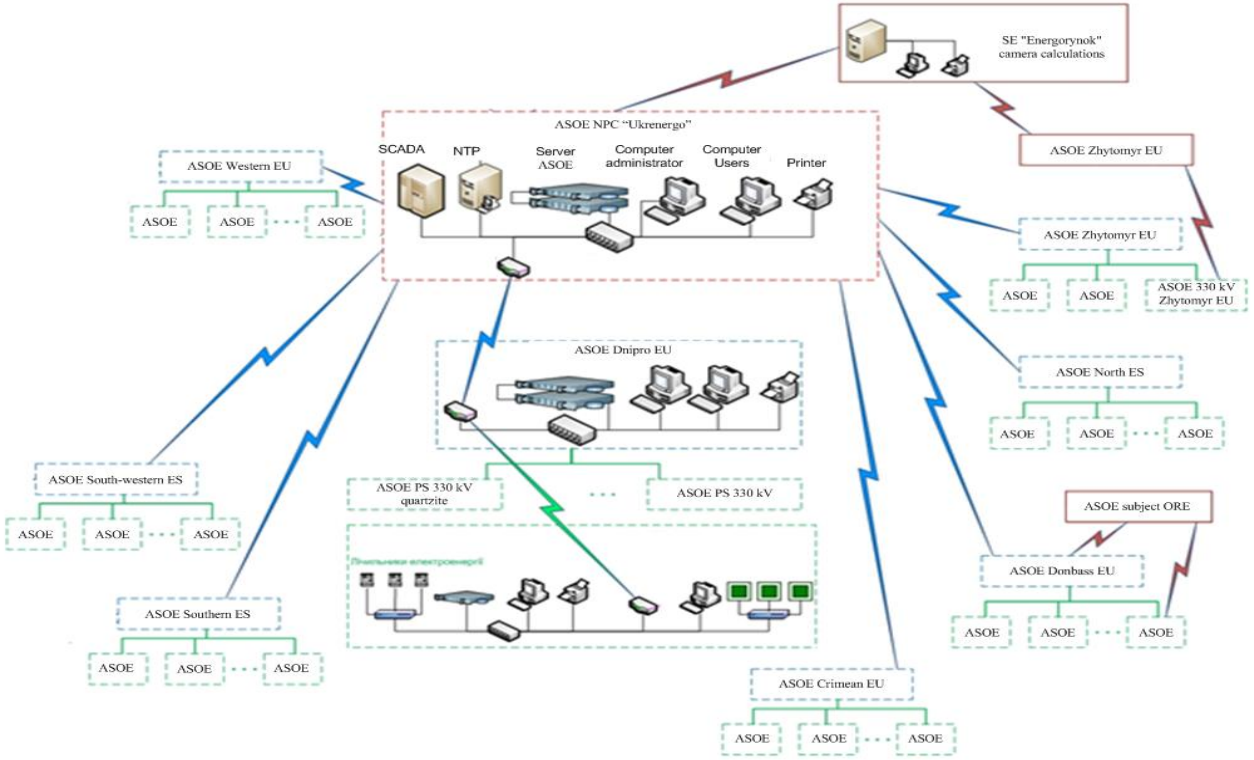

Figure 13. Scheme of control over information flows