The European Union's Tacis programme for Ukraine

CAPACITY BUILDING IN DONETSK OBLAST FOR WASTE MANAGEMENT - UKRAINE

Bibliographical Study

Carbon rights for landfills funding

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Warning

This programme is implemented by the Consortium Sogreah – GKW Consult - ADEME. The views expressed in this report do not necessarily reflect the views of the European Commission.

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1. Executive Summary

This report is a preliminary description of the Carbon Funds that can help the funding of the Donetsk Oblast Regional Landfills Programme. It aims at a discover of the mechanisms of implementation of the Kyoto Protocol and specifically the Joint Implementation that is a mechanism of funding for the countries undergoing the process of transition to a market economy (among them Ukraine). The first signatories of the Kyoto Protocol are called Annex 1 parties (among them Ukraine).

The first tranche of emission reduction is 2008-2012. EU created a trade market for emission allowances quoting the CO_2e tonne. Some countries need to buy emission reduction units: the CER (Certified Emission Reduction unit) tradable units generated by Projects that reduce emissions. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.

It means that in aim to benefit at maximum of the 2008-2012 market, the projects should be implemented before the end 2007.

Ukraine is an Annex 1 party and a country undergoing the process of transition to a market economy. For the implementation of the Kyoto Protocol, several obligations must be implemented:

- To name a DNA (Designated National Authority)
- To create a registry of emissions (electronic and conform to an international standard)
- To establish the 1990 inventory of emissions (baseline)
- To establish a yearly report of emissions (and the relevant procedures)
- To ratify methodologies (internationally recognised) of measure and accounting for GHG emissions[1]
- To frame the activity of verifier/validator of the GHG emission declarations

Some Carbon Funds focus on the landfill gas emissions. Some guarantee a price for the CO_2e tonne. Some fund totally or partially the investment of the equipments. Some require the equipments are provided by the funding country. Some are continuously open for proposals, other organise tenders.

The usual procedure is first to write a PIN (Project Idea Note). Then the project must be approved by the DNA of Ukraine and the Carbon Fund. Then the dossier PDD (Project Design Document) must be made. The duration is usually 6-9 months.

Carbon Funds can cover around 1/3 of the operation cost of the sanitary landfills and some of them can fund a part of the investment. All these elements pledge for the quick creation of a task force associating the regional administrations and the Tacis Programme and assigned to prepare the dossiers and to open negotiations with the Carbon Funds.

[1] Described in ISO 14064- norms, the national organisation of standardisation should recognise the ISO norms.

2. Definitions

2.1. Some questions of units

Some documents are quantifying the emissions in tonnes of CO_2 Equivalent and others in tonnes of carbon.

The Ukrainian inventory gives figures in gigagrammes (Gg) of carbon. 1 Gg = 10^9 g = 1000 tonnes.

The CO_2 Equivalent is the "official" measure of the greenhouse effect gases. Some use the "Carbon Equivalent", that gives values 3.67 times lower (acutely with a rate of 12/44), factor corresponding to the rate [atomic mass of carbon] / [molecular mass of CO_2].

Caution: don't confuse "CO_2 Equivalent" with "CO_2 alone emissions".

2.2. History

The climate on Earth mainly depends of a greenhouse effect due to the existence of particular gases in the upper layers of atmosphere: these gases reflect the infra-red rays re-emitted by the surface of the Earth and, by the way, maintain temperatures as we are used to. Among these gases, the most efficient, by concentration and reflecting capacity, is the carbon dioxide CO_2. Recently (on historical scale) we understood this greenhouse effect and we discovered that the concentration of CO_2 and other gases (globally called "greenhouse gases" or "greenhouse effect gases" - GHG) was increasing in these upper layers of atmosphere, due to anthropogenic activities. Models predicted that the development of the human activities would provoke a growth of the emission of CO_2 and subsequently an increase of the average temperature on Earth (limited but also with a large increase of the brackets of temperature and rainfalls (chaotic behaviour of the climate)) and an increase of the average level of the oceans by melting of the poles ices.

The international community worried about and the UN Convention in Kyoto adopted a document stating the commitment of the planet States to reduce their emissions of greenhouse gases, so-called Kyoto Protocol. It states also that this effort should not hinder the economical development, and specifically of the under-developed countries (the sustainable development appeared in the 80's in the Bruntland Report as "a development answering the today needs without compromising the possibility for future generations to answer their own needs" and was the cornerstone of the UN Convention of Rio in 1992). Anyway, it should not be reasonable to impose arbitrarily a uniform rate of reduction to all the activities. So the states ratifying the Kyoto Protocol engage to reduce (or control) the global GHG emission of the country referring to the 1990 level of emission. Practically, each country (or region as EU) assigns objectives to its branches of activity and the efforts are facilitated by a market allowing to exchange "emission rights" between facilities, branches and why not countries.

2.3. Legal framework

2.3.1. Kyoto Protocol[2]

(Article 3) *The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012.*

(Article 5) *The Parties undergoing the process of transition to a market economy may use a different base year or period for the implementation of their commitments. A certain degree of flexibility shall be allowed*

[2] www.unfccc.int

by the Conference of the Parties serving as the meeting of the Parties to this Protocol to the Parties undergoing the process of transition to a market economy.

Methodologies for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol shall be those accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties.

(Article 6) *For the purpose of meeting its commitments under Article 3, any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy, provided that:*

(a) Any such project has the approval of the Parties involved;

(b) Any such project provides a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to any that would otherwise occur;

(c) It does not acquire any emission reduction units if it is not in compliance with its obligations under Articles 5 and 7; and

(d) The acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3.

(Article 10) *All Parties … shall:*

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change:

(i) Such programmes would, inter alia, concern the energy, transport and industry sectors as well as agriculture, forestry and waste management.

(Article 11) *In the context of the implementation of Article 4, paragraph 1, of the Convention, in accordance with the provisions of Article 4, paragraph 3, and Article 11 of the Convention, and through the entity or entities entrusted with the operation of the financial mechanism of the Convention, the developed country Parties and other developed Parties included in Annex II to the Convention shall:*

(a) Provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in advancing the implementation of existing commitments under Article 4, paragraph 1 (a), of the Convention that are covered in Article 10, subparagraph (a); and

(b) Also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments under Article 4, paragraph 1, of the Convention that are covered by Article 10 and that are agreed between a developing country Party and the international entity or entities referred to in Article 11 of the Convention, in accordance with that Article.

Greenhouse gases

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)

Sectors/source categories

- Waste
  - Solid waste disposal on land
  - Wastewater handling
  - Waste incineration
  - Other

Annex B

Party Quantified emission limitation or reduction commitment (percentage of base year or period)

Australia	108
Austria	92
Belgium	92
Bulgaria*	92
Canada	94
Croatia*	95
Czech Republic*	92
Denmark	92
Estonia*	92
European Community	92
Finland	92
France	92
Germany	92
Greece	92
Hungary*	94
Iceland	110
Ireland	92
Italy	92
Japan	94
Latvia*	92
Liechtenstein	92
Lithuania*	92
Luxembourg	92
Monaco	92
Netherlands	92
New Zealand	100
Norway	101
Poland*	94
Portugal	92
Romania*	92
Russian Federation*	100
Slovakia*	92
Slovenia*	92
Spain	92
Sweden	92
Switzerland	92
Ukraine*	100
United Kingdom of Great Britain and Northern Ireland	92
United States of America	93

* Countries that are undergoing the process of transition to a market economy.

The Kyoto Protocol defines objectives and rules. But a lot of questions were not answered:

- Determination of the 1990 emissions
- Determination of the yearly emissions
- Demonstrability of the figures provided
- …

2.3.1.1. The Mechanisms under the Kyoto Protocol: Joint Implementation, the Clean Development Mechanism and Emissions Trading

2.3.1.1.1. Background

The Kyoto Protocol broke new ground by defining three innovative "flexibility mechanisms" to lower the overall costs of achieving its emissions targets. These mechanisms enable Parties to access cost-

effective opportunities to reduce emissions or to remove carbon from the atmosphere in other countries. While the cost of limiting emissions varies considerably from region to region, the benefit for the atmosphere is the same, wherever the action is taken.

Much of the negotiations on the mechanisms has been concerned with ensuring their integrity. There was concern that the mechanisms do not confer a "right to emit" on Annex I Parties or lead to exchanges of fictitious credits which would undermine the Protocol's environmental goals. The negotiators of the Protocol and the Marrakech Accords therefore sought to design a system that fulfilled the cost-effectiveness promise of the mechanisms, while addressing concerns about environmental integrity and equity.

2.3.1.1.2. Principles, nature and scope

The Marrakech Accords recognize that the Kyoto Protocol has not bestowed on Annex I Parties any "right, title or entitlement" to emit and call on Annex I Parties to take domestic actions to reduce emissions in a manner conducive to narrowing per capita differences between developed and developing countries while working toward achievement of the ultimate objective of the Convention.

The Marrakech Accords require that domestic actions (as opposed to use of the mechanisms) constitute a "significant element" of the efforts made by each Annex I Party to meet its target under the Kyoto Protocol. While they do not set a quantified proportion that is to be met through domestic action, the decisions relating to Articles 5, 7 and 8 of the Protocol require that Annex I Parties provide information in their national communications under the Protocol to demonstrate that their use of the mechanisms is "supplemental to domestic action" to achieve their targets. This information is to be assessed by the Facilitative Branch of the Compliance Committee.

2.3.1.1.3. Eligibility requirements

To participate in the mechanisms, Annex I Parties must meet the following eligibility requirements:

- They must have ratified the Kyoto Protocol.
- They must have calculated their assigned amount, as referred to in Articles 3.7 and 3.8 and Annex B of the Protocol in terms of tonnes of CO_2-equivalent emissions.
- They must have in place a national system for estimating emissions and removals of greenhouse gases within their territory.
- They must have in place a national registry to record and track the creation and movement of ERUs, CERs, AAUs and RMUs and must annually report such information to the secretariat.
- They must annually report information on emissions and removals to the secretariat.

The eligibility of each Annex I Party is initially to be determined through submitting a report on the above information to the secretariat, at the latest by 1st January 2007 (or a year after becoming a Party to the Protocol, whichever is later). This report will be reviewed, and any questions arising will be dealt with by the Enforcement Branch of the Compliance Committee within 16 months of submission through a set of expedited procedures. Should a Party subsequently be found to not meet the eligibility requirements, it may seek reinstatement of eligibility through a further expedited procedure. For further information, see the pages on Articles 5, 7 and 8, assigned amount accounting, and the Compliance Committee.

The Marrakech Accords provide for businesses, non-governmental organizations and other entities to participate in the three mechanisms, under the authority and responsibility of governments.

2.3.1.1.4. Registry systems under the Kyoto Protocol

Ultimately, after the commitment period has finished, the check to ensure that Annex I Parties are in compliance with their emissions targets will take place by comparing each Parties' emissions during the commitment period with their holdings of ERUs, CERs, AAUs and RMUs. These holdings, as well as transfers and acquisitions, will be tracked and recorded through a computerized system of registries:

- A national registry is to be established and maintained by each Annex I Party. This will contain accounts for the holdings of ERUs, CERs, AAUs and RMUs by the Party, as well as by any entities authorized by the Party to hold them. It will also contain accounts for setting units aside for compliance purposes (retirement) and removing units from the system (cancellation).

Transfers and acquisitions between account holders or between Parties will take place through these national registries.

- A CDM registry will be established and maintained by secretariat under the authority of the CDM Executive Board. This CDM registry is to conduct the issuance and distribution of CDM credits, upon instruction by the Board, and is to contain accounts for project participants.
- An international transaction log (ITL) will be established and maintained by the secretariat. This will verify transactions of AAUs, RMUs, ERUs, CERs, tCERs and lCERs as they are proposed, including their issuance, transfer and acquisition between registries, cancellation, retirement and carry-over to any subsequent commitment period. If such verification finds any proposed transaction to not to be in order, the registry is required to stop the transaction.

2.3.2. European Directive 2003/87/EC

The Directive is focused on the notion of permit.

Member States shall ensure that, from 1 January 2005, no installation undertakes any activity listed in Annex I resulting in emissions specified in relation to that activity unless its operator holds a permit issued by a competent authority in accordance with Articles 5 and 6, or the installation is temporarily excluded from the Community scheme pursuant to Article 27. (Article 4)

The main installations emitting GHG must obtain a permit, which is a way to allocate an allowance of emission referring to the national policy to reach the first period objectives. It's also a way to harmonize the application of the Protocol between the member states and to ensure a far competition between the enterprises.

A second interesting key point is that the allowances may be transferred between the persons within the Community and of third countries (Article 12).

For the rest, the Directive proposes to harmonize the procedures of monitoring, reporting, verification and registries. For registries, a European Regulation defines a standardised and secured system of registries (Biblio 2).

2.4. Glossary

AAU Assigned Amount Units
These are tradable units derived from an Annex I Party's emissions target under the Kyoto Protocol. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Accounting
Covers the company-internal compilation of GHG data.(4)

Additionality
Refers to a situation where a project results in emissions reductions additional to those that would have taken place in the absence of the project activity.(4)
A criterion often applied to GHG projects, stipulating that project-based GHG reductions should only be quantified if the project activity "would not have happened anyway"-i.e., that the project activity (or the same technologies or practices it employs) would not have been implemented in its baseline scenario and/or that project activity emissions are lower than baseline emissions.(1)
Environmental additionality is when emissions reductions are additional to what otherwise would have occurred in the absence of the certified project activity. These reductions must be "real" and "measurable" and must be quantified against a project baseline. Financial additionality is the notion that a project is made commercially viable through its ability to generate value in the form of certified emissions reductions (CSDA, 2001).(3)

Afforestation
is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources (Kyoto Definition).(3)

AIJ Activities Implemented Jointly
A UNFCCC established pilot program to allow private entities in one country to reduce, sequester, or

avoid emissions through a project in a different country. The pilot phase ends in 2000. AIJ has evolved into Joint Implementation (JI) under the Kyoto Protocol (CO2e.com).(3)

Allowance
The basic tradable commodity within GHG emission trading systems. Allowances grant their holder the right to emit a specific quantity of pollution once (e.g., one tonne of CO_2e). The total quantity of allowances issued by regulators dictates the total quantity of emissions possible under the system. At the end of each compliance period, each regulated entity must surrender sufficient allowances to cover their GHG emissions during that period.(1)
Allowance to emit one tonne of carbon dioxide equivalent during a specified period, which shall be valid only for the purposes of meeting the requirements of the Directive and shall be transferable in accordance with the provisions of the Directive.(2)

Annex 1 countries
Defined in the International Climate Change Convention as those countries taking on emissions reduction obligations: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, USA.(4)

Barriers
Any factor or consideration that would (significantly) discourage a decision to try to implement the project activity or its baseline candidates.(1)

Base year
A historic datum (a specific year or an average over multiple years) for tracking corporate GHG emissions over time. This term applies only to corporate or entity-wide GHG accounting, not to project-based GHG accounting.(1)
A historic datum (a specific year) for comparing emissions over.(4)

Base year emissions
GHG emissions in the base year. This term applies only to corporate or entity-wide GHG accounting, not to project-based GHG accounting.(1)
GHG emissions in the base year.(4)

Baseline
A reference point for what emissions would have been without the intervention of the GHG reduction project.(4)

Baseline Candidates
Alternative technologies or practices within a specified geographic area and temporal range that could provide the same product or service as the project activity.(1)

Baseline Emissions
An estimate of GHG emissions, removals, or storage associated with a baseline scenario or derived using a performance standard (see baseline procedures).(1)
Baseline emissions are the emissions that would occur without policy intervention (in a business-as-usual scenario). Baseline estimates are needed to determine the effectiveness of emissions reduction programs (or mitigation strategies) (USEPA, 2001).(3)

Baseline Parameter
Any parameter whose value or status can be monitored in order to validate assumptions about baseline emissions estimates or to help estimate baseline emissions.(1)

Baseline Procedures
Methods used to estimate baseline emissions. The Project Protocol presents two optional procedures: the project-specific procedure and the performance standard procedure.(1)

Baseline Scenario
A hypothetical description of what would have most likely occurred in the absence of any considerations about climate change mitigation.(1)

Benefits
The benefits that would be expected to accrue to decision-makers involved with the activities in each baseline scenario alternative, excluding all potential benefits resulting from GHG reductions.(1)

Biofuels
Fuels made from plant material, e.g. wood, straw and ethanol from plant matter.(4)

Boundaries
GHG accounting and reporting boundaries can have several dimensions, i.e. organizational, operational, geographic, sectoral, business unit, and other.(4)

Calculation tools
A number of cross-sector and sector-specific tools that calculate GHG emissions on the basis of activity data and emissions factors (available at www.ghgprotocol.org).(4)

Cap and trade system
A system that sets an overall emissions limit, allocates emissions allowances to participants, and allows them to trade emissions credits with each other.(4)
A Cap and Trade system involves the trading of emission allowances, where the total allowance is strictly limited or "capped". A regulatory authority establishes the cap which is usually lower (50% to 85%) than the historic level of emissions. Allowances are created to account for the total allowed emissions. Trading occurs when an entity has excess allowances, either through actions taken or improvements made, and sells them to an entity requiring allowances because of growth in emissions or an inability to make cost-effective reductions. Cap and Trade programmes are closed systems, but can be modified to allow the creations of new permits by non-capped sources in the manner of credit-based systems (CO2e.com, 2001).(3)

Carbon Fund
A fund that is established to implement projects aimed at reducing greenhouse emissions. The fund can be financed either by governments, companies or individuals. The projects can then generate credits that would be eligible for an emissions trading scheme. A fund could also be operated as a greenhouse gas reduction fund where companies can invest to offset their greenhouse gas emissions. In the latter case investors may receive carbon credits as dividends that could then traded.(3)

Carbon Stock
The absolute quantity of carbon held within a GHG sink at a specified time (see GHG sink).(1)

CDM Clean Development Mechanism
CDM is a mechanism established by Article 12 of the Kyoto Protocol for project-based emission reduction activities in developing countries. The CDM is designed to meet two main objectives: to address the sustainable development needs of the host country, and to increase the opportunities available to Parties to meet their reduction commitments (CO2e.com).(3)

Certification Programs
Programs where companies and organisations receive recognition for their efforts to reduce greenhouse gas emissions. This certification can be used to brand their products or company as climate friendly.(3)

CER Certified Emission Reduction unit
These are tradable units generated by Projects that reduce emissions in Non-Annex I Parties under the CDM. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Co-generation unit/combined heat and power (CHP)
A facility producing electricity and steam/heat using the waste heat from electricity generation.(4)

Cogeneration
A process that involves the use of waste heat from electric generation, such as exhaust from gas turbines, for industrial purposes or district heating (CO2e.com).(3)

Common Practice
The predominant technology(ies) implemented or practice(s) undertaken in a particular region or sector.(1)

Control
The ability of a company to direct the operating policies of another company or organization.(4)

CO_2 equivalent CO_2e
The universal unit of measurement used to indicate the global warming potential of greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.(1)
The quantity of a given GHG multiplied by its global warming potential. This is the standard unit for comparing the degree of harm which can be caused by emissions of different GHGs.(4)

Tonne of carbon dioxide equivalent
One metric tonne of carbon dioxide (CO_2) or an amount of any other greenhouse gas listed in Annex II with an equivalent global-warming potential.(2)

Cropland management
The system of practices on land on which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production (Kyoto Definition).(3)

Cross-sector calculation tool
A GHG calculation tool that addresses GHG sources common to various sectors, e.g. emissions from stationary or mobile combustion (see also calculation tools).(4)

Decision-Makers
Any parties who might be involved in the decision to implement a project activity or one of its baseline candidates. In most cases, the project developer will be the sole "decision-maker" with respect to the project activity. However, other parties could be the "decision-makers" for baseline candidates.(1)

Deforestation
The direct human-induced conversion of forested land to non-forested land (Kyoto Definition).(3)

Direct GHG emissions
Emissions or removals from GHG sources or sinks that are owned or controlled by the project developer.(1)
Emissions from sources that are owned or controlled by the reporting company.(4)

Direct monitoring
Direct monitoring of exhaust stream contents in the form of continuous emissions monitoring (CEM) or periodic sampling.(4)

DNA
Designated National Authority (Marrakech Accords)

Dynamic baseline
A forecast baseline that adjusts to the changes in the business environment over time.(3)

Dynamic Baseline Emissions
Baseline emission estimates that change over the valid time length of the baseline scenario. Dynamic baseline emissions are often estimated for land-use and forestry projects.(1)

Emissions
The intentional and unintentional release of GHGs into the atmosphere.(4)
The release of greenhouse gases into the atmosphere from sources in an installation.(2)

Emissions Algorithm
A formula to combine activity levels and emissions factors to determine emissions. In general, emissions algorithms can be described in the following simple conceptual form:
Emissions = Activity Level x Emission Factor (Australian Greenhouse Gas Office).(3)

Emissions credit
A commodity giving its holder the right to emit a certain quantity of GHGs. Emissions credits will, in the future, be tradable between countries and other legal entities.(4)

Emissions factor
A factor relating GHG emissions to a level of activity or a certain quantity of inputs or products or services (e.g., tonnes of fuel consumed, or units of a product). For example, an electricity emission factor is commonly expressed as t CO_2eq/megawatt-hour.(1)
A factor relating activity data (e.g. tonnes of fuel consumed, tonnes of product produced) and absolute GHG emissions.(4)

Equity share
The percentage of economic interest in/benefit derived from an operation.(4)

ERU Emission reduction units
These are tradable units generated by Joint Implementation Projects in Annex I Parties. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Quantifiable emissions reductions
Where the emissions, both before and after the control measure, must be quantifiable to an acceptable degree of certainty (New Jersey Open Market Emissions Trading). Detailed quantification of emission reductions resulting from the project. Document the actual reduction beyond the baseline emission level. Describe the actual activity level and associated emissions during the period for the applicable equipment/process as a rate consistent with that used for the baseline (NESCAUM).(3)

Real emission reductions
It means reductions are actual, genuine, and authentic. The credits must be representative of real reductions, that is, reductions of actual emissions, averaged over a representative period of time. Furthermore, creation of credits must not present a "shifting demand" problem, where the control measure causes in increase in operations and emissions from other sources (leakage) (New Jersey Open Market Emissions Trading). An emission reduction is real if it is a reduction in actual emissions, resulting from a specific and identifiable action or undertaking, net leakage of emissions (NESCAUM).(3)

Fuel Switching
Using an alternative fuel (usually of lower carbon intensity) to produce required energy.(1)
The substitution of conventional and existing technologies for more efficient and less carbon-intensive fuel technologies including repowering, upgrading instrumentation, controls, and/or equipment, more efficient utilization of fuel and fuel switching (CO2e.com Definition).(3)

Fugitive emissions
Intentional and unintentional releases of GHGs from joints, seals, packing, gaskets, etc.(4)

Geographic Area
A physical area that helps define the final list of baseline candidates. The area can be defined by a number of factors including socio-cultural, economic, or legal factors; the availability of necessary physical infrastructure; and/or biophysical characteristics.(1)

GHG accounting principles
General accounting principles to underpin GHG accounting and reporting.(4)

GHG Assessment Boundary
Encompasses all primary effects and significant secondary effects associated with the GHG project. Where the GHG project involves more than one project activity, the primary and significant secondary effects from all project activities are included in the GHG assessment boundary.(1)

GHG Emissions
GHGs released into the atmosphere.(1)

GHG emissions permit
The permit issued in accordance with Articles 5 and 6 of the Directive.(2)

GHG Program
A generic term for: (1) any voluntary or mandatory, government or non-government initiative, system, or program that registers, certifies, or regulates GHG emissions; or (2) any authorities responsible for developing or administering such initiatives, systems, or programs.(1)

GHG Project
A specific activity or set of activities intended to reduce GHG emissions, increase the storage of carbon, or enhance GHG removals from the atmosphere. A GHG project may be a stand-alone project, or a component of a larger non-GHG project.(1)

GHG Protocol Initiative and GHG Protocol (GHG Protocol)
A multi-stakeholder partnership of businesses, nongovernmental organisations, governments, academics, and others convened by the World Business Council for Sustainable Development and the World Resources Institute to design and develop internationally accepted GHG accounting and reporting standards and/or protocols, and to promote their broad adoption.(1)
A multi-stakeholder collaboration convened by the World Resources Institute and the World Business Council for Sustainable Development to design, develop and promote the use of an international standard for calculating and reporting business GHGs.(4)

GHG Reductions
A decrease in GHG emissions or an increase in removal or storage of GHGs from the atmosphere, relative to baseline emissions. Primary effects will result in GHG reductions, as will some secondary effects. A project activity's total GHG reductions are quantified as the sum of its associated primary effect(s) and any significant secondary effects (which may involve decreases or countervailing increases in GHG emissions). A GHG project's total GHG reductions are quantified as the sum of the GHG reductions from each project activity.(1)

GHG Sink
Any process that removes GHG emissions from the atmosphere and stores them.(1)

GHG Source
Any process that releases GHG emissions into the atmosphere.(1)

Global warming potential (GWP)
A factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of CO_2.[(4)"]

Green power
Includes renewable energy sources and specific clean energy technologies that reduce GHG emissions relative to other sources of energy that supply the electric grid. Includes solar photovoltaic panels, geothermal energy, landfill gas, and wind turbines.[(4)]

Greenhouse gases (GHGs)
Greenhouse gases are gases that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The six main GHGs whose emissions are human-caused are: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF_6).[(1)]
The gases listed in Annex I of the Directive.[(2)]
For the purposes of this standard/guidance, GHGs are the six gases listed in the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).[(4)]

Heating value
The amount of energy released when a fuel is burned completely. Care must be taken not to confuse higher heating values (HHVs), used in the US and Canada, and lower heating values, used in all other countries (for further details refer to the calculation tool for stationary combustion available at www.ghgprotocol.org).[(4)]

Indirect GHG emissions
Emissions or removals that are a consequence of a project activity, but occur at GHG sources or sinks not owned or controlled by the project developer.[(1)]
Emissions that are a consequence of the activities of the reporting company, but occur from sources owned or controlled by another company.[(4)]

Installation
A stationary technical unit where one or more activities listed in Annex I are carried out and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution.[(2)]

Intergovernmental Panel on Climate Change (IPCC)
International body of climate change scientists. The role of the IPCC is to assess the scientific, technical and socio-economic information relevant to the understanding of the risk of human-induced climate change (www.ipcc.ch).[(4)]

Inventory
A list of an organization's GHG emissions and sources.[(4)]

Inventory quality
The extent to which an inventory provides accurate information.[(4)]

JI Joint Implementation
Refers to emission reduction projects jointly implemented by entities within different industrial nations. JI is an extension of the concept developed in the Activities Implemented Jointly pilot that ends in 2000 (CO2e.com).[(3)]

Kyoto Protocol
A protocol to the International Convention on Climate Change - once entered into force it will require countries listed in its Annex B (developed nations) to meet reduction targets of GHG emissions relative to their 1990 levels during the period 2008-12.[(4)]

Leakage
Indirect effect of emission reduction policies or activities that lead to a rise in emissions elsewhere (e.g. fossil fuel substitution leads to a decline in fuel prices and a rise in fuel use elsewhere). For land use change and forestry activities, leakage can be defined as the unexpected loss of estimated net carbon sequestered. Specific to CDM/AIJ/JI projects in both forestry and energy sectors, leakage can be a result of unexpected effects including unforeseen circumstances, improperly defined baseline, improperly defined project lifetime or project boundaries, and inappropriate project design (CSDA, 2002).[(3)]

ICER Long-term Certified Emission Reduction unit
These are tradable units generated by Projects that enhance removals of greenhouse gases from the

atmosphere in Non-Annex I Parties under the CDM. ICERs expire at the end of the crediting period of the Project (though these crediting periods may be renewed such that the Project may continue for up to 60 years). ICERs may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Legal Requirements
ny mandatory laws or regulations that directly or indirectly affect GHG emissions associated with a project activity or its baseline candidates, and that require technical, performance, or management actions. Legal requirements may involve the use of a specific technology (e.g., gas turbines instead of diesel generators), meeting a certain standard of performance (e.g., fuel efficiency standards for vehicles), or managing operations according to a certain set of criteria or practices (e.g., forest management practices).(1)

LULUCF
Land Use, Land-Use Change and Forestry.(4)

Market Response
he response of alternative providers or users of an input or product to a change in market supply or demand caused by the project activity.(1)

Mobile combustion
Burning of fuels by transportation devices such as cars, trucks, trains, aeroplanes, ships etc.(4)

New entrant
Any installation carrying out one or more of the activities indicated in Annex I, which has obtained a greenhouse gas emissions permit or an update of its greenhouse gas emissions permit because of a change in the nature or functioning or an extension of the installation, subsequent to the notification to the Commission of the national allocation plan.(2)

Non-Annex 1 countries
Defined in the International Convention on Climate Change as those countries not taking on emissions reduction obligations (see also Annex 1 countries).(4)

Offset
An emissions reduction achieved by undertaking a GHG reduction project.(4)

One-Time Effects
Secondary effects related to the construction, installation, and establishment or the decommissioning and termination of the project activity.(1)

Operator
Any person who operates or controls an installation or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the installation has been delegated.(2)

Organic growth/decline
Increases or decreases in GHG emissions as a result of changes in production output, product mix, plant closures and the opening of new plants.(4)

Outsourcing
The contracting out of activities to other businesses.(4)

Performance Metric
A rate that relates the level of consumption of relevant inputs to the level of production for different baseline candidates, or that relates GHG emissions to the size or capacity of different baseline candidates. Performance metrics are used in developing performance standards.(1)

Performance Standard
A GHG emission rate used to determine baseline emissions for a particular type of project activity. A performance standard may be used to estimate baseline emissions for any number of similar project activities in the same geographic area.(1)

Performance Standard Procedure
A baseline procedure that estimates baseline emissions using a GHG emission rate derived from a numerical analysis of the GHG emission rates of all baseline candidates. A performance standard is sometimes referred to as a multi-project baseline or benchmark, because it can be used to estimate baseline emissions for multiple project activities of the same type.(1)

Permit
A marketable instrument giving its holder the right to emit a certain quantity of GHGs.(4)

Person
Any natural or legal person.(2)

Primary Effect
The intended change caused by a project activity in GHG emissions, removals, or storage associated with a GHG source or sink. Each project activity will generally have only one primary effect.(1)

Process emissions
Emissions generated from manufacturing processes, such as cement or ammonia production.(4)

Production-Based Performance Standard
A performance standard defined as a rate of GHG emissions per unit of a product or service produced by all identified baseline candidates. This type of performance standard will generally apply to energy efficiency, energy generation, and industrial process project activities.(1)

Project Activity
A specific action or intervention targeted at changing GHG emissions, removals, or storage. It may include modifications or alterations to existing production, process, consumption, service, or management systems, as well as the introduction of new systems.(1)

Project Developer
A person, company, or organisation developing a GHG project.(1)

Project GHG Accounting and Reporting
An additional module of the GHG Protocol covering GHG emissions accounting for GHG reduction projects.(4)

Project-Specific Procedure
A baseline procedure that estimates baseline emissions through the identification of a baseline scenario specific to the proposed project activity.(1)

The Public
One or more persons and, in accordance with national legislation or practice, associations, organisations or groups of persons.(2)

Ratio indicator
Indicators providing information on relative performance, e.g. GHG emissions per production volume.(4)

Registries
A registry is a term used on the trading floor to indicate which emission reductions on offer have been registered with an independent emission reduction registry. Each registry applies its own criteria to determine what emissions merit registering. The registration process can vary widely from verification against rigorous measurement protocol to simply dating the registrant's, as yet, unverified claims (Co2e.com, 2001).(3)

Relevant Input
Any kind of material or energy that is: (1) required to produce the product or service common to all baseline candidates, and (2) related to the project activity's primary effect.(1)

Renewable energy
Energy taken from sources that are inexhaustible, e.g. wind, solar and geothermal energy, and biofuels.(4)

Reporting
Presenting data to internal management and external users such as regulators, shareholders, the general public or specific stakeholder groups.(4)

Reporting for control
An approach for setting organizational boundaries. This requires reporting 100 percent of GHG emissions from controlled entities/facilities.(4)

Reporting for equity share
An approach for setting organizational boundaries. This requires reporting the equity share equivalent of GHG emissions from entities/facilities under control and significant influence.(4)

RMU Removal units
These are tradable units generated on the basis of removals of greenhouse gases from the atmosphere through LULUCF activities under Articles 3.3 and 3.4 of the Kyoto Protocol. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Retrofit Project
Any GHG project that involves modifying existing equipment, or replacing existing equipment with new parts, devices, or systems.(1)

Scope
Defines the operational boundaries in relation to indirect and direct GHG emissions.(4)

Scope 1 inventory
A reporting organization's direct GHG emissions.(4)

Scope 2 inventory
A reporting organization's emissions from imports of electricity, heat, or steam.(4)

Scope 3 Inventory
A reporting organization's indirect emissions other than those covered in scope 2.(4)

Secondary Effect
An unintended change caused by a project activity in GHG emissions, removals, or storage associated with a GHG source or sink. Secondary effects may be “positive” (i.e., resulting in GHG reductions) or “negative” (i.e., resulting in GHG emissions).(1)

Sector specific calculation tools
A GHG calculation tool that addresses GHG sources that are unique to certain sectors, e.g. process emissions from aluminium production (see also Calculation tools).(4)

Sequestration
The uptake and storage of CO_2. CO_2 can be sequestered by plants and in underground/deep sea reservoirs.(1)

Significant influence
For definition, refer to Chapter 3 of the Corporate Standards: Setting organizational boundaries.(4)

Significant threshold
A qualitative or quantitative criteria used to define a significant structural change. It is the responsibility of the company/verifier to determine the 'significant threshold' for considering base year emissions adjustment. In most cases the 'significant threshold' depends on the use of the information, the characteristics of the company, and the features of structural changes.(4)

Sink
Place where carbon is stored, mostly used for forests and underground/deep sea reservoirs of CO_2.(4)

Source
Any process or activity, which releases GHGs into the atmosphere.(4)

Static Baseline Emissions
Baseline emission estimates that do not change over the valid time length of the baseline scenario.(1)

Stationary combustion
Burning of fuels to generate electricity, steam or heat.(4)

Stringency Level
A GHG emission rate that is more restrictive than the average GHG emission rate of all baseline candidates. Stringency levels may be specified as a GHG emission rate corresponding to a certain percentile (better than the 50^{th} percentile) or to the lowest-emitting baseline candidate. Stringency levels are defined in the course of developing a performance standard.(1)

Structural change
A significant change in the size or kind of operation of a business case.(4)

Temporal Range
A contiguous time period that helps define the final list of baseline candidates. The temporal range can be defined by a number of factors, such as the dominance of a single technology for an extended period of time, the diversity of options in a sector or region, and/or a discrete change in an area’s or a region’s policy, technology, practice, or resource.(1)

tCER Temporary Certified Emission Reduction unit
These are tradable units generated by Projects that enhance removals of greenhouse gases from the atmosphere in Non-Annex I Parties under the CDM. tCERs expire at the end of the Commitment Period subsequent to the Commitment Period within which they were issued. tCERs may be counted by Annex I

Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases.(4)

Time-Based Performance Standard
A performance standard defined as a rate of GHG emissions per unit of time and unit of size or capacity of the baseline candidates. This type of performance standard will generally apply to project activities involving storage or removals of CO_2 by biological processes, fugitive emissions and waste emissions.(1)

Uncertainty
The likely difference between a reported value and a real value.(4)

Upstream/Downstream Effects
Secondary effects associated with the inputs used (upstream) or the products produced (downstream) by a project activity.(1)

Valid Time Length for the Baseline Scenario
The time period over which baseline emission estimates, derived from a baseline scenario or performance standard, are considered valid for the purpose of quantifying GHG reductions. Once the valid time length for the baseline scenario expires, either no further GHG reductions are recognized for the project activity, or a new (revised) baseline scenario or performance standard must be identified.(1)

Value chain module
An additional module of the GHG Protocol covering GHG emissions accounting for activities happening upstream and downstream from a business. This is work in progress.(4)

Validation and Verification
Verification is often undertaken during a due diligence process in a buy/sell transaction. It provides independent assurance that actual or expected emission reductions have been/will be achieved from an emission reduction project during a specified period. The level of assurance provided will depend on the procedures undertaken by the independent verifier, the scope of which is usually agreed by the transacting parties.(3)

Verification
The systematic examination of greenhouse gas emissions information, using audit-based skills by an independent third party. Verification involves analytical review of a data acquisition process, assessment and testing of internal controls, and the validation of data. Verification will be a key step towards certification. Certification is the final stage of the emissions reduction process, when project reduction activity transforms into a commodity (emission credits or allowances). Kyoto compliant certification will only truly begin with the establishment of various rules and modalities within the Kyoto Protocol process (CO2e.com).(3)
Verification is the objective and independent assessment of whether the reported GHG inventory properly reflects the GHG impact of the company in conformance with the pre-established GHG accounting and reporting standards.(4)

Voluntary Initiatives and Other Programs
A number of other voluntary initiatives exist that all work towards reducing greenhouse gas emissions. These initiatives operate in the absence of any government regulation mandating emission reductions. There are also a number of programs that have been initiated to determine how emission reduction programs may operate or how best to achieve emission reductions or to facilitate the establishment of emission trading schemes.(3)

Sources:

1 The GHG Protocol for Project Accounting (Biblio 21)

2 European Directive 2003/87 (Biblio 1)

3 Review of Existing Schemes and Initiatives (Biblio 19)

4 http://www.ghgprotocol.org/templates/GHG5/layout.asp?type=p&MenuId=OTEz

2.5. Organisations

2.5.1. GHG Protocol[3]

2.5.1.1. The GHG Protocol Initiative

The Greenhouse Gas Protocol Initiative (GHG Protocol) aims at harmonizing GHG accounting and reporting standards internationally to ensure that different trading schemes and other climate related initiatives adopt consistent approaches to GHG accounting. The development of these standards and corresponding tools has become increasingly relevant since the ratification of Kyoto and the development of national, and other relevant GHG emissions trading schemes both within and outside of the Kyoto framework.

The GHG Protocol is a broad international coalition of businesses, non-governmental organizations (NGOs), government and inter-governmental organizations. It operates under the umbrella of the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), and brings together leading experts on greenhouse gas emissions to develop internationally accepted accounting and reporting standards. The participants are working in partnership to design, disseminate and promote the use of globally applicable accounting and reporting standards for GHG emissions.

The GHG Protocol Initiative consists of two modules:

- The Corporate GHG Accounting and Reporting Standard (Corporate Module), which helps companies and other organizations to identify, calculate, and report GHG emissions. The corporate accounting and reporting standard builds on the experience and knowledge of over 350 leading experts drawn from businesses, NGOs, governments and accounting associations. It has been road tested by over 30 companies in nine countries.
- The Project GHG Accounting and Reporting Standard (Project Module) which aims at developing accounting and reporting standards and / or general guidance for both emission reduction and land use, land-use change and forestry (LULUCF) projects.

The GHG Protocol also provides practical tools with additional guidance to help companies calculate their GHG emissions from various sources.

2.5.1.2. Development of the Project Module

The development of a protocol to assist companies and project developers quantify GHG emissions from GHG reduction projects was a natural step for the GHG Protocol team after the development of the Corporate Accounting Standard.

WRI and WBCSD were approached by a number of companies and inter-governmental organizations with proposals to help develop a project accounting module that could help inform both project developers and GHG program developers.

In response, GHG Protocol established a project accounting and reporting module with the aim of developing accounting and reporting standards and/or general guidance for both emission reduction and land use, land-use change and forestry (LULUCF) projects.

This process drew on already existing material and best practices, while seeking to resolve differences and addressing issues that have received limited attention to date.

2.6. Schemes

There are a number of existing and emerging emissions trading schemes, registries, certification programs, carbon funds and voluntary initiatives globally. These schemes are in various stages of development and the level of complexity and their requirements vary quite considerably. Below is a slightly dated, yet comprehensive review of such programs, as well as current information and links to specific initiatives.

[3] www.ghgprotocol.org

2.6.1. Cap and Trade Programs

A Cap and Trade system involves the trading of emission allowances, where the total allowance is strictly limited or 'capped'. A regulatory authority establishes the cap which is usually lower (50% to 85%) than the historic level of emissions. Allowances are created to account for the total allowed emissions. Trading occurs when an entity has excess allowances, either through actions taken or improvements made, and sells them to an entity requiring allowances because of growth in emissions or an inability to make cost-effective reductions. Cap and Trade programmes are closed systems, but can be modified to allow the creations of new permits by non-capped sources in the manner of credit-based systems (CO2e.com, 2001).

There are two types of existing Cap and Trade systems, those with project reductions and those without project reductions. Below are links to specific programs of each type.

Schemes with project reductions

- Chicago Climate Exchange
- EU Greenhouse Gas Emissions Trading Scheme (EU ETS)
- Kyoto Protocol (International)
- UK Emissions Trading Scheme (implemented by DEFRA)
- The Climate Trust (Oregon)
- Regional Greenhouse Gas Initiative (RGGI - Northeast US)
- Energy Efficiency Certificates Trading Scheme (New South Wales, Australia)

Schemes without project reductions

- European Climate Change Programme (ECCP)
- Greenhouse Gas Emissions Reduction Trading Pilot (GERT - Canada)

2.6.2. Registries

A registry is a term used on the trading floor to indicate which emission reductions on offer have been registered with an independent emission reduction registry. Each registry applies its own criteria to determine what emissions merit registering. The registration process can vary widely from verification against rigorous measurement protocol to simply dating the registrant's, as yet, unverified claims (Co2e.com, 2001). There are a number of registries that use the GHG Protocol Corporate Standard in establishing their own accounting and reporting standards. Below are links to several of these programs worldwide.

- Mexico GHG Program
- California Climate Action Registry
- US EPA Climate Leaders
- WWF Climate Savers
- World Economic Forum Global GHG Register
- European Pollutant Emission Registry
- Canadian GHG Registries

2.6.3. Carbon Funds

A Carbon Fund is a fund that is established to implement projects aimed at reducing greenhouse emissions. The fund can be financed either by governments, companies or individuals. The projects can then generate credits that would be eligible for an emissions trading scheme. A fund could also be operated as a greenhouse gas reduction fund where companies can invest to offset their greenhouse gas emissions. In the latter case investors may receive carbon credits as dividends that could then traded. Below is a list of existing Carbon Funds.

For instance, Hancock New Forests Australia (HNFA) operates as an investment fund that invests in reforestation projects in Australia using native species only. These projects are related to Article 3.3 of the Kyoto Protocol and they anticipate that the credits produced through these projects will be compatible with the Kyoto Protocol's RMU unit.

Prototype Carbon Fund

Partnership between 17 companies and 6 governments, managed by the World Bank, the PCF became operational in April 2000. The Prototype Carbon Fund (PCF) operated by the World Bank funds JI and CDM projects in countries that are signatories of the Kyoto Protocol. Projects must meet specific project selection criteria and conform to PCF procedures to ensure high quality emission reductions. The PCF may support projects directly or through participation in local or regional funds it helps to establish. The minimum requirements for PCF projects are listed in Appendix 1. The aim of the PCF is to:

- Illustrate how project-based emissions reductions can promote sustainable development in developing countries;
- Provide an opportunity to "learn by doing" while the guidelines for emissions trading under the UNFCCC and/or the Kyoto Protocol are still being negotiated; and
- Demonstrate how the World Bank can mobilise new resources from both public and private sources to assist developing countries while pursuing environmental goals.

As the first carbon fund, its mission is to pioneer the market for project-based greenhouse gas emission reductions while promoting sustainable development and offering a learning-by-doing opportunity to its stakeholders.

BioCarbon Fund

The World Bank has mobilized a new fund to demonstrate projects that sequester or conserve carbon in forest and agro-ecosystems. The Fund, a public/private initiative administered by the World Bank, aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. The Fund started operations in May 2004 and has a total capital of $53.8 million.

Community Development Carbon Fund

The CDCF provides carbon finance to small-scale projects in the poorer areas of the developing world. The Fund, a public/private initiative designed in cooperation with the International Emissions Trading Association and the United Nations Framework Convention on Climate Change, became operational in July 2003. The first tranche of the CDCF is capitalized at $128.6 million with nine governments and 15 corporations/organizations participating in it and is closed to further subscriptions. The CDCF supports projects that combine community development attributes with emission reductions to create "development plus carbon", and will use financial innovation to improve the lives of the poor.

UK Carbon Trust

The UK Carbon Trust is a voluntary initiative between government and industry. The Carbon Trust's Low Carbon Innovation Programme (LCIP) will act in part like a venture capital company seeking a carbon return rather than a financial return. CDM and JI projects are unlikely to be included in the program but it may fund companies to make use of low carbon technology reduction projects.

Italian Carbon Fund

In fall 2003 the World Bank entered into an agreement with the Ministry for the Environment and Territory of Italy to create a fund to purchase greenhouse gas emission reductions from projects in developing countries and countries with economies in transition that may be recognized under such mechanisms as the Kyoto Protocol's CDM and JI. The Fund is open to the participation of Italian private and public sector entities.

The Netherlands CDM Facility

The World Bank announced an agreement with The Netherlands in May 2002, establishing a facility to purchase greenhouse gas emission reduction credits. The Facility supports projects in developing countries that generate potential credits under the Clean Development Mechanism (CDM) established by the Kyoto Protocol to the UN Framework Convention on Climate Change.

The Netherlands European Carbon Facility

The Netherlands, acting through its Ministry of Economic Affairs, the World Bank and the International Finance Corporation (IFC) in August 2004, signed an agreement appointing the World Bank and the IFC as Trustees of the Netherlands European Carbon Facility, in order to purchase greenhouse gas emission reductions for the benefit of the Netherlands. The Facility purchases emission reductions from JI projects only, i.e. from projects located in countries with economies in transition.

Danish Carbon Fund

The Danish Carbon Fund (DCF) was established in January 2005 with two public sector participants (the Ministry of Foreign Affairs of Denmark and the Ministry of the Environment of Denmark) and two private sector participants (Elsam Kraft and Energi E2). In the summer of 2005, three other private sector participants (Aalborg Portland, Nordjysk Elhandel, and Maersk Olie og Gas) joined the DCF, increasing the Fund's capital from 46.3 million euros in January 2005 to 57.985 million euros in August 2005.

Spanish Carbon Fund

The Spanish Carbon Fund was created in 2004 in an agreement between the Ministries of Environment and Economy of Spain and the World Bank. This fund was established to purchase greenhouse gas emission reductions from projects developed under the Kyoto Protocol to mitigate climate change while promoting the use of cleaner technologies and sustainable development in developing countries and countries with economies in transition.

Umbrella Carbon Facility

The UCF is an aggregating facility to pool funds from existing IBRD-managed carbon funds and other participants for the purchase of emission reductions from large projects. The Facility would have multiple tranches, with the First Tranche dedicated to purchasing Certified Emission Reductions (CERs) from the China HFC-23 projects.

Australian Greenhouse Gas Abatement Program (GGAP)

The Australian Greenhouse Gas Abatement Program (GGAP) is a major Government initiative to assist Australia in meeting its commitments under the Kyoto Protocol. The objective of GGAP is to reduce Australia's net greenhouse gas emissions by supporting activities that are likely to result in substantial emission reductions or substantial sink enhancement, particularly in the first commitment period under the Kyoto Protocol (2008-2012). Four hundred million dollars has been allocated to the Program between 2000-2001 to 2003-2004. GGAP is targeting opportunities for large-scale, cost-effective and sustained abatement across the economy and will only support projects that will result in quantifiable and additional abatement not expected to occur in the absence of GGAP funding. Priority will be given to projects that will deliver reductions exceeding 250,000 tonnes of carbon dioxide equivalents (CO_2e) per annum. Projects that do not meet this threshold but meet other criteria to a high degree may be selected.

In keeping with the Government's commitment to reduce greenhouse gas emissions through cost-effective actions that minimise the burden for business and the community, GGAP will seek out projects with a low cost for each tonne of emissions that is reduced or avoided. GGAP employs a competitive selection process, with two key cost-effectiveness indicators informing project selection: GGAP funds per metric tonne of reasonably assured and additional CO_2e estimated to be reduced in 2008-2012; and net national cost per metric tonne of reasonably assured and additional CO_2e estimated to be abated in 2008-2012.

Projects funded under GGAP are also expected to provide complementary benefits, for example opportunities for rural and regional Australia, ecologically sustainable development, employment growth, the use of new technologies and innovative processes, and non-government investment.

Natsource's C-Tech

Natsource's C-Tech fund is another carbon fund and considers emission reduction projects in developed countries. LULUCF projects are not eligible though.

Hancock Timber Resource Group

Hancock Timber Resource Group (HTRG) was founded in 1985 and is based in Boston, Massachusetts. It develops and manages globally diversified timberland portfolios for public and corporate pension plans, high net-worth individuals, and foundations and endowments. As of December 31, 2005, assets under management totalled $5.2 billion. These assets are located in North America, Australia, New Zealand, and Brazil.

2.6.4. Certification Programs

Certification Programs are programs where companies and organisations receive recognition for their efforts to reduce greenhouse gas emissions. This certification can be used to brand their products or company as climate friendly. Below are links to two existing certification programs.

- Climate Neutral Network
- Future Forests

2.6.5. Other Schemes and Initiatives

A number of other voluntary initiatives exist that all work towards reducing greenhouse gas emissions. These initiatives operate in the absence of any government regulation mandating emission reductions. There are also a number of programs that have been initiated to determine how emission reduction programs may operate or how best to achieve emission reductions or to facilitate the establishment of emission trading schemes. Below is a list of existing voluntary initiatives.

- Canadian Tradable Permits Working Group (TPWG)
- Canada's National Climate Change Process
- Canada's Baseline Protection Initiative

2.7. ISO 14064

From the previous developments, it's clear that he community must use uniform methods for the calculation and the registration of the GHG emissions. It has been done with the ISO 14064 norm, which is organised in 3 parts:

- ISO 14064-1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
- ISO 14064-2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
- ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions

The present report is focused on the application of the Kyoto Protocol to SHW landfilling. When abandoned in dumpsites or disposed in landfills, the SHW decompose and produce biogas mainly composed of methane and carbon dioxide. It's a GHG emission. When a landfill is equipped with a biogas collection system and a combustion equipment, the methane of the biogas is transformed in carbon dioxide and steam. As the methane has a global warming potential (GWP) of 21 times the carbon dioxide, there's a reduction of the greenhouse effect of the emitted gases. The GWP is mass-based. It means that

1 tonne CH_4 is equivalent to 21 tonnes CO_2. Caution: tonnes of biogas are not tonnes of methane. A lot of studies on landfill biogas give production of biogas in Nm^3 (Normo-cubic meters: cubic meters in the standard conditions of pressure (1 atmosphere) and temperature (20°C)) of biogas or Nm^3 of methane, with a volumetric rate between 40-60% methane in the biogas.

So all efforts aiming at the disposal of SHW in sanitary landfills equipped with biogas collection constitute a greenhouse gas emission reduction, in comparison with the former practice. The former practice must be valuated in GHG emissions at the reference year. The new practice constitutes a reduction of emissions, and so, at the country level, a right to emit for other organisations within the limit of the reference year.

This part will clarify the conditions for an access to the international market of carbon rights, as they are defined in the international standard. The text issued from the standard is in italic.

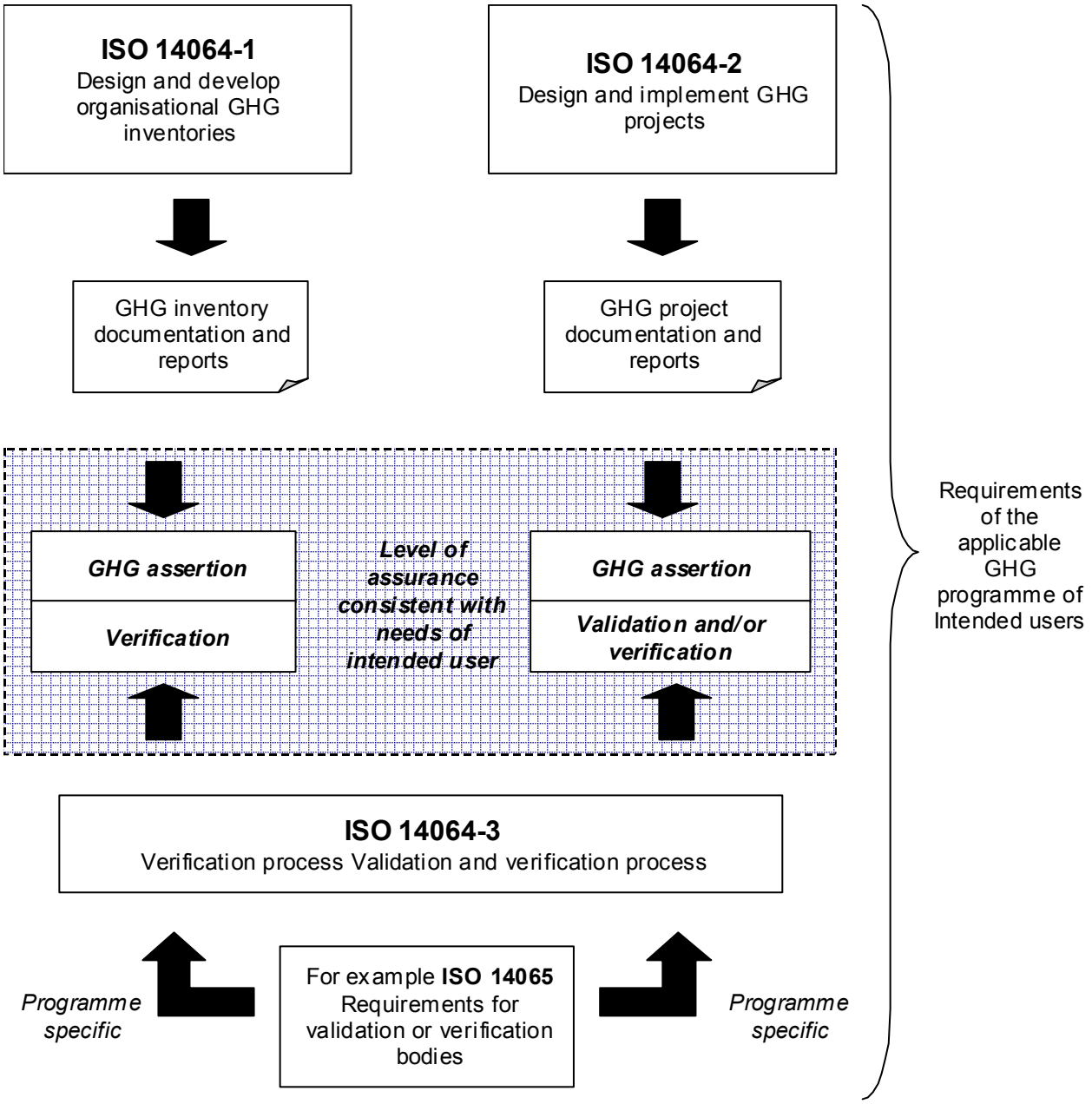


Figure 1 Relationships between the parts of ISO 14064

2.7.1. ISO 14064-1 Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

2.7.1.1. 3 Principles

The application of principles is fundamental to ensure that GHG-related information is a true and fair account.

2.7.1.2. 4 GHG inventory design and development

A company, either public or private, can operate several landfills. The company is an "*organisation*" and the landfills are the "*facilities*".

The organization shall consolidate its facility-level GHG emissions and removals by one of the following approaches:

a) control: the organization accounts for all quantified GHG emissions and/or removals from facilities over which it has financial or operational control; or

b) equity share: the organization accounts for its portion of GHG emissions and/or removals from respective facilities.

The organization shall establish and document its operational boundaries. The establishment of operational boundaries includes identifying GHG emissions and removals associated with the organization's operations, categorizing GHG emissions and removals into direct emissions, energy indirect emissions and other indirect emissions. It includes choosing which of the other indirect emissions will be quantified and reported. The organization shall explain any changes to its operational boundaries.

The organization shall quantify direct GHG emissions from facilities within its organizational boundaries.

The organization should quantify GHG removals from facilities within its organizational boundaries.

CO_2 emissions from the combustion of biomass shall be quantified separately.

2.7.1.2.1. 4.3 Quantification of GHG emissions and removals

2.7.1.2.1.1. 4.3.1 Quantification steps and exclusions

Within its organizational boundaries, the organization shall quantify and document GHG emissions and removals by completing, as applicable, the following steps:

a) identification of GHG sources and sinks (2.7.1.2.1.2);

b) selection of quantification methodology (2.7.1.2.1.3);

d) selection or development of GHG emission or removal factors (2.7.1.2.1.5);

e) calculation of GHG emissions and removals (2.7.1.2.1.6).

The organization may exclude from quantification direct or indirect GHG sources or sinks whose contribution to GHG emissions or removals is not material or whose quantification would not be technically feasible or cost effective.

The organization shall explain why certain GHG sources or sinks are excluded from quantification.

2.7.1.2.1.2. 4.3.2 Identification of GHG sources and sinks

The organization shall identify and document GHG sources contributing to its direct GHG emissions.

If the organization quantifies GHG removals, the organization shall identify and document GHG sinks contributing to its GHG removals.

The organization shall document the biogas production of the landfills (flows and composition).

2.7.1.2.1.3. 4.3.3 Selection of quantification methodologies

The organization shall select and use quantification methodologies that will reasonably minimize uncertainty and yield accurate, consistent and reproducible results.

The equipment of the landfill will include an equipment of continuous measure and registration of the production of biogas implemented on the collection network: volumetric stream, temperature, pressure, and rate of methane.

2.7.1.2.1.4. 4.3.4 Selection and collection of GHG activity data

Not useful

2.7.1.2.1.5. 4.3.5 Selection or development of GHG emission or removal factors

The organization shall explain its selection or development of GHG emission or removal factors, including identification of their origin and appropriateness for the intended use for the GHG inventory.

The company shall describe the system transforming CH_4 into CO_2 (flare, furnace or boiler, electricity power generator) and its efficiency.

2.7.1.2.1.6. 4.3.6 Calculation of GHG emissions and removals

The organization shall calculate GHG emissions and removals in accordance with the quantification methodology selected (see 2.7.1.2.1.3).

The company will calculate the mass of CH_4 in tonnes and the equivalent mass of CO_2e in tonnes with the coefficient GWP (Global Warming Potential) of 21.

2.7.1.3. 5 GHG inventory components

2.7.1.3.1. 5.1 GHG emissions and removals

The organization shall document the following, where quantified in accordance with Clause 4, separately at facility and organization levels:

— direct GHG emissions for each GHG;

— GHG removals;

— energy indirect GHG emissions;

— other indirect GHG emissions;

— direct CO_2 emissions from the combustion of biomass.

The organization shall use tonnes as the unit of measure and shall convert the quantity of each type of GHG to tonnes of CO_2e using appropriate GWPs.

NOTE 2 Annex C includes GWPs produced by the Intergovernmental Panel on Climate Change.

The mechanism is a removal of GHG by transformation of CH_4 into CO_2 because the GWP of CH_4 is 21. A subsidiary question is that this transformation (combustion) should not generate N_2O with a GWP of 210.

2.7.1.3.2. 5.2 Organizational activities to reduce GHG emissions or increase GHG removals

2.7.1.3.2.1. 5.2.1 Directed actions

The organization may plan and implement directed actions to reduce or prevent GHG emissions or increase GHG removals.

The organization may quantify GHG emission or removal differences attributable to the implementation of directed actions. GHG emission or removal differences resulting from directed actions will usually be reflected in the organization's GHG inventory, but may also result in GHG emission or removal differences outside GHG inventory boundaries.

If quantified, the organization should document its directed actions.

If reported, the organization shall report directed actions and associated GHG emission or removal differences separately and shall describe

a) the directed action,

b) the spatial and temporal boundaries of the directed action,

c) the approach used to quantify GHG emission or removal differences, and

d) the determination and classification of GHG emission or removal differences attributable to directed actions as direct, indirect or other types of GHG emissions or removals.

The biogas can be burnt in three classes of equipments: flares, furnaces and boilers, engines for electricity production. The exhaust gases of these equipments must be analysed in aim to quantify the methane and the N_2O that could be emitted to atmosphere.

For flares, it must be decided a procedure of control: frequency of the samplings, methodology of sampling, analyses.

For furnaces and boilers, there's a chimney that can be equipped with a continuous analyser of the main gases. It's the same for the engine exhausts that can be additionally equipped with a catalytic converter reducing un-burnt and NOx.

The norm indicates as example of directed action the " fuel switching or substitution". Biogas can be used as fuel for vehicles engines or other purposes but it could not be accounted twice for GHG reduction and these efforts seem to be relevant of energy saving and not GHG reduction.

2.7.1.3.3. 5.3 Base-year GHG inventory

2.7.1.3.3.1. 5.3.1 Selection and establishment of base year

The organization shall establish an historical base year for GHG emissions and removals for comparative purposes or to meet GHG programme requirements or other intended uses of the GHG inventory.

If sufficient information on historical GHG emissions or removals is not available, the organization may use its first GHG inventory period as the base year.

In establishing the base year, the organization

a) shall quantify base-year GHG emissions and removals using data representative of the organization's activity, typically single-year data, a multi-year average or a rolling average,

b) shall select a base year for which verifiable GHG emissions or removals data are available,

c) shall explain the selection of the base year, and

d) shall develop a GHG inventory for the base year consistent with the provisions of this part of ISO 14064.

The organization may change its base year, but shall explain any change to the base year.

According to the Kyoto Protocol, Ukraine is a country "undergoing the process of transition to a market economy". According to Article 3 §5 & §7, the historical base year or period for the implementation of its commitments is 1990 and according to Annex B, for the first quantified emission limitation and reduction commitment period, from 2008 to 2012, its assigned amount is 100%.

Anyway, the directed action or the project is based on the fact that the usual way to dispose today the household waste should emit methane to atmosphere and that the biogas collection and combustion will reduce the GHG emissions. So it should be interesting to estimate the production of household waste at the national level in 1990 and to compare with the today's production. The same should be done for the composition of the household waste and we dispose of the official figures of 1987.

2.7.1.3.3.2. 5.3.2 Recalculation of GHG inventory

The organization shall not recalculate its base-year GHG inventory to account for changes in facility production levels, including the closing or opening of facilities.

The organization should document base-year recalculations in subsequent GHG inventories.

2.7.1.3.4. 5.4 Assessing and reducing uncertainty

The organization should complete and document an uncertainty assessment for GHG emissions and removals, including the uncertainty associated with emission and removal factors.

The organization may apply the principles and methods of Reference [5] in completing the uncertainty assessment.

The equipment of the biogas collection and combustion will include analysers and counters, so the uncertainty assessment will be based on the uncertainty of these equipments.

2.7.1.4. 6 GHG inventory quality management

2.7.1.4.1. 6.1 GHG information management

2.7.1.4.1.1. 6.1.1 Principles

The organization shall establish and maintain GHG information management procedures that

a) ensure conformance with the principles of this part of ISO 14064,

b) ensure consistency with the intended use of the GHG inventory,

c) provide routine and consistent checks to ensure accuracy and completeness of the GHG inventory,

d) identify and address errors and omissions, and

e) document and archive relevant GHG inventory records, including information management activities.

2.7.1.4.1.2. 6.1.2 Information management procedure

The organization's GHG information management procedures should consider the following:

a) identification and review of the responsibility and authority of those responsible for GHG inventory development;

b) identification, implementation and review of appropriate training for members of the inventory development team;

c) identification and review of organizational boundaries;

d) identification and review of GHG sources and sinks;

e) selection and review of quantification methodologies, including GHG activity data and GHG emission and removal factors that are consistent with the intended use of the GHG inventory;

f) a review of the application of quantification methodologies to ensure consistency across multiple facilities;

g) use, maintenance and calibration of measurement equipment (if applicable);

h) development and maintenance of a robust data-collection system;

i) regular accuracy checks;

j) periodic internal audits and technical reviews;

k) a periodic review of opportunities to improve information management processes.

This procedure is comparable to the ISO 9000 usual procedures. About the point g) the calibration of the gas analysers supposes to dispose of "gauge samplings" of gases mix.

2.7.1.4.2. 6.2 Document retention and record keeping

The organization shall establish and maintain procedures for document retention and record keeping. The organization shall retain and maintain documentation supporting the design, development and maintenance of the GHG inventory to enable verification. The documentation, whether in paper, electronic or other format, shall be handled in accordance with the organization's GHG information management procedures for document retention and record keeping.

This procedure is comparable to the ISO 9000 usual procedures.

2.7.1.5. 7 Reporting of GHG

2.7.1.5.1. 7.1 General

The organization should prepare a GHG report to facilitate GHG inventory verification, participation in a GHG programme, or to inform external or internal users. GHG reports should be complete, consistent, accurate, relevant and transparent. The organization should determine the content, structure, public availability and methods of dissemination of GHG reports, based on requirements of the applicable GHG programme, internal reporting needs and the needs of intended users of the report.

If the organization makes a public GHG assertion claiming conformance to this part of ISO 14064, the organization shall make available to the public a GHG report prepared in accordance with this part of ISO 14064 or an independent third-party verification statement related to the GHG assertion. If the organization's GHG assertion has been independently verified, the verification statement shall be made available to intended users.

The best is to establish a national or regional third-party verification organisation in charge of the reporting and the publication of the reports for all the landfills.

2.7.1.5.2. 7.2 Planning the GHG report

The organization should consider and document the following in planning its GHG report:

a) purpose and objectives of the report in the context of the organization's GHG policies, strategies or programmes and applicable GHG programmes;

b) intended use and intended users of the report;

c) overall and specific responsibilities for preparing and producing the report;

d) frequency of the report;

e) period for which the report is valid;

f) report format;

g) data and information to be included in the report;

h) policy on availability and methods of dissemination of the report.

A yearly report should be published during the first quarter of the following year. A summary (2 pages) should be widely disseminated toward the population.

2.7.1.5.3. 7.3 GHG report content

2.7.1.5.3.1. 7.3.1 Methodology

The organization's GHG report shall describe the organization's GHG inventory and shall include the following:

a) description of the reporting organization;

b) person responsible;

c) reporting period covered;

d) documentation of organizational boundaries (2.7.1.2.1);

e) direct GHG emissions, quantified separately for each GHG, in tonnes of CO_2e (2.7.1.2.1.2);

g) if quantified, GHG removals, quantified in tonnes of CO_2e (2.7.1.2.1.2);

j) the historical base year selected and the base-year GHG inventory (2.7.1.3.3.1);

l) reference to, or description of, quantification methodologies including reasons for their selection (2.7.1.2.1.3);

m) explanation of any change to quantification methodologies previously used (2.7.1.2.1.3);

n) reference to, or documentation of, GHG emission or removal factors used (2.7.1.2.1.5);

o) description of the impact of uncertainties on the accuracy of the GHG emissions and removals data (2.7.1.3.4);

p) a statement that the GHG report has been prepared in accordance with this part of ISO 14064;

q) a statement describing whether the GHG inventory, report or assertion has been verified, including the type of verification and level of assurance achieved.

From a) to p), this part of the report should be standard.

2.7.1.5.3.2. 7.3.2 Figures

The organization should consider including in the GHG report:

a) a description of the organization's GHG policies, strategies or programmes;

c) if appropriate, description of directed actions and attributable GHG emission or removal differences, including those occurring outside organizational boundaries, quantified in tonnes of CO_2e (2.7.1.3.2.1);

e) as appropriate, a description of applicable GHG programme requirements;

f) GHG emissions or removals disaggregated by the facility;

g) if quantified, other indirect GHG emissions, quantified in tonnes of CO_2e (2.7.1.2.1.4);

h) uncertainty assessment description and results, including measures to manage or reduce uncertainties (2.7.1.3.4);

j) assessment of performance against relevant internal and/or external benchmarks, as appropriate;

k) description of GHG information management and monitoring procedures (2.7.1.5.1).

2.7.1.6. 8 Organization's role in verification activities

2.7.1.6.1. 8.1 General

The overall aim of verification is to review impartially and objectively the reported GHG emissions and removals or GHG assertion against the requirements of ISO 14064-3. On a regular basis, the organization should

a) prepare and plan for verification in accordance with 2.7.1.6.2 and 2.7.1.6.3 respectively,

b) determine an appropriate level of assurance based on the requirements of the intended user of the GHG inventory, taking into account relevant requirements of applicable programmes, and

c) conduct verification consistent with the needs of the intended user and the principles and requirements of ISO 14064-3.

The key-point is that the figures of GHG removals are measured by a set of equipments. The measures must be reliable so these equipments must be checked, controlled and protected against any falsification.

2.7.1.6.2. 8.2 Preparing for verification

In preparing for verification, the organization should

a) develop a verification scope and objectives,

b) review, as applicable, requirements of this part of ISO 14064,

c) review applicable organizational or GHG programme verification requirements,

d) determine the level of assurance required,

e) agree to verification objectives, scope, materiality and criteria with the verifier,

f) ensure that the roles and responsibilities of appropriate staff are clearly defined and communicated,

g) ensure that the organization's GHG information, data and records are complete and accessible,

h) ensure that the verifier has appropriate competence and qualifications, and

i) consider the content of the verification statement.

2.7.1.6.3. 8.3 Verification management

2.7.1.6.3.1. 8.3.1 Verification plan for the organization

The organization should develop and implement a verification plan that includes the following:

a) the verification process, scope, criteria, level of assurance and verification activities as agreed with the verifier;

b) roles and responsibilities for implementing and maintaining the plan;

c) resources necessary to achieve planned outcomes;

d) data sampling and custody procedures;

e) maintenance of necessary documentation and records;

f) processes for monitoring and reviewing the plan;

g) appointment of competent verifiers.

2.7.1.6.3.2. 8.3.2 Verification process

The organization's verification activities should address

a) agreement with the scope, objectives, criteria and level of assurance with the verifier,

b) assessment of GHG data sampling and custody procedures,

c) internal review of the GHG verification statement against criteria, and

d) verification reporting.

2.7.1.6.3.3. 8.3.3 Competence of verifiers

The organization should ensure that all personnel involved in the verification process

a) are aware of GHG management issues,

b) understand the operations and processes that they verify,

c) have the necessary technical expertise to support the verification process, and

d) are familiar with the contents and intent of this part of ISO 14064.

The organization should ensure that the verifier has appropriate competences as defined in ISO 14065.

The organization should select verification personnel who are administratively independent of the operations subject to verification, to ensure objectivity and impartiality in the verification process.

2.7.1.6.3.4. 8.3.4 Verification statement

The organization should request from the verifier a statement that includes, as a minimum

a) a description of the objectives, scope and criteria of the verification activities,

b) a description of the level of assurance, and

c) the verifier's conclusion indicating any qualification or limitations.

2.7.2. ISO 14064-2 Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements

2.7.2.1. 4 Introduction to GHG projects

The GHG project cycle is generally characterized by two main phases - a planning phase and an implementation phase. GHG project cycle steps vary depending upon the project's scale and specific circumstances, including applicable legislation, GHG programmes or standards. Whereas this part of ISO

14064 specifies requirements for GHG project quantification, monitoring and reporting, a typical GHG project cycle may include additional elements as shown in Figure 2.

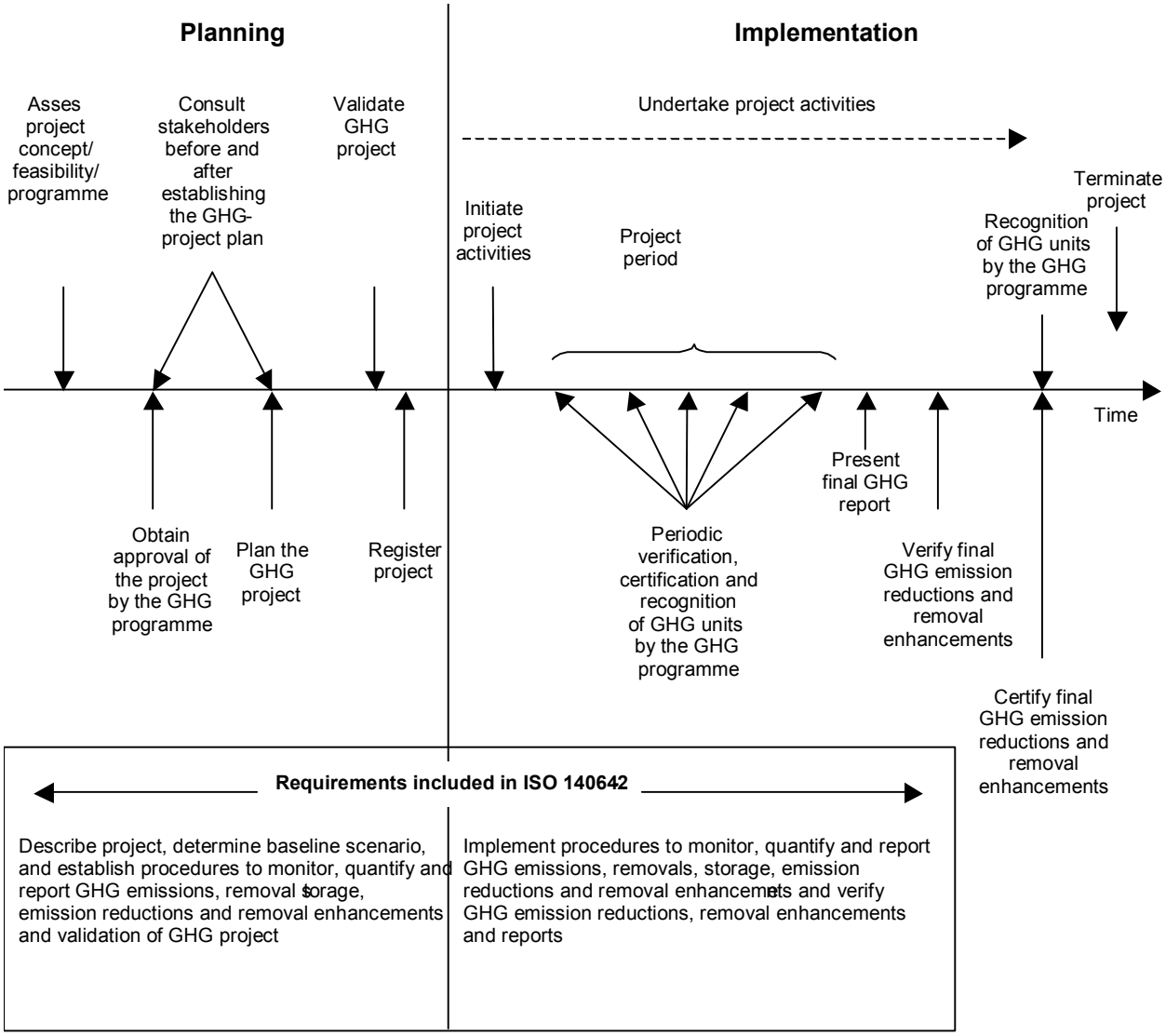


Figure 2 A typical GHG project cycle

NOTE 1 Not all GHG programmes will require all the elements included in this figure.

NOTE 2 A GHG unit is a unit used for GHG accounting. Common GHG units for GHG projects are certified emission reduction units (CER), emission reduction units (ERU), credits and offsets. GHG units are usually expressed in tonnes of CO_2e.

The GHG project proponent might initially identify the project concept, design the project and evaluate its feasibility, consult stakeholders and assess GHG programme eligibility requirements. As appropriate, the project proponent might seek written approval of project acceptance by the applicable GHG programme or responsible government institution.

For Ukraine, the responsible government institution is the Ministry of Ecology and Natural Resources. It must be said that the designation of the Ukrainian national authority for the CDM doesn't appear on the website of United Nations Framework Convention on Climate Change http://cdm.unfccc.int/DNA.

For the planning phase, this part of ISO 14064 specifies requirements for establishing and documenting a GHG project. In planning the GHG project, the project proponent

- describes the project,

- identifies and selects GHG sources, sinks and reservoirs relevant for the project,

- determines the baseline scenario, and

- develops procedures to quantify, monitor and report GHG emissions, removals, emission reductions and removal enhancements.

GHG programmes may require official registration, validation and public distribution of a GHG project plan before project implementation.

For Ukraine,

The project proponent might submit verified GHG emission reductions or removal enhancements to a GHG programme in order to generate recognized GHG units within that GHG programme. Certification and recognition of GHG units (e.g. credits) are beyond the scope of this part of ISO 14064.

In order to have broad and flexible application to different GHG project types and sizes, this part of ISO 14064 establishes principles and specifies process requirements rather than prescribing specific criteria and procedures. Therefore, as shown in Figure 3, additional requirements, criteria and guidance from relevant legislation, GHG programmes, good practice and standards are of vital importance for the credible application of this part of ISO 14064.

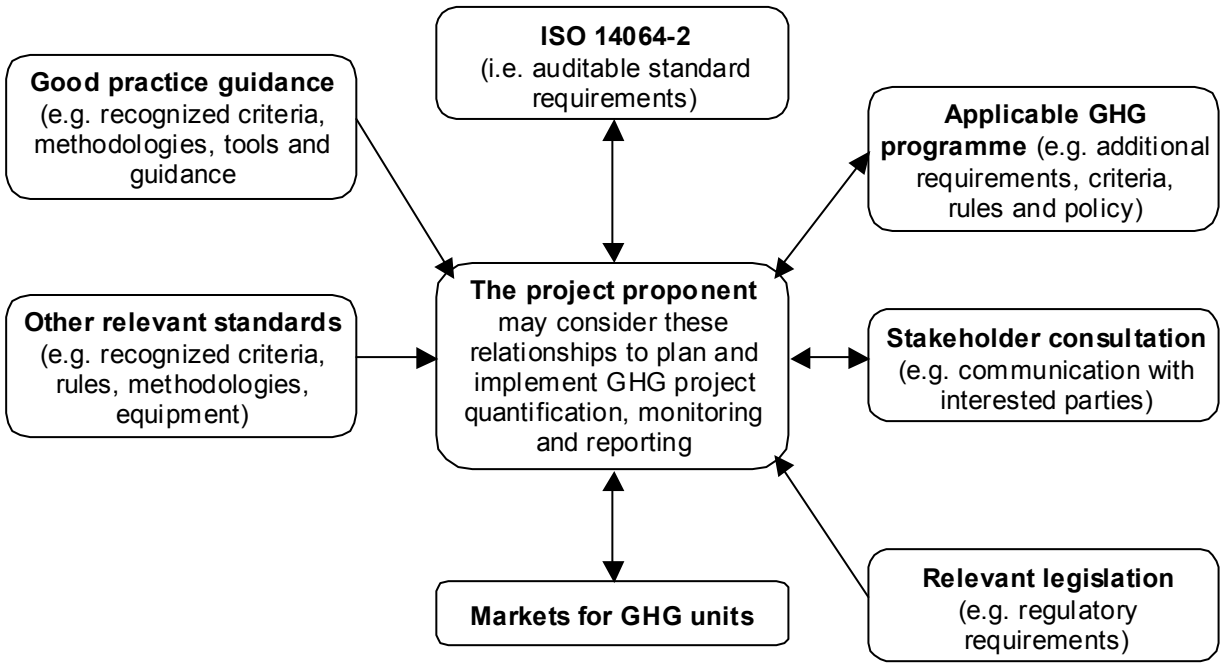


Figure 3 Framework for the use of ISO 14064-2

	Planning phase	Implementation phase
	5.1 General requirements	
5.2 Describe the project	**Develop**	**Update**
5.3 Identify SSRs relevant for the project	**Select or establish and apply** criteria and procedures	-
5.4 Determine the baseline scenario	**Select or establish and apply** criteria and procedures	**Update**
5.5 Identify SSRs for the baseline scenario	**Select or establish and apply** criteria and procedures	-
5.6 Select relevant SSRs for monitoring or estimation	**Select or establish and apply** criteria and procedures	-
5.7 Quantify emissions and/or removals	**Select or establish and apply** criteria and procedures	**Apply** criteria and procedures
5.8 Quantify emission reductions and removal enhancements	**Select or establish and apply** criteria and procedures	**Apply** criteria and procedures
5.9 Manage data quality	**Select or establish and apply** criteria and procedures	**Apply** criteria and procedures
5.10 Monitor the GHG project	**Select or establish and apply** criteria and procedures	**Apply** criteria and procedures
5.11 Document the GHG project	**Establish** criteria and procedures	**Apply** criteria and procedures
5.12 Validation and/or certification	**Validate** the GHG project	**Verify** emission reductions or removal enhancements
5.13 Report GHG project	**Establish** criteria and procedures	**Apply** criteria and procedures

Figure 4 Linkages between planning and implementation requirements

2.7.2.2. 5 Requirements for GHG projects

2.7.2.2.1. 5.1 General requirements

The project proponent shall ensure the GHG project conforms to relevant requirements of the GHG programme to which it subscribes (if any), including eligibility or approval criteria, relevant legislation or other requirements.

In fulfilling the detailed requirements of this clause, the project proponent shall identify, consider and use relevant current good practice guidance. The project proponent shall select and apply established criteria and procedures from a recognized origin, if available, as relevant current good practice guidance.

It exists good practice guidance for the landfill biogas collection as Guidelines of GIEC for national inventories of GHG (1996), the Greenhouse Gas Assessment Handbook of the World Bank (1998).

In cases where the project proponent uses criteria and procedures from relevant current good practice guidance that derive from a recognized origin, the project proponent shall justify any departure from those criteria and procedures.

In cases where good practice guidance from more than one recognized origin exists, the project proponent shall justify the reason for using the selected recognized origin.

Where there is no relevant current good practice guidance from a recognized origin, the project proponent shall establish, justify and apply criteria and procedures to fulfil the requirements in this part of ISO 14064.

2.7.2.2.2. 5.2 Describing the project

The project proponent shall describe the project and its context in a GHG project plan that includes the following:

a) project title, purpose(s) and objective(s);

b) type of GHG project;

c) project location, including geographic and physical information allowing the unique identification and delineation of the specific extent of the project;

d) conditions prior to project initiation;

e) a description of how the project will achieve GHG emission reductions and/or removal enhancements;

f) project technologies, products, services and the expected level of activity;

g) aggregate GHG emission reductions and removal enhancements, stated in tonnes of CO_2e, likely to occur from the GHG project;

h) identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements;

i) roles and responsibilities, including contact information of the project proponent, other project participants, relevant regulator(s) and/or administrators of any GHG programme(s) to which the GHG project subscribes;

j) any information relevant for the eligibility of a GHG project under a GHG programme and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information;

k) a summary environmental impact assessment when such an assessment is required by applicable legislation or regulation;

l) relevant outcomes from stakeholder consultations and mechanisms for on-going communication;

m) chronological plan for the date of initiating project activities, date of terminating the project, frequency of monitoring and reporting and the project period, including relevant project activities in each step of the GHG project cycle.

It's an expert job.

2.7.2.2.3. 5.3 Identifying GHG sources, sinks and reservoirs relevant to the project

The project proponent shall select or establish criteria and procedures for identifying and assessing GHG sources, sinks and reservoirs controlled, related to, or affected by the project.

Based on selected or established criteria and procedures, the project proponent shall identify GHG sources, sinks and reservoirs as being

a) controlled by the project proponent,

b) related to the GHG project, or

c) affected by the GHG project.

2.7.2.2.4. 5.4 Determining the baseline scenario

The project proponent shall select or establish criteria and procedures for identifying and assessing potential baseline scenarios considering the following:

a) the project description, including identified GHG sources, sinks and reservoirs (see 5.3);

b) existing and alternative project types, activities and technologies providing equivalent type and level of activity of products or services to the project;

c) data availability, reliability and limitations;

d) other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections.

The project proponent shall demonstrate equivalence in type and level of activity of products or services provided between the project and the baseline scenario and shall explain, as appropriate, any significant differences between the project and the baseline scenario.

The project proponent shall select or establish, explain and apply criteria and procedures for identifying and justifying the baseline scenario.

NOTE A baseline scenario determined using a project-specific approach represents what would occur in the absence of the project, whereas a GHG programme can prescribe another approach to determine the baseline scenario, such as a performance standard (e.g. benchmark or multi-project) baseline scenario.

In developing the baseline scenario, the project proponent shall select the assumptions, values and procedures that help ensure that GHG emissions reductions or removal enhancements are not over-estimated.

The project proponent shall select or establish, justify and apply criteria and procedures for demonstrating that the project results in GHG emissions reductions or removal enhancements that are additional to what would occur in the baseline scenario.

2.7.2.2.5. 5.5 Identifying GHG sources, sinks and reservoirs for the baseline scenario

In identifying GHG sources, sinks and reservoirs relevant to the baseline scenario, the project proponent

a) shall consider criteria and procedures used for identifying the GHG sources, sinks and reservoirs relevant for the project,

b) if necessary, shall explain and apply additional criteria for identifying relevant baseline GHG sources, sinks and reservoirs, and

c) shall compare the project's identified GHG sources, sinks and reservoirs with those identified in the baseline scenario.

2.7.2.2.6. 5.6 Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals

The project proponent shall select or establish criteria and procedures for selecting relevant GHG sources, sinks and reservoirs for either regular monitoring or estimation.

The project proponent shall justify not selecting any relevant GHG source, sink and reservoir for regular monitoring.

2.7.2.2.7. 5.7 Quantifying GHG emissions and/or removals

The project proponent shall select or establish criteria, procedures and/or methodologies for quantifying *GHG emissions and/or removals for selected GHG sources, sinks and/or reservoirs (see 5.6).*

Based on selected or established criteria and procedures, the project proponent shall quantify GHG emissions and/or removals separately for

a) each relevant GHG for each GHG source, sink and/or reservoir relevant for the project, and

b) each GHG source, sink and/or reservoir relevant for the baseline scenario.

When highly uncertain data and information are relied upon, the project proponent shall select assumptions and values that ensure that the quantification does not lead to over-estimation of GHG emissions reductions or removal enhancements.

The project proponent shall estimate GHG emissions and/or removals by GHG sources, sinks and reservoirs relevant for the project and relevant for the baseline scenario, but not selected for regular monitoring.

The project proponent shall establish and apply criteria, procedures and/or methodologies to assess the risk of a reversal of a GHG emission reduction or removal enhancement (i.e. permanence of GHG emission reduction or removal enhancement).

If applicable, the project proponent shall select or develop GHG emissions or removal factors that

- are derived from a recognized origin,

- are appropriate for the GHG source or sink concerned,

- are current at the time of quantification,

- take account of the quantification uncertainty and are calculated in a manner intended to yield accurate and reproducible results, and

- are consistent with the intended use of the GHG report.

2.7.2.2.8. 5.8 Quantifying GHG emission reductions and removal enhancements

The project proponent shall select or establish criteria, procedures and/or methodologies for quantifying GHG emission reductions and removal enhancements during project implementation.

The project proponent shall apply the criteria and methodologies selected or established to quantify GHG emission reductions and removal enhancements for the GHG project. GHG emission reductions or removal enhancements shall be quantified as the difference between the GHG emissions and/or removals from GHG sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario.

The project proponent shall quantify, as appropriate, GHG emission reductions and removal enhancements separately for each relevant GHG and its corresponding GHG sources, sinks and/or reservoirs for the project and the baseline scenario.

The project proponent shall use tonnes as the unit of measure and shall convert the quantity of each type of GHG to tonnes of CO_2e using appropriate GWPs.

NOTE Annex B contains GWPs produced by the Intergovernmental Panel on Climate Change.

2.7.2.2.9. 5.9 Managing data quality

The project proponent shall establish and apply quality management procedures to manage data and information, including the assessment of uncertainty, relevant to the project and baseline scenario.

It means to apply the ISO 9000 procedures of data management.

The project proponent should reduce, as far as is practical, uncertainties related to the quantification of GHG emission reductions or removal enhancements.

2.7.2.2.10. 5.10 Monitoring the GHG project

The project proponent shall establish and maintain criteria and procedures for obtaining, recording, compiling and analysing data and information important for quantifying and reporting GHG emissions and/or removals relevant for the project and baseline scenario (i.e. GHG information system). Monitoring procedures should include the following:

a) purpose of monitoring;

b) types of data and information to be reported, including units of measurement;

c) origin of the data;

d) monitoring methodologies, including estimation, modelling, measurement or calculation approaches;

e) monitoring times and periods, considering the needs of intended users;

f) monitoring roles and responsibilities;

g) GHG information management systems, including the location and retention of stored data.

Where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to current good practice.

The project proponent shall apply GHG monitoring criteria and procedures on a regular basis during project implementation.

2.7.2.2.11. 5.11 Documenting the GHG project

The project proponent shall have documentation that demonstrates conformance of the GHG project with the requirements of this part of ISO 14064. This documentation shall be consistent with validation and verification needs (see 5.12).

2.7.2.2.12. 5.12 Validation and/or verification of the GHG project

The project proponent should have the GHG project validated and/or verified.

If the project proponent requests validation and/or verification of the GHG project, a GHG assertion shall be presented by the project proponent to the validator or verifier.

The project proponent should ensure that the validation or verification conforms to the principles and requirements of ISO 14064-3.

There are two questions.

A JI project must be agreed by the Carbon Fund. It may be supposed that the Carbon Fund has experts for the validation of the project.

But before to be transmitted to the Carbon Fund, the project must be agreed by the national authority, for Ukraine, the Ministry of Ecology and Natural Resources. For the moment, there's no idea of the structure or the experts who will play the role of "validator" for the Ministry.

2.7.2.2.13. 5.13 Reporting the GHG project

The project proponent shall prepare and make available to intended users a GHG report. The GHG report

- shall identify the intended use and intended user of the GHG report, and

- shall use a format and include content consistent with the needs of the intended user.

If the project proponent makes a GHG assertion to the public claiming conformance to this part of ISO 14064, the project proponent shall make the following available to the public:

a) an independent third-party validation or verification statement, prepared in accordance with ISO 14064-3, or

b) a GHG report that includes as a minimum:

1) the name of the project proponent;

2) the GHG programme(s) to which the GHG project subscribes;

3) a list of GHG assertions, including a statement of GHG emission reductions and removal enhancements stated in tonnes of CO_2e;

4) a statement describing whether the GHG assertion has been validated or verified, including the type of validation or verification and level of assurance achieved;

5) a brief description of the GHG project, including size, location, duration and types of activities;

6) a statement of the aggregate GHG emissions and/or removals by GHG sources, sinks and reservoirs for the GHG project that are controlled by the project proponent, stated in tonnes of CO_2e, for the relevant time period (e.g. annual, cumulative to date, total);

7) a statement of the aggregate GHG emissions and/or removals by GHG sources, sinks and reservoirs for the baseline scenario, stated in tonnes of CO_2e for the relevant time period;

8) a description of the baseline scenario and demonstration that the GHG emission reductions or removal enhancements are additional to what would have happened in the absence of the project;

9) as applicable, an assessment of permanence;

10) a general description of the criteria, procedures or good practice guidance used as a basis for the calculation of project GHG emission reductions and removal enhancements;

11) the date of the report and time period covered.

As the projects will be proposed to Carbon Funds, it will be verified and eventually validated by the Carbon Fund. But can the Carbon Fund be considered as an independent third-party? Certainly not because it may be its interest to agree a maximum of projects whatever the quality, or to refuse a maximum of projects because its engagements are already fulfilled. So Ukraine should name (or agree) organisations as independent third party experts for the verification of GHG projects. The problem is not so they are independent third party that they are really expert in the matter.

2.7.2.3. Annex A

Annex A contains additional information in cases where the project proponent wishes to conform to the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol's Clean Development Mechanism (CDM) or Joint Implementation (JI) Mechanism.

Specific eligibility requirements that have to be fulfilled by the project, the host party and investor party under the Kyoto regime are shown in Table A.1.

<table>
<tr><td rowspan="2">Aspect</td><td rowspan="2">JI</td><td colspan="3">CDM</td></tr>
<tr><td>Regular CDM</td><td>Small-scale CDM</td><td>Sinks project</td></tr>
<tr><td rowspan="6">Project</td><td colspan="2"></td><td>Meet small-scale definition. (Reference [6], Decision p. 21, paragraph 6)</td><td>Only afforestation and reforestation project activities are eligible. Special treatment for small-scale CDM (Reference [7], Annex p. 4, paragraph 1i)</td></tr>
<tr><td colspan="4">Only emissions of greenhouse gases listed in Annex A of the Kyoto Protocol (Article 3 KP).</td></tr>
<tr><td>Written approval by the parties involved (Reference [5], Annex p. 14, paragraph 31b)</td><td colspan="3">Written approval of voluntary participation of project participants, including confirmation by the host party that the project activity assists it in achieving sustainable development (Reference [6], Annex p. 35, paragraph 40a)</td></tr>
<tr><td></td><td colspan="3">Public funding is not to result in the diversion of official development assistance (Reference [6], Decision p. 20)</td></tr>
<tr><td>Additionality</td><td>Additionality (Reference [6], Annex p. 34, paragraph 37d)</td><td>Additionality: Barriers or quantitative evidence</td><td>Additionality (Reference [7], Annex p. 18, paragraph 12d)</td></tr>
</table>

Aspect	JI	CDM		
		Regular CDM	Small-scale CDM	Sinks project
	Refrain from credits generated from nuclear facilities (JI: Reference [5], Decision p. 5/CDM: Reference [6], Decision p. 20)			A systematic coincidence of verification and peaks in carbon stocks is avoided (Reference [7], Annex p. 18, paragraph 12e)
	Projects starting as of the year 2000 may be eligible for crediting from 2008. (Reference [8], Draft Decision p. 6, paragraph 5)	Projects starting in the period between 1 January 2000 and 18 November 2004 which have not yet requested registration but have either submitted a new methodology or have requested validation by a designated operational entity by 31 December 2005, can request retroactive credits if they are registered by the Executive Board by 31 December 2006 at the latest (Reference [10], paragraph 4).		
		Analyse environmental impacts. Undertake environmental impact assessment if required by the host party or project participants. (Reference [6], Annex p. 34, paragraph 37c)	Analyse environmental impacts if required by the host party	Analyse the socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary (Reference [7], Annex p. 18, paragraph 12c)
		Stakeholder comments and a report to the designated operational entity on how due account was taken of any comments received (JI: Reference [5], Annex p. 14, paragraph 32/CDM: Reference [6], p. 34, paragraph 37b)		
Host party	See investor party requirements, whereas the party has as a minimum to fulfil the criteria a) -d) (second track). If it meets all criteria a) -g) it can use the so-called first track and can set up own rules for verification etc. (Reference [5], Annex p. 13, paragraph 24)	Has designated a national authority (Reference [5], Annex p. 11, paragraph 20a/CDM)		Select and report to the Executive Board which definition of "forest" was chosen: a single minimum tree crown cover; a single minimum land area value; or a single minimum tree height value (Reference [7], Annex p. 17, paragraph 8)
	Has ratified the Kyoto Protocol (JI: Reference [5], Annex p. 12, paragraph 21a/CDM: Reference [6], Annex p. 32, paragraph 31a)			
Investor party	Has designated a focal point (Reference [5], Annex p. 11, paragraph 20a)	Has designated a national authority (Reference [6], Annex p. 32, paragraph 30)		
	Has ratified the Kyoto Protocol (JI: Reference [5], Annex p. 12, paragraph 21a/CDM: Reference [6], Annex p. 32, paragraph 31a)			
	Has calculated its assigned amount pursuant to the rules (JI: Reference [5], Annex p. 12, paragraph 21b/CDM: Reference [6], Annex p. 32, paragraph 31b)			
	Has in place a national registry in accordance with the rules (JI: Reference [5], Annex p. 12, paragraph 21d/CDM: Reference [6], Annex p. 32, paragraph 31d)			
	Has in place a national system for estimation of emissions in accordance with the rules. (JI: Reference [5], Annex p. 12, paragraph 21c/CDM: Reference [6], Annex p. 32, paragraph 31c])			
	Has submitted annually the most recent required inventory in accordance with the rules. (JI: Reference [5], Annex p. 12, paragraph 21e/CDM: Reference [6], Annex p. 32, paragraph 31e)			
	Has submitted supplementary information on assigned amount in accordance with the rules. (JI: Reference [5], Annex p. 12, paragraph 21f/CDM: Reference [6], Annex p. 32, paragraph 31f)			

Aspect	JI	CDM		
		Regular CDM	Small-scale CDM	Sinks project
				There is a quantitative limit: For the first commitment period ≤5 times 1% of the host country's base year emissions (Reference [6], Decision p. 22, paragraph 7b)

Table A.1 — Kyoto mechanism eligibility criteria

2.7.3. ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions

2.7.3.1. 3 Principles

The concept of "independent third party validator or verifier" is not in the culture inherited from Soviet Union neither developed after independence. It's why it should be recommendable to name foreign validators or verifiers, agreed by all the parties. The question is who will pay their work.

2.7.3.1.1. 3.2 Independence

Remain independent of the activity being validated or verified, and free from bias and conflict of interest. Maintain objectivity throughout the validation or verification to ensure that the findings and conclusions will be based on objective evidence generated during the validation or verification.

2.7.3.1.2. 3.3 Ethical conduct

Demonstrate ethical conduct through trust, integrity, confidentiality and discretion throughout the validation or verification process.

2.7.3.1.3. 3.4 Fair presentation

Reflect truthfully and accurately validation or verification activities, findings, conclusions and reports. Report significant obstacles encountered during the validation or verification process, as well as unresolved, diverging opinions among validators or verifiers, the responsible party and the client.

2.7.3.1.4. 3.5 Due professional care

Exercise due professional care and judgment in accordance with the importance of the task performed and the confidence placed by clients and intended users. Have the necessary skills and competences to undertake the validation or verification.

NOTE The principles of independence, ethical conduct, fair presentation and due professional care are derived from ISO 19011 and have been adapted to reflect the context of this part of ISO 14064.

2.7.3.2. 4 Validation and verification requirements

2.7.3.2.1. 4.1 Validators or verifiers

The validator or verifier selected to perform the validation and verification activities

a) shall demonstrate competence and due professional care consistent with their roles and responsibilities;

b) shall be independent;

c) shall avoid any actual or potential conflicts of interest with the responsible party and the intended users of the GHG information;

d) shall demonstrate ethical conduct throughout the validation and verification;

e) shall reflect truthfully and accurately validation and verification activities, conclusion and reports;

f) shall meet the requirements of the standards or the GHG programme to which the responsible party subscribes.

NOTE Further general guidance on appropriate knowledge, skills and competencies for validators and verifiers is provided in A.2.2. ISO 14065 gives requirements for third-party validators or verifiers.

2.7.3.2.2. 4.2 Validation and verification process

The process for completing a validation or verification of GHG information based on Clause 4 requirements is shown in next Figure. Additional guidance on Clause 4 requirements is provided in Annex A.

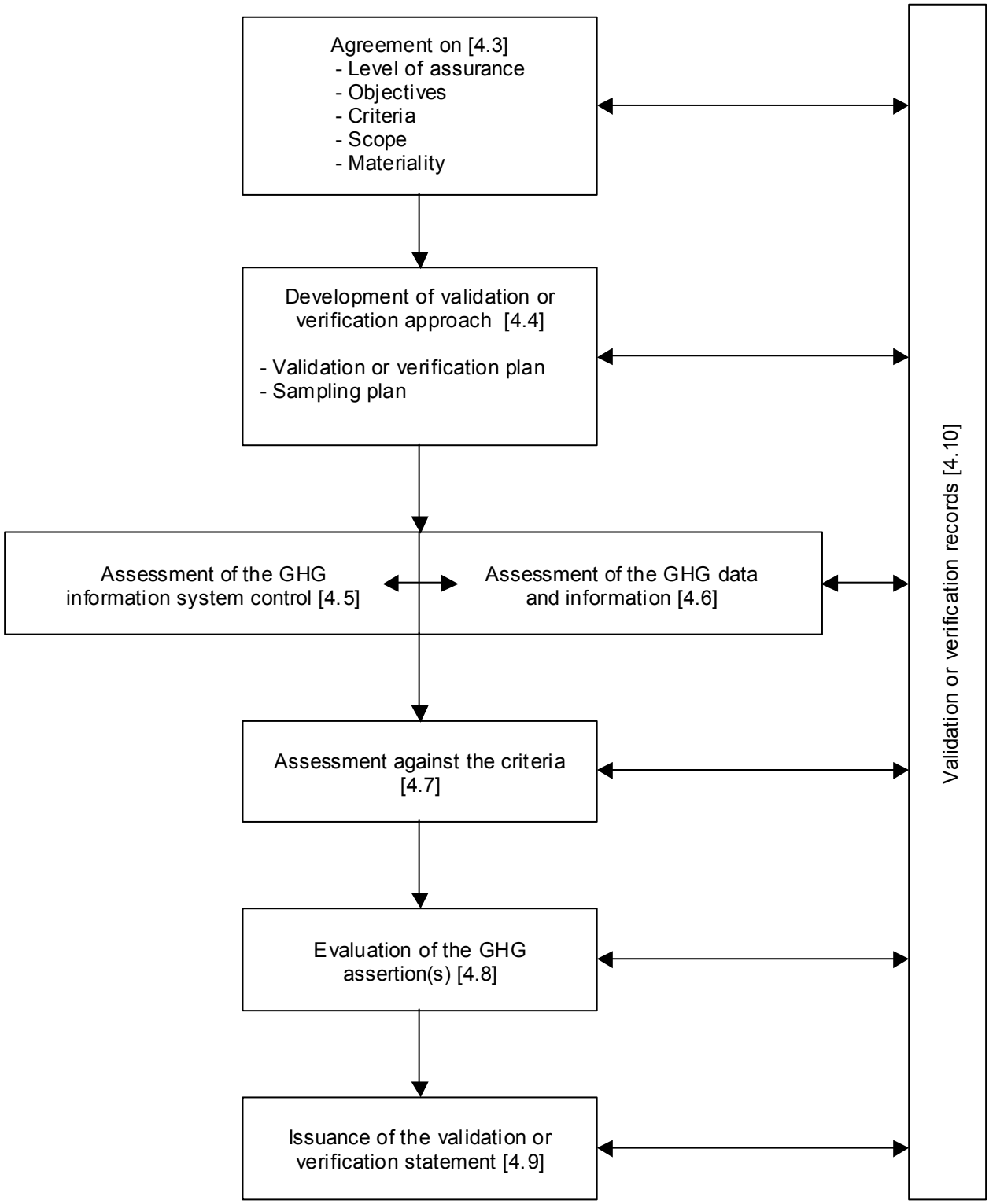


Figure 5 Validation and verification process

2.7.3.2.3. 4.3 Level of assurance, objectives, criteria and scope of the validation or verification

2.7.3.2.3.1. 4.3.1 Level of assurance

The level of assurance of the validation or verification shall be agreed with the client at the beginning of the validation or verification process.

Who is the client?

2.7.3.2.3.2. 4.3.2 Objectives

The validator and client shall agree on the validation objectives at the beginning of the validation process.

In the validation of GHG projects, validation objectives shall include an assessment of the likelihood that implementation of the planned GHG project will result in the GHG emission reductions and/or removal enhancements as stated by the responsible party.

The verifier and client shall agree on the verification objectives at the beginning of the verification process.

Who is the client?

2.7.3.2.3.3. 4.3.3 Criteria

The validator or verifier and client shall agree on the criteria of the validation or verification at the beginning of the validation or verification process. In agreeing to the criteria, the principles of the standards or GHG programme to which the responsible party subscribes shall be applied.

NOTE Validation or verification criteria may include those given in ISO 14064-1 or ISO 14064-2.

Who is the client?

2.7.3.2.3.4. 4.3.4 Scope

The validator or verifier and client shall agree on the validation or verification scope at the beginning of the validation or verification process. The validation and verification scope, as a minimum, shall include the following:

a) organizational boundaries or the GHG project and its baseline scenarios;

b) physical infrastructure, activities, technologies and processes of the organization or GHG project;

c) GHG sources, sinks and/or reservoirs;

d) types of GHGs;

e) time period(s).

Who is the client?

2.7.3.2.3.5. 4.3.5 Materiality

The validator or verifier shall establish the materiality required by the intended users, considering validation or verification objectives, level of assurance, criteria and scope.

All that should be defined at the national level for the landfill biogas projects.

2.7.3.2.4. 4.4 Validation or verification approach

2.7.3.2.4.1. 4.4.1 General

The validator or verifier shall conduct a review of the organization's or project's GHG information to assess

- the nature, scale and complexity of the validation or verification activity to be undertaken on the client's behalf,

- confidence in the responsible party's GHG information and assertion,

- completeness of the responsible party's GHG information and assertion, and

- the eligibility of the responsible party to participate in the GHG programme, if applicable.

If the information supplied by the responsible party is not sufficient to conduct a review of the organization's or project's GHG information, the validator or verifier shall not proceed with the validation or verification.

The validator or verifier shall assess sources and the magnitude of potential errors, omissions and misrepresentations for further validation or verification activities. The categories of potential errors, omissions and misrepresentations assessed shall be the following:

a) the inherent risk of a material discrepancy occurring;

b) the risk that the controls of the organization or GHG project will not prevent or detect a material discrepancy;

c) the risk that the validator or verifier will not detect any material discrepancy that has not been corrected by the controls of the organization or GHG project.

All that should be defined at the national level for the landfill biogas projects.

2.7.3.2.4.2. 4.4.2 Validation or verification plan

The validator or verifier shall develop a documented validation or verification plan that addresses, as a minimum, the following:

a) level of assurance;

b) validation or verification objectives;

c) validation or verification criteria;

d) validation or verification scope;

e) materiality;

f) validation or verification activities and schedules.

The validation or verification plan shall be revised as necessary during the course of the validation or verification process. The validator or verifier shall communicate the validation or verification plan to the client and the responsible party.

All that should be defined at the national level for the landfill biogas projects.

2.7.3.2.4.3. 4.4.3 Sampling plan

The validator or verifier shall develop a sampling plan to take account of the following:

a) level of assurance agreed with the client;

b) validation or verification scope;

c) validation or verification criteria;

d) amount and type of evidence (qualitative and quantitative) necessary to achieve the agreed level of assurance;

e) methodologies for determining representative samples;

f) risks of potential errors, omissions or misrepresentations.

The sampling plan shall be amended, when necessary, based on any new risks or material concerns that could potentially lead to errors, omissions and misrepresentations that are identified throughout the validation or verification process.

The validator or verifier shall use the sampling plan as an input to develop the validation or verification plan.

All that should be defined at the national level for the landfill biogas projects.

2.7.3.2.5. 4.5 Assessment of the GHG information system and its controls

The validator or verifier shall assess the organization or project's GHG information system and its controls for sources of potential errors, omissions and misrepresentations, taking the following into consideration:

a) selection and management of the GHG data and information;

b) processes for collecting, processing, consolidating and reporting GHG data and information;

c) systems and processes that ensure the accuracy of the GHG data and information;

d) design and maintenance of the GHG information system;

e) systems and processes that support the GHG information system;

f) results of previous assessments, if available and appropriate.

The results of the assessment of the GHG information system and its controls shall be used by the validator or verifier to amend the sampling plan, if necessary.

All that should be defined at the national level for the landfill biogas projects.

2.7.3.2.6. 4.6 Assessment of GHG data and information

The validator or verifier shall examine the GHG data and information to develop evidence for assessment of the organization's or project's GHG assertion. This examination shall be based on the sampling plan. The results of this examination shall be used by the validator or verifier to amend the sampling plan, if necessary.

2.7.3.2.7. 4.7 Assessment against validation or verification criteria

The validator or verifier shall confirm whether or not the organization or GHG project conforms to the validation or verification criteria.

When evaluating material discrepancy, the validator or verifier shall consider principles of the standards or GHG programme to which the responsible party subscribes.

It must be decided what to do if the organization or GHG project doesn't conform to the validation or verification criteria.

2.7.3.2.8. 4.8 Evaluation of the GHG assertion

The validator or verifier shall evaluate whether the evidence collected in the assessments of controls, GHG data and information, and applicable GHG programme criteria is sufficient and if it supports the GHG assertion. The validator or verifier shall consider materiality in evaluating the collected evidence.

The validator or verifier shall conclude whether or not the GHG assertion is without material discrepancy, and whether the verification or validation activities provide the level of assurance agreed to at the beginning of the validation or verification process.

NOTE Some standards (such as ISO 14065) and GHG programmes require that, for third-party validation or verification, conclusions on the GHG assertion are drawn by person(s) different from those who conducted the validation or verification activities.

If the responsible party amends the GHG assertion, the validator or verifier shall evaluate the modified GHG assertion to determine whether the evidence supports the modified GHG assertion.

2.7.3.2.9. 4.9 Validation and verification statement

The validator or verifier shall issue a validation or verification statement to the responsible party upon completion of the validation or verification. The validation or verification statement

a) shall be addressed to the intended user of the GHG assertion,

b) shall describe the level of assurance of the validation or verification statement,

c) shall describe the objectives, scope and criteria of the validation or verification,

d) shall describe whether the data and information supporting the GHG assertion were hypothetical, projected and/or historical in nature,

e) shall be accompanied by the responsible party's GHG assertion, and

f) shall include the validator's or verifier's conclusion on the GHG assertion, including any qualifications or limitations.

NOTE Some GHG programmes require certification by a verifier of the GHG performance achieved by the organization or GHG project over a specified period of time.

2.7.3.2.10. 4.10 Validation or verification records

The validator or verifier shall maintain records, as necessary, to demonstrate conformity to the requirements of this part of ISO 14064. Records pertaining to the validation or verification shall be retained or destroyed on agreement between the participating parties and in accordance with the validation or verification plan and any applicable GHG programme and contractual requirements.

2.7.3.2.11. 4.11 Facts discovered after the validation or verification

The validator or verifier shall obtain sufficient evidence and identify relevant information up to the date of the validation or verification statement. If facts that could materially affect the validation or verification statement are discovered after this date, the validator or verifier shall consider appropriate action.

2.7.4. Conclusion on ISO 14064

Projects are a partnership between [organisations and project proponents], the [host country] and the [Carbon Funds]. Each partner expects its own benefits and has its own objectives.

The objective of the Carbon Fund is to bring the evidence he reduced GHG emissions for its country by "buying" GHG removals in other countries. The facts are provided by the "organisations" but they must become "evidences" throughout the regulations of the "host country".

The developers and technology suppliers must be involved in aim to focus on the character of "evidence" of the figures of the GHG removal.

At least as a first step, the task of verification/validation must be entrusted to international organisations (private or public), which would guarantee they are "independent third party experts". The choice of an agreed list of validators/verifiers must be commonly decided by the host country and the Carbon Funds.

3. Europe's offers

This part will review several European Carbon Funds which may intervene for the funding of landfill biogas collection. It reflects the today's (may 2006) available information and it cannot be exhaustive.

There's a market of the CO_2e tonne. The quotation depends of the constraints at the countries level and the plants level to reach the 2008-2012 objectives. Until 2008, it's like a free market and prices may be 26 €/t, 10 €/t, 5 €/t. After 2008 the penalties may be 40 €/t and even 120 €/t has been said. It also appeared recently that the figures of the 1990 base were often too optimistic is some countries and the 2012 objectives too easy to target. At least, the negotiations for the next period have begun and the today's debate is about the duration of the next period from 2009: 5 years, 10 years, 12 years?

The JI and CDM projects are long-term projects, so their funding cannot be based on "spot" prices. The Carbon Funds as the Danish propose long-term engagements with a fixed price for 2008-2012 that is close a bottom price of the market.

3.1. European Union Arrangements

3.1.1. European Union Policy

Building on the innovative mechanisms set up under the Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) - joint implementation, the clean development mechanism and international emissions trading - the EU has developed the largest company-level scheme for trading in emissions of carbon dioxide (CO_2), making it the world leader in this emerging market. The emissions trading scheme started in the 25 EU Member States on 1 January 2005 (Biblio 22).

A key aspect of the EU scheme is that it allows companies to use credits from Kyoto's project-based mechanisms, joint implementation (JI) and the clean development mechanism (CDM), to help them comply with their obligations under the scheme. This means the system not only provides a cost-effective means for EU-based industries to cut their emissions but also creates additional incentives for businesses to invest in emission-reduction projects elsewhere, for example in Russia and developing countries. In turn this spurs the transfer of advanced, environmentally sound technologies to other industrialised countries and developing nations, giving tangible support to their efforts to achieve sustainable development.

The EU emissions trading scheme (ETS) is based on a recognition that creating a price for carbon through the establishment of a liquid market for emission reductions offers the most cost-effective way for EU Member States to meet their Kyoto obligations and move towards the low-carbon economy of the future.

The scheme should allow the EU to achieve its Kyoto target at a cost of between EUR 2.9 billion and EUR 3.7 billion annually. This is less than 0.1 % of the EU's GDP. Without the scheme, compliance costs could reach up to EUR 6.8 billion a year.

Joint implementation and the clean development mechanism enable developed countries that have binding emission reduction or limitation targets under the Kyoto Protocol to undertake emission-saving investments in third countries and credit these savings towards their own emission target.

The CDM covers projects in countries without an emission target under the protocol, i.e. developing nations. Reductions since 2000 are potentially eligible to receive credits called 'certified emission reductions', or CERs. JI applies to projects in countries that have agreed to an emission target - other industrialised countries and countries with economies in transition - and will yield credits known as 'emission reduction units', or ERUs, once the first Kyoto commitment period starts in 2008.

The EU scheme is the first in the world that recognises most of these credits as equivalent to emission allowances (1 EUA = 1 CER = 1 ERU) and allows them to be traded under the scheme[4]. Credits from nuclear facilities and land use, land-use change and forestry activities are not accepted.

[4] Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance within the Community, in respect of the Kyoto Protocol's project mechanisms.

Thus, the launch of the ETS three years before the start of the protocol's first commitment period has given certainty to investors in the rapidly emerging market for JI and CDM projects. This has encouraged more investment in such projects and consequently promotes the transfer of environmentally sound technologies that help the host countries meet their sustainable development goals.

For EU companies covered by the scheme, the recognition of JI and CDM credits has increased the range of options available for meeting their emission targets, improved the liquidity of the market and potentially lowered the price of allowances, thus further reducing their compliance costs.

Companies are not the only ones looking for emission reduction credits through JI and CDM. Member States intend to use such credits themselves to help meet their emission target under the protocol. In their national allocation plans, they have indicated that they intend to procure 500-600 million tonnes of CO_2 credits for the period 2008-12. Since the majority of JI and CDM projects tend to generate emission reductions averaging between 500 000 and 1 million tonnes of CO_2, EU countries' demand for emission credits can only be satisfied through a great number of such projects. As 2008 draws nearer, EU Member States are actively seeking JI and CDM projects and a number of project contracts have already been signed.

With this strong demand for emission credits building up rapidly, major European banks and other financial institutions both in the private and public sector have become active in providing finance for prospective emission reduction projects.

But the use of the Kyoto mechanisms within the EU will be only supplemental to domestic action to limit or reduce emissions, as agreed by UNFCCC parties at Marrakech in 2001.

The key point of the EU policy is that it recognises these credits as equivalent to emission allowances:

1 EU Allowance = 1 Certified Emission Reduction = 1 Emission Reduction Unit

meaning that 1 tonne CO_2 is always 1 tonne CO_2.

The priorities of government bodies differ from the priorities of companies and associations in some aspects (Biblio 18).

- A large majority of companies and associations would prefer allocation periods of ten years or more and would opt for announcement of decisions on the National Allocation Plans (NAPs) two to three years prior to the beginning of the subsequent allocation period. Companies and associations seek clarity and long-term stability regarding the rules; and this, over longer periods. This would ensure a stable climate for investments and the renewal of asset portfolios.

- Government bodies rank allocation intervals not as high as companies and associations. A majority of government bodies would like to continue the five year allocation intervals with allocation decisions one year before the interval beyond 2012.

- Government bodies also see longer-term topics relating to the scope of the scheme as important, such as the definition of combustion installations and the inclusion of other sectors and gases. Companies and associations, in contrast, rank these topics lower in their prioritisation. More than 70% of government bodies prefer a broad definition of combustion installations. Companies and associations slightly prefer a narrower definition. Also, government bodies give priority to the inclusion of chemicals, aviation and aluminium in the EU ETS when they have to make the choice to include other sectors beyond the combustion installations.

But the key-point stays the Directive 2003/87/EC regulating the European market of CO_2. (Biblio 1)

3.1.2. Evolution of the prices

A report was made for the Directorate General Environment in May 2003 (Biblio 17). The objective was to test with a model the sensitivity of the prices of CO_2e allowances to the inclusion of JI and CDM projects. The conclusions are the followings. Anyway the price should not decrease below 5€/tCO_2e.[5]

The volume of credits obtained through JI and CDM projects by the enlarged EU Emission Allowance Trading Scheme, as well as the magnitude of cost savings and allowance price impacts will crucially depend on how much competition there will be from EU Member States and other countries in JI and CDM credits.

[5] ETSe: Emission Trade Sector / NTS: Non Trade Sector / ETS: Emissions Trading Scheme / FSU: Former Soviet Union countries

The first result is that allowing project credits into the EU trading scheme lowers allowances prices and costs for ETS compliance.

As expected, the lower the level of competition for JI and CDM credits, the greater the volume of credits purchased by the enlarged EU ETS and the lower the price of the corresponding allowances.

Without any competition from the European NTS sector and the other Annex B countries on the JI and CDM credits market, the allowance price collapses from 26€/tCO_2e (Case 1) to less than 5 €/tCO_2e (Case 2) with linking. The annual compliance cost for the ETS sector is reduced by about 60% from 2.9 b€ to some 1.1 b€. The reductions acquired by the enlarged EU ETSe through JI and CDM represent in this case 12,7 % of the initial allocation to ETS participants.

However, it seems reasonable to expect that other participating Annex B countries will also carry out JI and CDM projects in order to generate project credits. The taking account of this competition on the ETS market entails more than a doubling of the allowance price to 10.5 €/tCO_2e, and almost doubles the annual compliance cost for the enlarged EU ETSe to 2 b€.

The restricted linking of the enlarged EU NTSe to the market, via Member State credit purchases, have noticeable impacts. While the 6% limit leads to a comparable allowance price to case 3, and an annual compliance cost for the ETS sector 20% higher, 2.4 b€, the 3% limit case gets close to the "No linking" situation, with an allowance price for enlarged EU ETSe of 20 €/tCO_2e (the international allowance price reaches 11 €/tCO_2e) and an annual compliance cost for the ETS sector of 2.8 b€. In the case of unlimited linking, the permit price falls to 12.4 €/tCO_2e and the compliance cost to 2.2 b€, the allowances obtained by the enlarged EU ETSe through projects represent in this case 7% of its objectives.

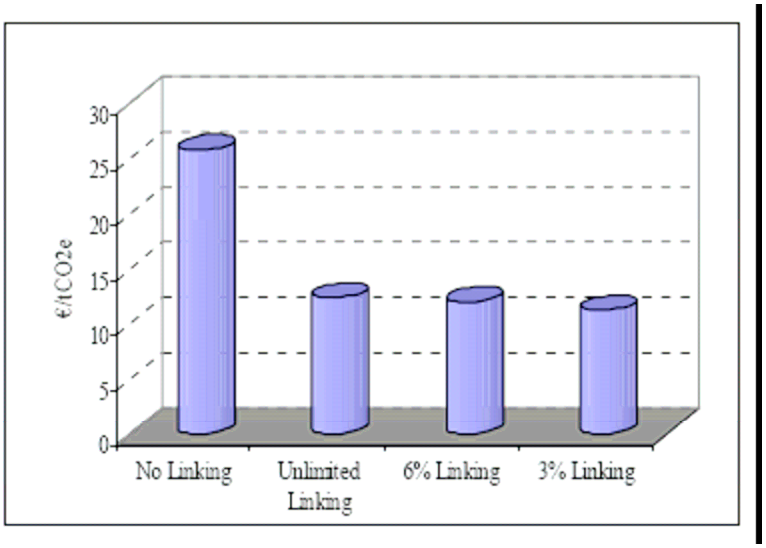


Figure 6 International (Kyoto) market price

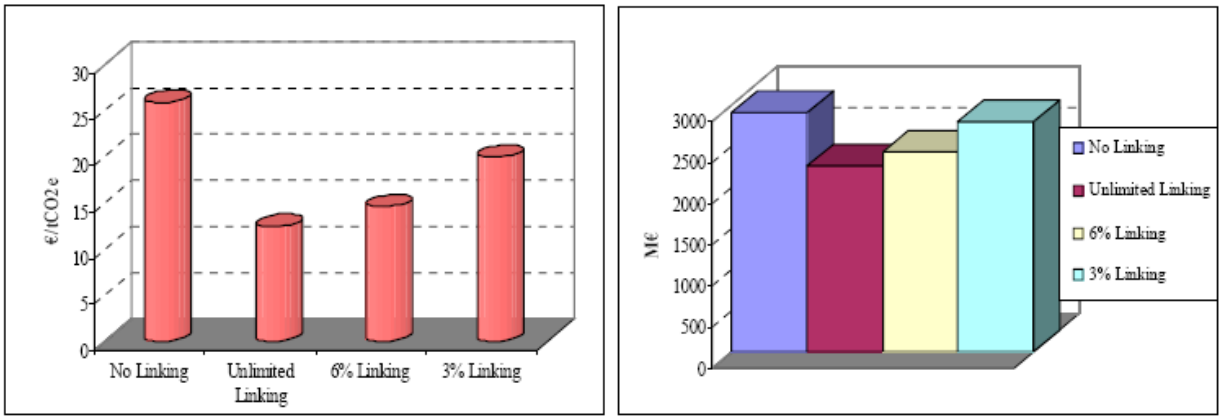


Figure 7 Enlarged EU ETSe allowance price (€/tCO_2e) and annual compliance cost (M€)

In all cases, China is expected to be the greatest credits supplier (around 47% of the total – JI included, 55% of CDM only). The second most important region for project-based emission reductions is the Former Soviet Union with around 14% of the total, followed by India, with around 11% of the reductions

done through CDM and JI (12% of CDM only). The Rest of Asia represents 9%, Africa-Middle East-Turkey 14%. Latin America comes last with around 5% only of the reductions (2% for Brazil alone).

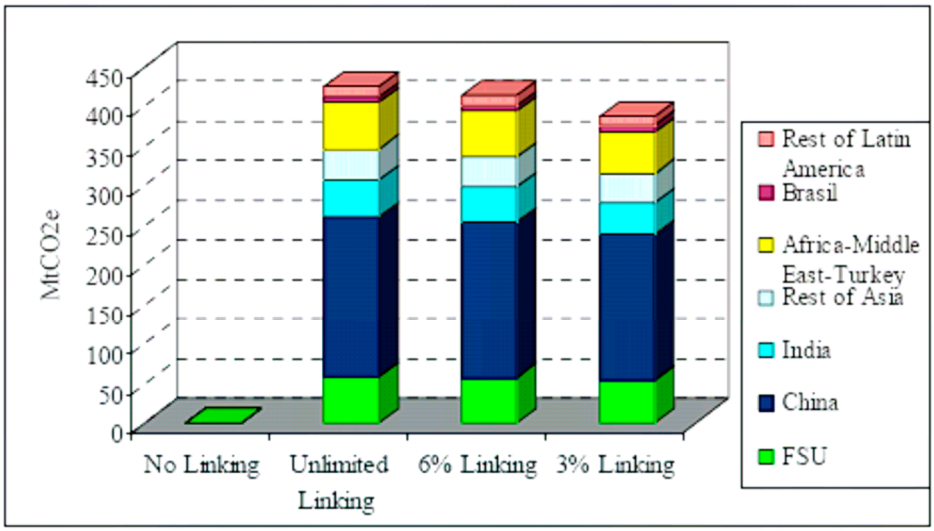


Figure 8 Supply of CDM and JI credits

3.2. Austria

3.2.1. Austrian JI/CDM Programme

The Austrian JI/CDM Programme buys Emission reductions for the Austrian government to achieve its commitment under the Kyoto Protocol. The programme focuses on project-related Flexible mechanisms:

Joint Implementation (JI) and Clean Development Mechanism (CDM) and involves:

- The purchase of emission reduction credits from JI or CDM projects and investment in funds and facilities.
- The financing of particular immaterial services, such as Baseline Studies etc., which are necessary in respect to JI or CDM projects.

Kommunalkredit Public Consulting (KPC) was appointed for the Programme Management (kyoto@kommunalkredit.at) on behalf of the Austrian Ministry of Agriculture and Forestry, Environment & Water Management. The Programme is operational since August 2003.

The total purchasing volume is about 35 million tonnes CO_2.

In its current 4th Call for proposals, the Austrian JI/CDM Programme is looking for JI and CDM projects through efficient and flexible transaction structures.

This call will be open till 5 April 2007.

3.2.2. Project Cycle

Below the project cycle of a typical JI/CDM project under the Austrian JI/CDM Programme is described.

The basis is formed by the international regulations of the Kyoto Protocol and the Marrakech Accords, which is supplemented by additional Austrian criteria.

A two-phase negotiation procedure with prior public announcement is launched for purchasing Emission Reductions generated by Joint Implementation (JI) projects & Clean Development Mechanism (CDM) projects within the Austrian JI/CDM Programme.

The negotiation procedure is designed in a way to offer a flexible and efficient approach to those clients who intend to sell their emission reductions to the Austrian Programme. Consequently, the following structure is set up:

1. Initially, the Project Idea Note (PIN) may be submitted any time from the date of publication of this Call until the specified closure date. If already available, the Project Design Document (PDD) may be

submitted likewise. The evaluation of the project will be performed continuously within a maximum of 30 working-days from receipt of the complete documentation. The evaluation will ascertain that all selected projects meet or exceed the standards of the Austrian JI/CDM Programme.

2. All selected projects may be invited to negotiations. Negotiations will be held individually with the applicant to conclude an ERPA. During negotiation the applicant will be invited to provide a detailed project documentation as outlined in the tender dossier forwarded. All submitted proposals will be assessed applying the evaluation criteria given in the tender dossier and will result in determining the eligibility of the applicant and the appending project to participate in and conclude an ERPA with the Austrian JI/CDM Programme.

Based on the results of the negotiations the Programme Management makes a recommendation to the Commission for the Austrian JI/CDM Programme. The Commission may recommend the project to the Austrian Federal Minister of Agriculture, Forestry, Environment and Water Management, who then officially approves the project from the Austrian side.

All interested Applicants are invited to provide their documents on the basis of this 4th Call for projects.

3.2.3. JI project

The JI project cycle is divided into two phases:

1. Project preparation phase
    - Project planning:
        a. Project Idea Note (PIN)
        b. Project Design Document (PDD)
    - Project approval:
        c. PDD validation
2. Project implementation phase
    - Monitoring and verification:
        d. Monitoring and verification of the monitoring data
    - Transfer of Emission Reduction Units (ERUs):
        e. Transfer of ERUs and payment

3.2.3.1. Project Planning

3.2.3.1.1. Project Idea Note (PIN)

PIN preparation	At the beginning the applicant prepares a Project Idea Note (PIN). A PIN is a short project description and contains the basic details of the project.
Handing over the PIN to the Programme Management	The applicant submits the completed PIN as part of an Expression of Interest (EoI) to the Programme Management (Kommunalkredit Public Consulting). The Programme Management checks the PIN (as well as additional information of the EoI) regarding conformity with international regulations and the Austrian JI/CDM Programme.
Letter of No Objection (LoNO) and feedback	As soon as the host country confirms by means of a LoNO that it agrees to the project in principle, the Programme Management informs the applicant on the result of the evaluation.

3.2.3.1.2. Project Design Document (PDD)

PDD preparation	The Project Design Document (PDD) is a precise project description and serves as the basis for the JI project evaluation by an Independent Entity (IE). In addition to the project description, the complete PDD particularly contains the following documents/information: • Baseline Study; • Monitoring Plan; • stakeholders' comments; • details on ecological, socio-economic and development effects.
Handing over the PDD to the Programme Management	The PDD must be forwarded along with all necessary documents to the Programme Management as part of a comprehensive Proposal. The Programme Management then checks the PDD (as well as the additional documents) for completeness and compliance with the international and Austrian regulations. Additionally, the Programme Management evaluates the project on the basis of the following criteria: • quality of Baseline and Monitoring Plan; • economic and technical aspects; • ecological, socio-economic and development effects.

3.2.3.2. Project approval: PDD Validation

Handing over the PDD to an IE and validation	Validation stands for examination performed by an Independent Entity (IE) to verify whether a proposed project activity complies with the Kyoto Protocol requirements and criteria as well as the detailed regulations. The applicant must deliver the PDD (incl. all necessary documents) to an IE for validation.
Letter of Approval	The applicant has to show a written assurance from the host country (Letter of Approval), which represents a binding declaration of support for the JI project by the host country.
Contract and approval of the project by the Federal Minister of Agriculture, Forestry, Environment and Water Management	Provided positive negotiations (particularly on the price per ERU) the Programme Management prepares the contract between the Republic of Austria and the applicant and advises the Commission for the Austrian JI/CDM Programme and the Federal Minister of Agriculture, Forestry, Environment and Water Management of the project evaluation. The Federal Minister finally decides whether the project is approved by the Austrian side.
Possible advance payment to the applicant	After signing of the contract an advance payment of up to 30 percent of the contract value can be made.

3.2.3.3. Monitoring and verification

3.2.3.3.1. Monitoring and verification of the monitoring data

Handing over the monitoring report to the IE	The project applicant prepares monitoring reports at regular intervals. These reports contain all data necessary for calculating the emission reductions generated. The project applicant delivers the monitoring reports to the IE at regular intervals.

Verification	Verification takes place at regular intervals and is an examination and a confirmation of the emission reductions achieved according to the monitoring report by the IE.
Verification report	The Independent Entity prepares a verification report, which must be made publicly available through the climate secretariat.

3.2.3.4. Transfer of Emission Reduction Units (ERUs)

3.2.3.4.1. Transfer of ERUs and payment

Transfer of the ERUs and payment	As soon as the verification is completed, the ERUs can be transferred from the registry of the host country into the registry of the Republic of Austria. Subsequently the agreed price is paid.

3.2.4. CDM Projects

The CDM project cycle is divided into two phases:

1. Project preparation phase
    - Project planning:
        a. Project Idea Note (PIN)
        b. Project Design Document (PDD)
    - Project approval:
        c. PDD validation and registration
2. Project implementation phase
    - Monitoring:
        d. Monitoring, verification and certification
    - Transfer of Certified Emission Reductions (CERs):
        e. Issuance of CERs and payment

3.2.4.1. Project planning

3.2.4.1.1. Project Idea Note (PIN)

PIN preparation	At the beginning the applicant prepares a Project Idea Note (PIN). A PIN is a short project description and contains the basic details of the project.
Handing over the PIN to the Programme Management	The applicant submits the completed PIN as part of an Expression of Interest (EoI) to the Programme Management (Kommunalkredit Public Consulting). The Programme Management checks the PIN (as well as additional information of the EoI) regarding conformity with international regulations and the Austrian JI/CDM Programme.
Letter of No Objection (LoNO) and feedback	As soon as the host country confirms by means of a LoNO that it agrees to the project in principle, the Programme Management informs the applicant on the result of the evaluation.

3.2.4.1.2. Project Design Document (PDD)

PDD preparation	The Project Design Document (PDD) is a precise project description and serves as the basis for the CDM project evaluation by an Operational Entity (OE). In addition to the project description, the complete PDD particularly contains the following documents/information: • Baseline Study; • Monitoring Plan; • stakeholders´ comments; • details on ecological, socio-economic and development effects.
Handing over the PDD to the Programme Management	The PDD must be forwarded along with all necessary documents to the Programme Management as part of a comprehensive Proposal. The Programme Management then checks the PDD (as well as the additional documents) for completeness and compliance with the international and Austrian regulations. Additionally, the Programme Management evaluates the project on the basis of the following criteria: • quality of Baseline and Monitoring Plan; • economic and technical aspects; • ecological, socio-economic and development effects.

3.2.4.2. Project approval

3.2.4.2.1. PDD validation and registration

Handing over the PDD to an OE and validation	Validation stands for examination performed by an Operational Entity (OE) to verify whether a proposed project activity complies with the Kyoto Protocol requirements and criteria as well the detailed regulations. The applicant must deliver the PDD (incl. all necessary documents) to an OE for validation.
Letter of Approval	The applicant has to show a written assurance from the host country (Letter of Approval), which represents a binding declaration of support for the CDM project by the host country.
Contract and approval of the project by the Federal Minister of Agriculture, Forestry, Environment and Water Management	Provided positive negotiations (particularly on the price per CER) the Programme Management prepares the contract between the Republic of Austria and the applicant and advises the Commission for the Austrian JI/CDM Programme and the Federal Minister of Agriculture, Forestry, Environment and Water Management of the project evaluation. The Federal Minister finally decides whether the project is approved by the Austrian side.
Possible advance payment to the applicant	After signing of the contract an advance payment of up to 30 percent of the contract value can be made.
Registration	Registration is the formal approval of the validated project by the Executive Board (EB). Projects officially are CDM projects only after their registration. The registration by the Executive Board will be deemed final eight weeks after forwarding of the validated project by the OE to the EB, unless one of the Parties involved or at least three members of the EB request review of the CDM project.

3.2.4.3. Monitoring

3.2.4.3.1. Monitoring, verification and certification

Handing over the monitoring report to an OE	The project applicant prepares monitoring reports at regular intervals. These reports contain all data necessary for calculating the emission reductions generated. The project applicant delivers the monitoring reports to a normally different OE at regular intervals.
Verification	Verification takes place at regular intervals and is an examination and a confirmation of the emission reductions achieved according to the monitoring report by the OE.
Verification and certification report	The OE prepares a verification report that must be made publicly available through the climate secretariat. Based on this verification report, the OE writes a certification report, which is made available to the project participants, the Parties involved, the Executive Board and the public. This certification report represents a request to the EB to issue Certified Emission Reductions (CERs).

3.2.4.4. Transfer of Certified Emission Reductions (CERs)

3.2.4.4.1. Issuance of CERs and payment

Issuance of Certified Emission Reductions and payment	Following certification, the Certified Emission Reductions are issued by the Executive Board (EB). Subsequently the agreed price is paid.

3.2.5. Projects and Funds

1.) Closed Projects: 15

2.) Projects in the pipeline: 115 Projects

3.) Purchased tonnes CO_2e: 14 Million t CO_2e

4.) Funds & Facilities:

- Community Development Carbon Fund (CDCF)

Responsible institution:	World Bank
Project type:	Small Scale CDM Projects
Regional focus:	Least developed countries
Investment volume:	5 mill. US$

- Austrian CDM Project Procurement and CER Sale Facility

Responsible institution:	EcoSecurities
Project type:	Small Scale CDM Projects
Regional focus:	Latin and South American countries
Investment volume:	1,250,000 t CO_2e

115 projects from 26 countries are in the pipeline. Contracts have already been concluded with 15 projects.

3.2.5.1. JI projects

Till April 2006, 35 projects from 11 countries were submitted to the Austrian JI/CDM Programme. With 6 JI projects, ERPAs (Emission Reduction Purchase Agreements) were concluded, which represent a total volume of up to 4 Mill. t CO_2e.

	JI
Bulgaria	7
Czech Republic	2

Estonia	1
Hungary	4
Latvia	1
New Zealand	4
Poland	1
Romania	1
Russia	5
Slovakia	1
Ukraine	8
	35

Project Categories:

1. Energy production (renewable/non renewable), (e.g. hydro, wind, biomass, biogas etc.)
2. Avoidance or recovery of landfill gases
3. Combined heat and power installations
4. Fuel switch to renewable or less carbon intensive fuels
5. Energy distribution
6. Energy demand
7. Manufacturing industries
8. Chemical industries
9. Waste handling and disposal
10. Energy efficiency projects (e.g. thermal building renovation)
11. Agriculture

3.2.5.2. CDM projects

Till April 2006, 80 projects from 15 countries were submitted to the Austrian JI/CDM Programme. With 9 CDM projects, ERPAs (Emission Reduction Purchase Agreements) were concluded, which represent a total volume of up to 8.6 Mill. t CO_2e.

	CDM
Bhutan	1
Bolivia	1
Brazil	2
China	32
Colombia	2
Ecuador	1
Egypt	1
Ethiopia	1
Georgia	1
India	32
Indonesia	1
Israel	2
Malaysia	1
Paraguay	1
Serbia and Montenegro	1
	80

Project Categories

1. Energy production (renewable/non renewable), (e.g. hydro, wind, biomass, biogas etc.)
2. Avoidance or recovery of landfill gases
3. Combined heat and power installations

4. Fuel switch to renewable or less carbon intensive fuels
5. Energy demand
6. Manufacturing industries
7. Chemical industries
8. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
9. Waste handling and disposal
10. Agriculture

3.2.6. Legal Framework

3.2.6.1. Laws and Directives

The Austrian JI/CDM Programme incorporated into the Austrian Umweltförderungsgesetz (UFG - Environmental Support Act) started on August 21, 2003.

The Programme's aims are:

- To purchase of emission reduction credits directly from JI and CDM projects and through participation in funds and facilities.
- To finance of particular immaterial services, such as baseline studies etc., which are necessary with respect to JI or CDM projects.

Details of the Programme are regulated in the Directive for the Austrian JI/CDM Programme.

3.2.6.2. Memoranda Of Understanding (MOU)

To facilitate the handling of specific JI or CDM projects, the Austrian Federal Minister of Agriculture, Forestry, Environment and Water Management has concluded so-called "Memoranda of Understanding (MoUs)" with various countries.

These framework contracts form a legal basis for JI/CDM projects and give potential investors a certainty in principle that the respective host country will assent to transferring emission reduction credits generated by accordant projects to the investor country.

Up to April 2006 MoUs have been concluded with the following countries:

1. Argentina
2. Bolivia
3. Bulgaria
4. China
5. Colombia
6. Czech Republic
7. Ecuador
8. Hungary
9. Indonesia
10. Latvia
11. Mexico
12. Morocco
13. New Zealand
14. Peru
15. Romania
16. Slovakia
17. Tunisia
18. Vietnam

3.3. Denmark

DanishCarbon.dk is interested in Joint Implementation (JI) and Clean Development Mechanism (CDM) projects in Central and Eastern Europe. DanishCarbon.dk regards the Kyoto Protocol mechanisms

(JI/CDM) as a way to develop projects with positive social, economic and environmental impacts. This is done through reducing emissions, the transfer of technology, and bringing in investment.

For DanishCarbon.dk JI and CDM projects are a partnership between project hosts, developers, technology suppliers, the host country and the Danish government where each partner benefits. Project hosts and developers earn a higher return on investments which facilitate the project; Technology suppliers find a new market for their products; Host countries benefit from the acquisition of the newest technology and the improvement of the local environment; The Danish government is supported in its commitment to comply with the Kyoto Protocol.

For more information on how DanishCarbon.dk purchases Carbon Credits please look at the three Methods for Obtaining Carbon Credits.

Please note that the DanishCarbon 2006 Tenders was launched on February 23, 2006 with the following deadlines for submission of Project Idea Notes (PINs): April 1, August 1 and November 1, 2006. Full Project Proposals (PDDs) can be forwarded DanishCarbon anytime.

3.3.1. Who may become a Project Host?

Any enterprise, public utility or other entity in countries in Central and Eastern Europe may become a Project Host if:

- it wants to carry out a JI/CDM project reducing emissions of Greenhouse Gases;
- it meets the specific country and project eligibility criteria;
- the project can be approved by the National Focal Point in the host country as a JI/CDM

3.3.1.1. Eligible countries

DanishCarbon.dk procures Carbon Credits generated from JI and CDM projects located in countries in Central and Eastern Europe who have ratified the Kyoto Protocol. This includes countries in Central Asia and Caucasus. A general overview of DanishCarbon.dk's area of interest and applicable countries is presented on the map.

DanishCarbon.dk has established formal agreements with several countries on Climate Cooperation in Central and Eastern Europe.

3.3.1.2. Climate Cooperation with Central and Eastern Europe Countries

Denmark has made overall cooperation agreements on joint climate projects with Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Kyrgyzstan, Latvia, Moldova, Poland, Romania, Slovakia, and Ukraine. Negotiations are taking place on similar country agreements with the Czech Republic, Hungary, Lithuania, and Russia.

3.3.1.3. Climate Cooperation with Ministries and Institutions in Central and Eastern Europe

3.3.1.3.1. Ministries

Georgia

Ministry of Environment Protection and Natural Resources
www.parliament.ge/SOEGEO/english/institut/moe/moe.htm

Ukraine

Ministry of the Environmental Protection
www.menr.gov.ua/

3.3.1.3.2. Cooperation institutions

European Bank for Reconstruction and Development

www.ebrd.com

Senter Carbon Credits in the Netherlands

www.senter.nl/carboncredits

Nordic Environment Finance Corporation

www.nefco.org/general.htm

UN Climate Convention site UNFCCC

http://unfccc.int/

OECD

www.oecd.org/

World Bank Prototype Climate Fund PCF

http://prototypecarbonfund.org

3.3.1.4. Eligible types of projects

Project types which may be eligible under DanishCarbon.dk include:

- Renewable energy, e.g. introduction of wind power, biomass, solar, geothermal energy and small hydro power (below 20 MW)
- Fuel switch from CO_2-intensive fuels to cleaner fuels, e.g. coal to gas, fuel oil to gas and introduction of waste to energy
- Energy efficiency, e.g. combined heat and power (CHP), process optimisation, lighting and insulation.
- Methane capture, e.g. landfill gas extraction and biogas extraction
- Reductions in industry, e.g. reduction of emissions from energy efficiency, adipic acid production, nitric acid production and HCFC production.

Projects which have an associated approved CDM methodology will have a higher priority than those without.

In working with DanishCarbon.dk a project host and developer gains from the 15 years of experience and success of the Danish Ministry of the Environment in the region, which makes DanishCarbon.dk a fast, flexible and efficient buyer of your Carbon Credits.

3.3.1.5. Fast, Flexible and Efficient

Fast

DanishCarbon.dk has quick procedures and is able to bring your project idea or proposal to the point of contracting within months. DanishCarbon.dk will also work diligently to support the fast and qualified implementation of your project.

Flexible

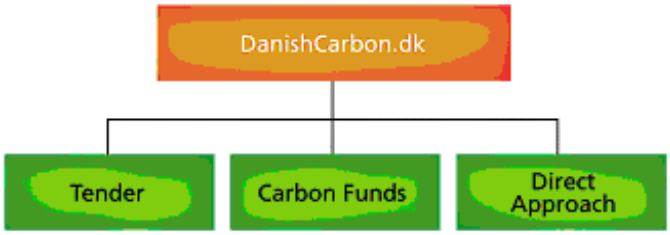
DanishCarbon.dk meets the needs of all types of project hosts and developers through three alternative carbon contracting methods. These methods offer opportunities which include among others intensive development support, funds for carbon purchase and investment financing, and quick purchasing from already developed projects.

Efficient

Short communication lines and direct contact with our qualified team ensures a smooth development, contracting, and implementation of your project.

You can access information regarding each of the DanishCarbon.dk Carbon Contracting Methods by clicking on the appropriate box below.[6]

[6] Brochures are available which give a description of the DanishCarbon.dk programme and the three Carbon Contracting Methods available for JI/CDM projects.



DanishCarbon.dk has invested in three Carbon Funds in order to diversify the Danish Governments portfolio for obtaining Carbon Credits, and to establish means for Danish industry to invest in the purchase of Carbon Credits.

The EcoSecurities-Standard Bank Carbon Facility is an initiative created to assist governments and industry to source JI and CDM emission reductions for compliance with the Kyoto Protocol and other emission reduction programs. Managed by EcoSecurities and Standard Bank London Limited, the Facility seeks to buy high quality emission reduction credits from Joint Implementation projects in Central and Eastern Europe and from Clean Development Mechanism projects in Central Asia.
http://www.essbcarbonfacility.com/

NEFCO is an international financial institution financing environmental projects in Eastern Europe through various types of instruments including the Baltic Sea Region Testing Ground Facility (TGF), which provides financing for Joint Implementation projects under the Kyoto Protocol. The fund purchases ERUs and AAUs from projects in Host Countries in the Baltic Sea region, primarily Poland. Lithuania, Latvia, Estonia, and Russia, and later Ukraine. www.nefco.org/tgf

The World Bank's carbon finance initiatives are part of the larger global effort to combat climate change, and go hand in hand with the Bank's mission to reduce poverty and improve living standards in the developing world. The Danish Carbon Fund would support projects in developing countries and countries with economies in transition, in exchange for greenhouse gas emission reductions under the Clean Development Mechanism (CDM) and the Joint Implementation Mechanism (JI). In addition, the involvement of Danish companies as participants in the Funds further strengthens and promotes the sharing of knowledge amongst private sector buyers in the carbon market. http://carbonfinance.org/

The Direct Approach helps project hosts and developers build a project from scratch in difficult markets and regions. This method offers intensive support by the experienced team at DanishCarbon.dk which helps pave the way for Danish JI/CDM projects in countries that are building their capacity in relation to Carbon Credit trading.

3.3.1.6. Long experience with Direct Approach

Since 2002 DanishCarbon.dk has utilised the Direct Approach as a method for the contracting of Carbon Credits. The Direct Approach reflects the Danish Environmental Protection Agency's (DEPA) long-standing programme for environmental cooperation in Central and Eastern Europe, and thus is a natural way for DanishCarbon.dk to obtain Carbon Credits. Most of the projects being developed and implemented under the Direct Approach have been identified through cooperative efforts of DEPA and host countries. The programme's first few contracted JI projects were developed and implemented under the Direct Approach.

DanishCarbon.dk is continuing in this effort by carrying out activities in cooperation with prospective host countries in Central and Eastern Europe in order to identify and develop projects to the point of contracting.

If you find that your JI/CDM project lies within the above-mentioned description, you are welcome to contact the DanishCarbon.dk team directly for further discussion of how we can assist you in developing your project.

3.4. NEFCO

3.4.1. Eligible Projects

The main criteria for NEFCO's participation in projects are:

- The project is located in one of NEFCO's countries of operation.
- The project has a relevant environmental effect.
- The project is based on long-term cooperation through investments in enterprises, primarily though the formation of joint venture companies or corporate acquisitions.
- The project has a Nordic company or institution as business partner.
- The project is economically, financially, institutionally and technically viable.

NEFCO can participate in a project through:

- Subscriptions of equity and shares, facilitating mobilization of the necessary equity base for a project. NEFCO then participates as a partner in the project.
- Medium and long-term loans and guarantees, which are usually provided on market terms. In some cases subordinated loans and loans with equity features may be provided. Often the loans are extended in addition to NEFCO's equity participation in the project.
- Since 1996 NEFCO also administers a special Nordic facility for concessional financing of selected environmental projects within the neighbouring region. Through this facility projects can be supported by grants.

Through its participation NEFCO complements financing from other interested parties and/or financial institutions. The project structure should provide a reasonable balance between the different risks and benefits of the various participants in the project. NEFCO will not accept a majority ownership or a dominating position for itself.

The project should have relevant environmental effects. Priority will be given to projects that have substantial environmental effects for the Nordic region, i.e. projects that lead to reduction of pollution in the Baltic Sea and the Barents Sea or reduction of trans-boundary airborne pollution.

Projects resulting in positive environmental effects for the Nordic countries and the surrounding seas can for example be related to modernisation of industrial plants and energy utilities. Another group consists of projects carried out in cooperation with municipalities and other authorities to supply environmental services, such as purification of wastewater or waste management. A third category consists of companies that manufacture environmental equipment and equipment for more effective use of energy, or that supply consulting and engineering services within the field of environment and energy to create better conditions for the realization of environmental measures. To some extent NEFCO also participates in projects of mainly local environmental interest but offering a desirable demonstration effect. A Nordic partner should take part in the project on a long-term basis. Generally this implies participation in an enterprise, and so acquisitions and joint ventures are typical. The Nordic partner is required to have sufficient experience of the business.

The project should be carried out in one of NEFCO's countries of operation in Eastern Europe. Namely, NW Russia, Estonia, Latvia, Lithuania, Ukraine and Belarus. The project must be feasible.

The environmental, technical, institutional, economical and financial feasibility of the project should be demonstrated, normally through an adequate feasibility study. NEFCO requires projects to meet reasonable profitability criteria but, this having been established, focuses more on the environmental effects. In this NEFCO represents a green equity concept, unlike commercial investment funds.

3.4.2. Financing Instruments

NEFCO administers a range of different funds for a variety of purposes. A brief description of the main funds is found below.

3.4.2.1. NEFCO Investment Fund

The Investment fund amounts to approximately 113,4 MEUR. The fund provides loans and equity financing. In some cases subordinated loans and loans with equity features can also be provided. The loans are from medium to long term, and are provided on market conditions.

3.4.2.2. Nordic Environmental Development fund - NMF

Through this fund, originally established by the Nordic Ministers of Environment in 1995, NEFCO is endeavouring to support the realization of projects that otherwise would not materialize or could be realized only later in the future. Local participation in the financing is required. Contributions from the fund can be provided as grants for the procurement of goods or services (cash subsidies) or to reduce the borrower's debt service costs. The maximum grant is one-third of the total project cost. The capacity of the fund is approximately DKK 300 million.

3.4.2.3. Testing Ground Facility - TGF

The Baltic Sea Region Testing Ground Facility (TGF), is a fund, which provides financial assistance to projects, primarily by purchasing emission reduction credits. The TGF was established at the end of December 2003 by the governments of Denmark, Finland, Iceland, Norway and Sweden, pledging an aggregate capital of € 10 million. In 2004, Germany committed further € 5 million. The TGF will invest in projects with a potential for delivering cost-effective ERUs and AAUs for the account of the investors.

3.4.2.4. Cleaner Production Revolving Facility - CPF

The Revolving Facility for Cleaner Production provides loans for small scale projects that reduce risk to human and the environment. The loans range from approximately EUR 50 000 to 350 000 and have a fixed interest rate. The projects are required to have a rapid pay-back.

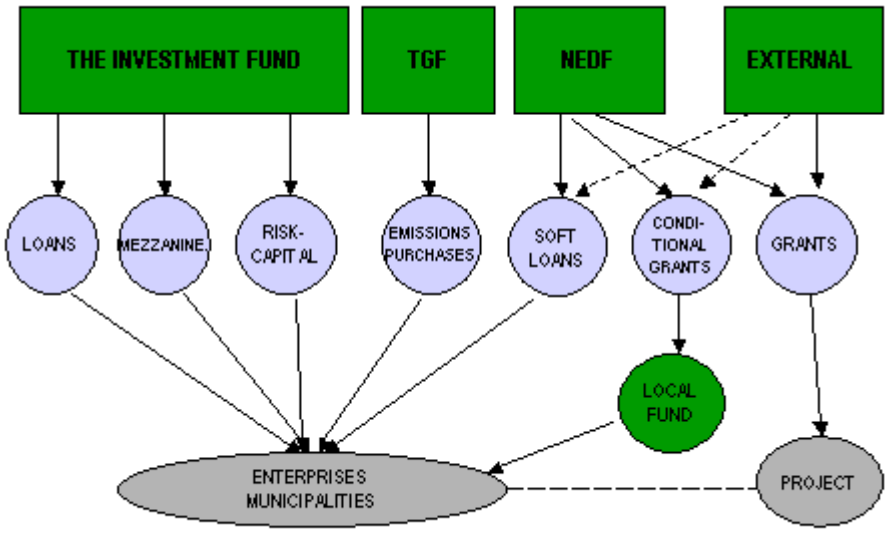


Figure 9 Structure of Funding Recourses

3.4.3. TGF Calls for JI Project Proposals in Ukraine

Baltic Sea Region Testing Ground Facility: Call for JI Project Proposals in Ukraine

19.4.2006

Project owners and developers in the republic of Ukraine are invited to submit proposals for JI projects for consideration as possible carbon finance investments by the Testing Ground Facility*

General background

In September 2003 an intergovernmental agreement, the Testing Ground Agreement, was concluded between several of the governments in the Baltic Sea Region establishing a regional Testing Ground for Joint Implementation to help the countries of the Baltic Sea Region to position themselves favourably in respect of fulfilling their own commitments under the Kyoto Protocol. As a part of the Testing Ground cooperation a new fund, the Baltic Sea Region Testing Ground Facility (TGF) was established. The TGF invests in projects with a potential for delivering cost-effective ERUs (according to Article 6 of the Kyoto Protocol) and AAUs (according to Article 17 of the Kyoto Protocol) for the account of its investors.

The Testing Ground Facility (TGF) is now a Public Private Partnership based carbon purchase fund which counts among its investors, the Governments of Denmark, Finland, Iceland, Norway and Sweden, and North European heat and power companies (see website for details) pledging an aggregate capital of €32.5 million.

The Nordic Environment Finance Corporation (NEFCO) is the Fund Manager. NEFCO is an international financial institution, based in Helsinki, working with environment and energy projects, principally in the Russian Federation and Ukraine.

Investment criteria

The TGF will invest in projects owned and operated by private enterprises, public utility companies, public-private partnerships and municipal, regional or governmental authorities.

Energy related projects are given priority with a focus on:

- Renewable energy (biomass, small scale hydropower, wind power and geothermal)

- Fuel switching

- Energy efficiency

- Energy conservation.

However, also other sectors such as waste (e.g. waste to energy, recapturing of methane from landfills) and projects related to reduction of other greenhouse gases are eligible for financing from the TGF.

All projects are subject to standard viability criteria: economic, financial, technical, institutional and environmental feasibility. An important aspect will be to determine that all financing needed for project implementation is arranged or well advanced. A key criterion is that projects should be sufficiently advanced in project development to be able to generate emission reductions by 1st January 2008.

In addition, particular attention is paid to securing the eligibility of the projects under the Kyoto Protocol and their potential of providing delivery of ERUs and AAUs (including host country related preconditions). Host country approval will be required.

Projects should be implemented in accordance with the so called Track 2 procedure.

Purchase of ERUs/AAUs

The TGF acts as buyer of ERUs/AAUs on the basis of emission reduction purchase contracts concluded with project owners. There is no preset minimum threshold limit for emission reductions but projects should be able to bear reasonable transaction costs and cost-effectiveness will be a criterion in the assessment of project proposals. A maximum of 1 million tCO_2e over the commitment period per project will be observed.

The price for the ERUs/AAUs will be agreed individually for each project with payments will normally be made upon delivery of the ERUs/AAUs.

For emissions reductions occurring during the commitment period 2008-2012 the TGF will acquire ERUs. For early credits the TGF has the possibility to enter into agreements with the Ukrainian authorities for delivery of a corresponding amount of AAUs.

The TGF is able to mobilize the resources needed for project preparation and JI determination.

Co-financing Arrangements

It is expected that projects in most cases, in addition to equity provided by the project owners, will require co-financing from various sources in order to be fully financed. From time to time NEFCO and/or the Nordic Investment Bank, following its normal project selection and evaluation criteria (which are provided at www.nefco.org and www.nib.int), may provide co-financing. The TGF may in addition seek co-financing

arrangements with other financiers, including IFIs such as the NIB, EIB and EBRD as well as commercial financiers and private investors.

TGF also offers the opportunity to co-purchase emission reductions with its investors and other institutions.

Procedure

Interested parties are invited to send information in English on their projects to NEFCO not later than 31st July 2006 in order to participate in the first round of evaluation. Later submissions will, however, also be considered. The information should be sent in the first instance to:

Ash Sharma
Programme Manager,
Testing Ground Facility

Nordic Environment
Finance Corporation
P.O.Box 249,
FIN-00171 Helsinki
Finland
ash.sharma@nefco.fi

Vladimir Morozov
TGF Representative in Ukraine
Donetsk, Ukraine

morozov@ukrntec.com

An initial information package should contain at least the information detailed in the attachment to this note. Alternatively another Project Idea Note (PIN) format may be used, provided that it contains essentially the same information. If more comprehensive information is available (such as a Project Design Document) it is recommended that this be included.

For additional information please visit www.nefco.org/tgf

3.4.4. TESTING GROUND FACILITY Attachment

Request for Initial Information on Proposed Projects (Project Idea Note) Alternatively another PIN format may be used, provided that it contains essentially the same information

General information

Project title

Location of project

Project owner(s) (incl. contact details)

Project developer (if applicable)

Project type (e.g. fuel switching, energy efficiency)

Host country

Information on relevant host country authorities

Host country approval that it considers the project to be a potential JI Project

GHG reductions

Estimate of annual greenhouse gases emissions reductions (in metric tons of CO_2e)

Technology that will be used (proven technologies will be favoured)

Baseline (calculation of the emissions if the project would not have been implemented)

Motivation for choice of baseline method

Readiness of the project in respect of Track 2 procedure (including cost coverage)

Estimated total amount and period of delivery of AAUs (before 2008) and ERUs (2008-2012)

Estimated price per AAU/ERU offered

Other environmental effects

Other emissions reductions (SO_2, NOx, POPs etc.)

Need for EIA/EA and, if required, status of EIA/EA

Project information

Objectives of the project

Sector in which the project will be operating and sector policies and trends

Planned project activities (construction, operation)

Expected acquisition of equipment and potential suppliers (sourcing of supplies)

Implementation schedule (including timetable for obtaining of permits and conclusion of project agreements)

Information on project owner (including financial data based on audited accounts for last three years)

Information on project owner's experience/competence relevant for the implementation of the project

Investment and financing

Total project costs (in EUR) (itemized budget)

Financial projections (showing project's viability)

Detailed financing plan indicating amounts and sources of financing

Risks and mitigation

Summary description of risks (market, financial, economic and environment) and envisaged mitigation

Important: This invitation does not constitute an offer to procure any emission reductions and is not part of any tender. The TGF shall not be under any obligation to respond to any proposal submitted on the basis of this invitation.

3.5. The Netherlands[7]

3.5.1.1. Background CDM

The Kyoto Protocol of the U.N. Framework Convention on Climate Change calls for industrialized countries (listed in Annex I to the UNFCCC) to reduce their Green House Gas (GHG) emissions to levels below those generated in 1990 by the period 2008 - 2012. Clean Development Mechanism (CDM), Joint Implementation (JI) and Emission Trading (ET) are the three "Flexible Mechanisms" of the Kyoto Protocol designed to enable the Annex I countries to achieve their quantified emission reduction targets at lower costs.

The goals of CDM as defined in article 12 of the Kyoto Protocol are:

3. to contribute to sustainable development in non-Annex I countries;
4. to contribute to the ultimate objective of UNFCCC: the absolute mitigation of climate change;
5. to assist Annex I parties in complying with their emissions reduction commitments.

With the help of CDM, countries which have set themselves an emission reduction target under the Kyoto Protocol (Annex I countries) can contribute to the financing of projects in developing countries (non-Annex I countries) which do not have a reduction target. These projects should reduce the emission of greenhouse gases while contributing to the sustainable development of the host country involved. Subsequently, the achieved emission reductions can be purchased by the Annex I country in order to meet its reduction target.

Certified emission reductions (CERs), representing GHG reductions under CDM, can only be produced and banked through projects that have started after 01-01-2000.

[7] http://www2.vrom.nl/

3.5.2. Policy CDM

3.5.2.1. The Dutch policy regarding the reduction of GHG-emissions

According to the agreements reached in Kyoto and subsequently in the European Union, the Netherlands has a 6% emission reduction target for GHG emissions (carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and the fluorinated gases: HFCs, PFCs and SF_6). The Dutch government has agreed that a substantial part of this reduction should be achieved within the Netherlands itself and the remaining part should be achieved in other countries through the three Kyoto mechanisms.

The Netherlands is one of the first countries, which have earmarked public funding for buying CO_2-reductions by CDM. The Ministry of VROM is responsible for the implementation of CDM.

VROM has also been assigned as Designated National Authority (DNA) for CDM in the Netherlands.

3.5.2.2. The implementation of CDM by the Ministry of VROM

The Dutch government has a substantial budget available for the implementation of CDM. In April 2001, the Ministry of VROM set up a CDM Division as part of the International Environmental Affairs Directorate of the Ministry. The responsibility of the division is to use the funds allocated by the Dutch government to purchase Certified Emission Reductions (CERs) from sustainable projects in developing countries in a cost-effective manner. In fact, the purchase of CERs creates an additional return on project investments. As a result, sustainable projects can be realized, which would not have been feasible without the possibility of selling CERs.

The Ministry of VROM intents to purchase CERs through the following five tracks:

1. Multilateral international financial institutions;
2. SENTER Internationaal, a Dutch agency acting on behalf of several Dutch Ministries;
3. Private financial institutions;
4. Bilateral purchase-agreements with Host Countries;
5. Participation in carbon funds.

Via the above ways VROM is contracting various organizations to act as intermediaries for the purchase of CERs. Under the guidance of VROM, these intermediaries select sustainable projects in developing countries and purchase the resulting CERs for the benefit of the Ministry. Investors from all countries may submit CDM-project proposals to these intermediaries that will judge these projects, including the compliance with the requirements.

Until now, the Ministry of VROM has contracted the following organizations:

Rabobank
Rabobank is an internationally operating private bank focusing on the food and the agribusiness. CDM project proposals may be submitted to the Rabobank at all times.

International Finance Corporation (IFC)
IFC is also known as the IFC-Netherlands Carbon Facility (INCaF). CDM project proposals may be submitted to the IFC at all times.

International Bank for Reconstruction and Development (IBRD)
CDM project proposals may be submitted to the IBRD at all times.

La Corporación Andina de Fomento (CAF)
The CAF-Netherlands CDM Facility focuses on public and private sector transactions, located in countries in Latin America and the Caribbean. CDM project proposals may be submitted to CAF at all times.

The Community Development Carbon Fund (CDCF)
For small scale projects in the least developed regions, please contact helpdesk@carbonfinance.org with reference to CDCF

SENTER Internationaal
SENTER Internationaal has organized a CDM tender called CERUPT for investment projects in developing countries. This tender closed on 31 January 2002; for the time being no new projects will be considered.

3.5.3. Host countries

3.5.3.1. Eligibility

In principle, all non-Annex I countries are eligible for CDM co-operation with the Netherlands. However, in order to participate in the Dutch CDM facilities, the host country needs to have ratified the Kyoto Protocol, or to have explicitly stated its willingness to do so as CER transactions are only possible between countries party to the Kyoto Protocol. The Netherlands ratified the Kyoto Protocol on 31 May 2002.

3.5.3.2. Legal arrangements

For the transfer of CERs to the Netherlands, approval of the host country government is needed.

In accordance with the modalities and procedures of CDM (Annex decision 17/CP.7), parties participating in the CDM shall designate a national authority (DNA).

The DNA will usually function as a CDM focal point. Countries that have not arranged a DNA for CDM yet, may also have a CDM focal point. The CDM focal point may be different from the UNFCCC focal point! Since there is no official list of all CDM focal points yet, VROM uses an informal list of CDM focal points. If you have any comments or recommendations on this list, please contact the Ministry of VROM, which is the Designated National Authority and also the focal point for CDM in the Netherlands, at: cdm.dna@minvrom.nl.

3.5.3.3. Co-operation with the Netherlands

In order to facilitate the process of Endorsement and Approval of CDM projects by host countries, and thus assisting project participants, the Netherlands signs Memoranda of Understanding (MoUs) with those countries. The MoUs focus on a long-standing CDM co-operation with host countries with a high potential CDM projects. However, the conclusion of a MoU is no prerequisite for CDM co-operation with the Netherlands. The host country will still have to approve of each individual CDM project by issuing the formal Letter of Approval, whether an MoU has been signed or not.

3.5.3.4. Memoranda of Understanding until now:

Argentina
Bolivia
Brazil
Colombia
Costa Rica
Ecuador
Guatemala
Honduras
Indonesia
Mexico
Nicaragua
Panama
El Salvador
Uruguay

The Netherlands also considers the possibility to buy credits through bilateral contracts with governments of potential host countries for CDM-projects.

3.5.4. Projects

3.5.4.1. Where to submit a CDM project proposal?

Currently investors from all over the world may submit CDM-project proposals at all times at the following intermediairy organisations contracted by the Government of the Netherlands:

- Rabobank
  Focuses on the food and agribusiness. For more information, please contact Ms Jenneke Segers at Jenneke.Segers@rabobank.com
- IFC
  For more information, please contact carbonfinance@ifc.org with reference to the IFC-Netherlands Carbon Facility (INCAF)
- IBRD
  For more information, please contact helpdesk@carbonfinance.org with reference to the Netrherlans Clean Development Facility (NCDF)
- CAF
  Focuses on projects in Latin America and the Caribbean. For more information, please contact Jorge Barrigh at JBarrigh@caf.com.
- The Community Development Carbon Fund (CDCF)
  For small scale projects in the least developed regions, please contact helpdesk@carbonfinance.org with reference to CDCF.

3.5.4.2. Eligible projects

Projects eligible for CDM would include renewable energy, such as wind, solar, geothermal, hydro and biomass (clean) energy; energy improvement; transportation improvement; recovery and utilization of methane from waste landfills and coal mines and/or fossil fuels-switching to less carbon-intensive sources (example: from coal to natural gas).

Examples of projects not eligible for financial support of the Dutch CDM programme:

- Afforestation and reforestation projects (important decisions on this issue will be taken at COP 9 in 2003);
- Projects related to nuclear energy;
- Projects that are not cost-effective for the Netherlands (contact the intermediary organization for project requirements);
- Projects which may result in severe damage on biodiversity or on social livelihood.

3.5.4.3. Baselines

In all cases, greenhouse gas reductions are expressed as the difference between the actual emissions of a project and the emissions that would have occurred in the absence of this project; the latter is also referred to as 'the baseline'. This baseline is the reference for calculating the amount of GHG reduced and has to be defined for each separate project. The international community has not yet agreed upon a sophisticated set of baseline methodologies. In order to facilitate a prompt start of the Dutch CDM programme, the Ministry of VROM has developed its own set of guidelines for baselines, which can be used by project developers. In addition, VROM has developed standardized baselines for small-scale projects.

In January 2003 the executive board of COM launched a package of simplified modalities for small-scale CDM projects, including a “simplified CDM project design document” for registering such projects, and an “indicative list of simplified baseline and monitoring methodologies”, helping project proponents to lower costs for complying with CDM rules. Those standards may be downloaded form the UNFCC. In the meantime the international community has agreed upon a sophisticated set of baseline methodologies.

3.5.4.4. Focal points

For the transfer of CERs to the Netherlands, approval of the host country government is needed. It is recommended to contact the CDM focal point in the host country in an early stage of the project development. The Designated National Authority (DNA) for CDM would usually act as a CDM focal point. Countries that have not arranged a DNA for CDM yet, may have an informal CDM focal point. The CDM focal point may be different from the UNFCCC focal point!

3.5.4.5. Tips

Useful formats and information may be found on the following websites:

www.unfccc.org/cdm

www.prototypecarbonfund.org

www.carboncredits.nl

3.5.5. Approval criteria

Companies, international organisations and private persons (entities) from the whole world are eligible to request an Approval for participation in Clean Development Mechanism (CDM) projects by the Netherlands Designated National Authority for CDM (CDM DNA), if they meet the conditions set out in the Ministerial Decree for Approval of Participation in Kyoto Project Activities (Staatscourant/79, 24 April 2005), that replaces the interim-policy for Approval of participation in CDM project activities (Staatscourant/241, 12 December 2005).

Only requests regarding project activities in an advanced stage of development will be considered: after a call for public comments has been published by the validating Designated/Applicant Operational Entity (DOE).

Summarized, the request for a "Letter of Approval" by the Netherlands CDM DNA for participation in a CDM project activity should:

- State the exact name of the project, as mentioned in the most recent publicly available version of the CDM Project Design Document (PDD), and
- The full name of the entity, as registered at the Chamber of Commerce.

In addition, the following supportive evidence should be provided:

- For hydropower dam projects with generation capacity larger than 20MW:

  Declaration for compliance with the recommendations of the World Commission on Dams in the report "Dams and Development: A New Framework for Decision Making" available on Internet at: http://www.dams.org

- For other project types:

  1.Declaration for consistency of the participation of the entity in the Article 12 project activity with the Kyoto Protocol and related subsequent decisions.

  2. Evidence for registration of the private entity at the Chamber of Commerce, or a comparable institution. Private persons should provide a copy of a valid identity and original evidence from the Municipality for address registration. International organisations should provide a copy of official documentation on the establishment and purpose of the organisation.

  3. Reference for registration of the project as a CDM project activity. If the project is not registered yet: an exact link to the UNFCCC's or the DOE's website, where the most recent publicly available version of the Project Design Document (PDD) is published.

  4. An original Letter of Intention, signed by all other project participants, to add the company as a project participant (upon receipt of a Letter of Approval), except if the company is already mentioned as a project participant in the most recent publicly available version of the PDD.

Complete requests with the official letterhead of the entity, signed by an authorized representative of the entity requesting approval, with enclosed supportive evidence, should be submitted per post at the following address:

Ministry of Housing, Spatial Planning and the Environment (VROM)
CDM DNA
Att. Ms. Lucy Naydenova
P.O. Box 30945/IPC 670
2500 GX The Hague
The Netherlands

Although in general governmental institutions in the Netherlands are required to respond to external correspondence within eight weeks, the intention of the Netherlands CDM DNA is to handle complete and correct requests within two weeks, except in the months July and August, when some delays might occur due to summer holidays.

The Letter of Approval, if granted, will be unconditional, entity specific and project specific. It will be signed by Mr. Yvo de Boer, director of the Ministry's Directorate for International Affairs, who is mandated to sign Letters of Approval for participation in CDM projects on behalf of the Netherlands CDM DNA.

Similar approval criteria will be used for Joint Implementations (JI). JI Approval request should be sent to the JI Focal Point at the Ministry of Economic Affairs. [link to www.minez.nl]

Obtaining a Letter of Approval from the Netherlands CDM DNA does not require an account in the Netherlands CO_2 Emissions Trading Registry, but it might be useful to have one. The Netherlands Emissions Authority (NEA) [link to http://www.nederlandse-emissieautoriteit.nl/EN_index.html] is responsible for the opening of accounts in the Netherlands CO_2 Emissions Trading Registry.

Outsourcing of the approval function of the Netherlands CDM DNA will be considered in the second half of 2006.

3.6. Sweden

3.6.1. International Climate Investments

International cooperation is a prerequisite for effectively abating climate change. To this end, the Kyoto protocol includes three so called flexible mechanisms, according to which a country can benefit from emission reductions achieved in another country. The flexible mechanisms are:

- Joint Implementation, JI: Developed countries can by accomplishing emission reductions in other developed countries, that also have binding targets according to the Kyoto protocol, receive emission reductions that can be used to meet their Kyoto targets.
- Clean development mechanism, CDM: Through the CDM, investments are channelled to projects that mitigate greenhouse gas emissions while contributing to sustainable development in the host countries (developing countries). In return, the investing country (developed country) receives credits that can be used to meet their Kyoto targets.
- Emission trading: This involves the purchase and sale of emission credits between parties that have a binding target.

Since 1998, the Swedish Energy Agency has been entrusted with the administration of international climate related investments. During the period 1998 to 2000, the Agency was responsible for the pilot projects under the Activities Implemented Jointly scheme (EAES Programme) initiated by the First Conference of the Parties to the UNFCCC in 1995. To date, it has invested in approximately 70 projects in Eastern Europe and the Baltic region.

In 2000, the Swedish Energy Agency established the Swedish International Climate Investment Programme (SICLIP). This programme includes two main areas of climate investment, CDM, and JI. The latter includes the Testing Ground Facility (TGF), a fund for regional climate co-operation in the Baltic Sea Region.

On January 1st 2005, the European Trading Scheme (ETS) is entering into force. The Swedish Energy Agency in cooperation with other Swedish authorities is responsible for the implementation of the scheme.

3.6.2. SICLIP – Swedish International Climate Investment Programme

In 1997, the Swedish Parliament decided to allocate SEK 350 million for international climate policy initiatives during the period 1997-2004. Parts of these resources were earmarked for multilateral cooperation within the framework of the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, that is the Clean Development Mechanism (CDM) and Joint Implementation (JI).

The Agency has been entrusted with the administration of international climate related investments, which are managed within the Swedish International Climate Investment Programme (SICLIP). This programme

includes two main areas of climate investment, CDM, and JI. The latter includes the Testing Ground Facility (TGF), a fund for regional climate co-operation in the Baltic Sea Region.

Presently, the Agency is involved in projects in Latin America, Africa, Asia and Central and Eastern Europe. The SICLIP programme's main aim is to contribute to the development of the Kyoto mechanisms and for the Swedish authorities, as well as relevant authorities in the host countries, to enhance knowledge and gain experience of developing CDM and JI projects.

3.6.2.1. JI - Joint Implementation

With regards to JI investments, a call for proposals was announced in August 2003. Fifteen project proposals were received by the close of the call in October 2003 of which, three/four small to medium sized projects leading to approximately one million ERUs, will be developed further. The prioritised areas are renewable energy applications and energy efficiency improvements. As in the case of the SICLIP-CDM programme, the main objective of the SICLIP-JI is to gain experience in the use of the mechanism as well as contribute to its further development as well as acquiring emission reductions to a competitive cost. The experience gained from this programme will be useful in providing support to Swedish companies intending to invest in JI projects in the future.

3.6.2.2. CDM - Clean development mechanism

The SICLIP-CDM programme was set up in 2002. The objective of the programme is to put together a geographically balanced portfolio of projects with priority given to energy efficiency and renewable energy projects.

The Agency envisages that experience gained from this programme will be useful in providing support to Swedish companies intending to invest in CDM projects in the future. A call for proposals was announced in May 2002. Forty-six proposals were received by the close of the call in June 2002. Five projects were selected for further development. To date, purchase agreements have been signed with four of these projects, three of which are in Brazil and one in India. During a period of 7 to 21 years, the five projects are expected to generate a total of approximately two million CERs.

3.6.2.3. TGF - Testing Ground Facility

At the BASREC Ministerial Meeting in Vilnius, Lithuania, in November 2002 the ministers, besides approving a new three-year mandate for BASREC, also decided to establish a "testing ground" for Joint Implementation in line with the Kyoto Protocol in the Baltic Sea Region including Northwest Russia.

During 2003 the work has proceeded within the BASREC's Climate Group with the establishment of the Fund, the "Testing Ground Facility" - TGF, that was initiated by the Nordic Ministers of Energy at their meeting in Haugesund in June 2002. The aim with the Fund is to finance climate projects in the region in line with the Kyoto Protocol mechanism Joint Implementation (JI) and thus to purchase emission reduction units The Nordic contribution amounts to a total of 10 MEUR. The Swedish Government has assigned the Swedish Energy Agency the responsibility for the Swedish participation in and contribution to the Fund, a total of 4 MEUR. According to the assignment the Agency will represent Sweden in the steering group for the Fund, Investors' Committee. The guidelines for the Testing Ground Facility were approved by the parties in early December 2003. The Nordic Environment Finance Corporation, NEFCO, has been assigned as Administrator of the TGF. The first meeting of the Investors' Committee was held in March 2004.

Besides the five Nordic Countries, Denmark, Finland, Iceland, Norway and Sweden, Germany has declared its intention to contribute to the Fund.

A regional agreement, the Testing Ground Agreement (TGA) was signed by most of the BASREC member states at a Ministerial Meeting in Gothenburg on 29 September 2003.

3.6.3. The EAES Programme - the Swedish contribution to the UNFCCC Pilot Phase for Activities Implemented Jointly (AIJ)

In the autumn 1992 a special international energy related climate investment was established. The international investment programme, usually known as the EAES Programme (Programme for an

Environmentally Adapted Energy System) was mainly directed to the countries in the Baltic Sea Region, i.e. Estonia, Latvia, Lithuania, Poland and the Russian Federation. In connection with the decision by Parties of the Climate Convention at their first meeting in Berlin (COP1) to establish the Pilot Phase for Activities Implemented Jointly (AIJ) in Eastern Europe as well as in developing countries, the EAES Programme was adjusted to the requirements for the AIJ Pilot Phase.

The EAES Programme focused on renovation and up-grading of the district heating systems in the countries concerned, including conversion of heat production plants in district heating networks by switching from fossil fuels to the use of domestic wood fuels. NUTEK, National Board for Industrial and Technical Development was originally assigned to implement the programme. In connection with the establishment of a new national energy agency, the Swedish Energy Agency - Energimyndigheten, from 1 January 1998 the responsibility for the EAES Programme was transferred to the Swedish Energy Agency.

Altogether the EAES Programme comprises 65 projects . 52 have been implemented in Estonia, Latvia and Lithuania, 12 in the Russian Federation and 1 in Poland. Around 40 of the projects comprise fuel switching from fossil fuels to domestic wood fuels. All the projects in the Baltic States have been reported to the UN Climate Secretariat and are included in the list on implemented AIJ projects.

In connection with the implementation of the investment projects a number of handbooks, manuals etc. have been produced on the local languages. Translations of information material originally produced in Swedish have also been made, adapted to local conditions in the respective countries.

With the projects under the EAES Programme as models the Swedish Energy Agency has also received an assignment to establish similar projects in Lithuania with financing from the Baltic Billion Fund during 1999-2002. Under this allocation, 5 additional investment projects have been implemented. Furthermore, a bilateral wood fuel development project has been implemented, which was lead by the Swedish National Board of Forestry and the Forestry Department of the Lithuanian Ministry of Environment aiming at increasing the wood fuel potential by using residues from forestry work for wood fuel production.

The experiences from the EAES Programme have been subject to studies in a number of international investigations (EU, IEA etc.) and have thereby contributed to the development and application of the rules and regulations for the Kyoto Protocol mechanisms and i.e. for the BASREC JI Handbook.

The EAES Programme has been awarded twice: In November 1999 the CTI Climate Technology Award and in March 2000 The Energy Globe Award.

3.7. Finland

3.7.1. Finnish CDM/JI Pilot Programme

The Finnish CDM/JI Pilot Programme was launched in 1999 in order to gather experience on the two project-based mechanisms included in the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) namely the Clean Development Mechanism (CDM) and Joint Implementation (JI). The Programme also aims to purchase cost-effective emission reductions for Finland by implementing CDM and JI projects consistent with the Kyoto Protocol. Furthermore, the Programme aims to build administrative capacity and to develop procedures and guidelines for the implementation of CDM and JI projects.

In November 2001 the Seventh Conference of Parties to the UNFCCC held in Marrakech finalised the international rules for the Kyoto Mechanisms. According to the Marrakech Accords, the Kyoto Mechanisms may be used without any quantitative restrictions but their use must be additional and supplementary to domestic policies and measures. The Marrakech Accords define the specified rules for JI and CDM projects (16/CP7, 17/CP7). The international rules for the Kyoto Mechanisms will finally be adopted by the First Session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol, to be held in Montréal in November/December 2005.

The Pilot Programme has been allocated some € 20 million in total. Of this, USD 10 million has been invested in the Prototype Carbon Fund (PCF) administered by the World Bank, and € 1,75 million in the Testing Ground Facility (TGF) operating under the Baltic Sea Region Energy Cooperation programme (BASREC) and administered by the Nordic Environment Finance Corporation (Nefco).

The estimated amount of credits from the Pilot Programme's activities (including the carbon funds) during the commitment period under the Kyoto Protocol is 2 million tonnes of carbon dioxide equivalent (tCO_2e).

The role of the Kyoto mechanisms as a part of Finland's national strategy for reducing greenhouse gas emissions has first been discussed in the report by the Working Group on Kyoto Mechanisms. The Working Group indicated that Finland should build capacity to deal with the complex issues involved in the Kyoto Mechanisms in preparation for their possible future use to meet emission reductions targets under the Kyoto Protocol. According to the Working Group, the CDM/JI Pilot Programme plays an important role in the process.

The National Energy and Climate Strategy of Finland has been under revision during 2005, and it was finally approved by the Government on 24 November 2005. The new Strategy also includes Government approval to the purchase of 10 million tonnes of carbon dioxide equivalents from Kyoto Mechanisms to be used by Finland for the Kyoto period 2008-2012. Specifications of this new purchase programme, which will in many ways be the continuation of the Pilot Programme, is likely to become available in early 2006.

3.7.2. Activities

During the first four years of its operation, the Pilot Programme has identified more than 80 potential JI projects in nine host countries and over 40 potential CDM projects in fifteen host countries.

The current project portfolio of the Pilot Programme includes ten on-going CDM/ JI projects. In the autumn of 2002, the Pilot Programme's first two JI projects in Estonia, Kadrina and Tamsalu Bark Boiler (District Heating) Projects, received preliminary determination statements. Two other projects in Estonia, the Paide Bioenergy Project and the Pakri Wind Farm Project, were determined with a positive outcome in January and March 2003. The related Emission Reductions Purchase Agreements (ERPAs) between the Finnish Ministry of the Environment and the Estonian project sponsors as well as the inter-governmental project agreements between Estonia and Finland regarding the Paide and Pakri projects were signed in October 2003 and January 2004, respectively. New CDM projects were selected through an international tender between January and March 2003. As a result, of the currently on-going projects a bundle of four small-scale CDM projects in Honduras was included in the project portfolio of the Pilot Programme. The Emission Reductions Purchase Agreement for the Honduran projects was signed in March 2005. Another international tender, aiming at identifying new small-scale CDM projects, was launched in September 2005. In this second tender, also afforestation and reforestation projects were eligible.

The lessons learned so far indicate that the process of implementing CDM and JI projects is a complicated one. For instance, in some cases it may take a relatively long time to receive an endorsement from the host country. Also, the exact amount of credits will not be known until the baseline and the Project Design Document (PDD) have been evaluated by an independent party. It seems that CDM and JI projects should be considered as long-term investments that only begin where conventional investment projects end. However, the process of implementing JI and CDM projects has become more efficient during the Pilot Programme, especially after the international rules for JI and CDM were agreed by the COP-7 in Marrakech.

3.7.2.1. Legal Framework and Guidelines

The Finnish Ministry of the Environment has signed a Memorandum of Understanding (MoU) with Latvia, Lithuania, Poland, Ukraine, Hungary and Estonia concerning JI co-operation. There have also been negotiations about a Memorandum of Understanding between Finland and Russia. The Finnish Ministry for Foreign Affairs has signed a Memorandum of Understanding with El Salvador, Nicaragua and Costa Rica concerning CDM co-operation. CDM cooperation is also included in the MoU on environmental cooperation that Finland signed with China in 2002.

The Steering Committee of the Pilot Programme has decided that in addition to a Memorandum of Understanding, a specific inter-governmental agreement with a JI host country on the purchase and transfer of emissions reductions is required for each JI project. In December 2002, Finland signed an Framework agreement on JI co-operation with Estonia, namely the "Agreement on Joint Implementation of Emission Reductions of Greenhouse Gases between the Government of the Republic of Finland and the Government of the Republic of Estonia", that defines the detailed rules for JI co-operation thereby complementing the MoU signed by Estonia and Finland in 1999. The rights and obligations of the private parties involved in the project must also be clarified. For this reason, a separate Emission Reductions Purchase Agreement needs to be concluded between the project sponsor and the competent Finnish authority.

Countries hosting CDM projects do not have any quantified emissions limitation commitments under the Kyoto Protocol. Therefore, the transfer of credits generated by CDM projects does not have a similar impact as in the case of JI projects, where the transfer directly influences the host country's own commitments under the Kyoto Protocol. In CDM, the transfer also takes place at the International CDM Registry instead of the national registry of the JI host country. For this reason, an inter-governmental agreement between Finland and the host country is generally not necessary when the host country has ratified the Kyoto Protocol. The host country's consent to the project and transfer of the resulting emission credits is expressed in a Letter of Approval. In CDM projects the emission reductions purchase agreement (ERPA) is signed between the Ministry for Foreign Affairs of Finland and the project sponsor.

The Pilot Programme's Guidelines for selecting and implementing JI and CDM projects have been developed since 2000. In Spring 2002 a new draft version incorporating the developments in Marrakech was finalised, and the guidelines have thereafter been updated twice, in January 2003 and in December 2003. Currently the guidelines are once again being developed and updated, and they will be made available on the Pilot Programme's website once the new version has been finalised.

3.7.2.2. Activities in 2003

Between January and March 2003, the Pilot Programme organised an international invitation to propose projects in order to identify new CDM projects. The invitation focused on small-scale CDM projects. The simplified rules concerning small-scale CDM projects were accepted by COP8 in New Delhi. Within the deadline 28 tenders in total were received for CDM projects in South and Central America, Asia and Africa. Of the 28 tenders received, 23 have been included in the long list of approved projects and 5 tenders were rejected as they did not fulfil all formal requirements. Four tenders from the long list of approved projects were granted preliminary approval by the Steering Committee of the Pilot Programme, and thus entered the project pipeline.

In 2003, the Programme also proceeded with several on-going pilot JI projects. The Tamsalu and Kadrina Bark Boiler (District Heating) projects, both located in Estonia, were operational and producing emission reductions already in 2002. Both projects have received preliminary determination statements in 2002. Contract negotiations regarding these projects continued in 2003. The determinations of the Paide and Pakri Projects in Estonia were finalised in January and March 2003 respectively. Agreements with the Estonian government and the project sponsors concerning the Paide and Pakri projects were signed in October 2003 and January 2004, respectively. The Paide project became operational in October 2003 and is now generating emission reductions.

3.7.2.3. Activities in 2004

In 2004 the Programme proceeded with the CDM projects identified through the international tender organised in 2003. The PDDs of the projects were prepared together with the project proponents. By the end of 2004 the PDDs of the AHPPER projects (Rio Blanco, Cececapa, Yojoa and Zacapa), the Parpikala project and the 5 Biomass Based Gasifier Power Plants -project were being finalised and the validations of these projects had started. The validation of the Rio Blanco project was finalised in November 2004. In December 2004 the request for registration of the Rio Blanco project was made. During 2004 the Programme also proceeded with the JI projects. The agreements of the Pakri Wind Farm were signed on 9 January 2004. The project includes the installation of eight wind turbines totalling around 20 MW in Paldiski, Estonia. The Pakri project became operational in late 2004, as the first wind turbine was installed and connected to the grid, and the project is now generating emission reductions.

The PDDs of the Tamsalu and Kadrina projects were finalised in accordance with the preliminary determination statements and the determinations of these two projects were thereafter finalised.Furthermore, the first set of emission reductions generated by the Tamsalu and Kadrina projects were verified in December 2004.

In May 2004, the Programme organised an information seminar on the Pilot Programme. In connection with the seminar the Pilot Programme also published a report on the activities, experiences and lessons learned under the Pilot Programme thus far.

3.7.2.4. Activities in 2005

In January 2005 one of the Pilot Programme's CDM projects in Honduras, the Rio Blanco Project, was registered by the CDM Executive Board as the second project overall and as the first ever small-scale

project. In March 2005 the Emission Reductions Purchase Agreement for the four Honduran CDM projects was signed between the Ministry for Foreign Affairs of Finland and the project proponents. The Certified Emission Reductions generated by the Rio Blanco project during the year 2004 were issued as the first ever by the CDM Executive Board in October 2005. The validations for the three other Honduran projects continued and the projects are expected to be registered by late 2005/early 2006. Some of the CDM projects developed under the Pilot Programme were discontinued for various reasons.

The second tender for small-scale CDM projects was launched in September 2005. Through this tender, the Pilot Programme aims to identify up to four new small-scale CDM projects that are at relatively advanced stages of development. Also small-scale afforestation and reforestation projects are eligible. The tender is two phased. During the first phase, which closed on 16 November 2005, interested project proponents were requested to submit an Expression of Interest. During the second phase, those project proponents who have submitted projects fulfilling the eligibility requirements will be asked to submit a tender. The Emission Reductions Purchase Agreements are expected to be signed in 2006.

As for JI, the first set of emission reductions generated by the Paide project were verified in May 2005. The Pakri Wind Farm in Paldiski, Estonia was officially opened in June 2005. The Tamsalu and Kadrina projects continued to be operational and generating emission reductions.

3.7.2.5. Objectives in 2006

The pilot phase of the Pilot Programme will end in 2006, when the new official Finnish Kyoto mechanisms programme will take over. The objective of the Pilot Programme in 2006 is to wind up its activities and enable a smooth transition to the new official programme. During the first two months of 2006 the Pilot Programme will continue activities relating to the second CDM tender launched in 2005, in order to identify the projects eligible to enter the project portfolio.

3.7.3. Implementation

3.7.3.1. The Second Finnish CDM Tender is open for Expressions of Interest

Ministry for Foreign Affairs of Finland through its current CDM/JI Pilot Programme invited Expressions of Interest from Project Proponents to propose small-scale Clean Development Mechanism (CDM) projects by 16 November 2005. Small-scale afforestation or reforestation projects are also eligible. (02.11.2005).

3.7.3.2. Estonia

An agreement on a joint implementation project for reducing emissions of greenhouse gases was signed on 10 October in Tallinn. Wärtsilä Finland Ltd Biopower has supplied the new power plant in Paide, which replaces the previous oil-fuelled one. Under the agreement, Finland will have the credit for the reduction in greenhouse gas emissions achieved when the new wood-chip power plant is taken into use. (10.10.2003).

Agreements on a Joint Implementation project for reducing greenhouse gas emissions in Estonia were signed today in Helsinki. The Pakri Wind Farm project includes the installation of eight wind turbines totalling 20 MW in Paldiski, Estonia. (9.1.2004).

3.7.4. Organisation

The Pilot Programme is implemented by the Ministry for Foreign Affairs. The work is supervised by an inter-ministerial Steering Committee consisting of representatives from the Ministry for Foreign Affairs, Ministry of Environment , Ministry of Trade and Industry, Ministry of Agriculture and Forestry, Ministry of Finance and the Finnish Environment Institute. The Steering Committee is chaired by Ministry for Foreign Affairs and meets approximately once a month with the task of developing the Pilot Programme's guidelines and practices as well as selecting the concrete projects and monitoring the lessons learned. The Finnish Environment Institute (SYKE) has been acting as a consultant for the Pilot Programme since August 2000 and it is responsible for the identification and practical implementation of the pilot projects in co-operation with the relevant ministries.

3.8. BASREC

3.8.1. Organisation

Energy ministers of the Baltic Sea region countries and the European Commission decided in their conference in Helsinki in October 1999 to set up the inter-governmental Baltic Sea Region Energy Co-operation (BASREC).

The countries participating in BASREC are Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia, and Sweden. The European Commission is represented by DG TREN, the Directorate General for Transportation and Energy.

3.8.2. Climate change

Differences in energy efficiency, industrial structure, natural resources and sources of fossil and non-fossil fuels give raise to wide variations in carbon emissions intensities between BASREC countries. These features give rise to cost differentials for energy emission reductions and opportunities for future exchange of emissions reductions in accordance with the Kyoto Protocol. Such trade could be a supporting complement to energy trade and investments in the BASREC region since the mechanisms could provide offsets for emissions that are necessarily linked to the combustion of fossil fuels. The mechanisms can also provide benefits for investments in energy efficiency and renewable energy and thus contribute to transition towards sustainable energy systems in the region. For such reasons energy ministers in Vilnius decided to establish the Testing Ground in the BSR with the objectives

- to build capacity and competence to use the Joint Implementation (JI) mechanism under the Kyoto Protocol and to promote the realisation of high quality projects in the energy sector generating emissions reductions,
- to develop methods and procedures in conformity with the rules and guidelines of the Kyoto Protocol,
- to collaborate in addressing administrative and financial barriers, and to minimise transaction costs, especially regarding small scale JI projects,
- to facilitate generation, ensure issuance and transfer of greenhouse gas credits related to or accruing from JI projects, and to implement projects early and offer credit for emissions reductions prior to 2008 by appropriate means.

These ambitions are also enshrined in the Testing Ground Agreement, TGA and constitute a basis for the work plan of the BASREC in the field of climate change policy. The Testing Ground facility (TGF) provided funds for credits to the TGA. Given the background and decisions referred to above the following work should be done by the BASREC Climate Group.

The aims of Climate Change Working Group work:

- To develop common understanding and insights in the trading and link directives and its implementation with emphasis on consequences for the energy sector and the scope for JI on the testing ground.
- To provide an updated, clear and correct manual for Joint implementation projects in BASREC countries.
- To make TG (test ground) known and to stimulate involvement and participation in TG activities. To analyse needs and consequences for BASREC countries and provide for their interests to be taken onboard when the emissions trading and JI is developed.

3.8.3. Establishment of the Testing Ground For Flexible Mechanisms of the Kyoto Protocol

The Energy Ministers of the CBSS Countries and the EU Commission task BASREC with the Establishment of the Testing Ground for Flexible Mechanisms of the Kyoto Protocol.

The ministers in charge of energy issues in the Baltic Sea region countries and the EU Commission decided to make the region a testing ground for Joint Implementation projects for reducing greenhouse gas emissions in the energy sector. Joint Implementation is one of the flexible mechanisms of the Kyoto Protocol. The energy ministers convened within the framework of the Baltic Sea Region Energy Co-operation, BASREC, in Vilnius, Lithuania, on 20 November 2002.

The ministers found that great progress has already been made in starting the preparations for drafting the legislative and administrative framework, as well as in developing procedural instruments for the implementation of the testing ground, receiving strong support in the Baltic Sea States. The establishment of the testing ground, together with the Financing Facility for the same purpose, would create new energy investments aimed at emissions reductions.

The Baltic Sea region testing ground is an early start towards the beginning of the commitment period of 2008-2012 in the implementation of the Kyoto Protocol. The early start will give the participating countries time for promoting capacity building and for enhancing common understanding among the actors both in the administration and in the market place. The aim is that the first investment projects in the testing ground could be launched in 2003.

The energy ministers and the EU Commission also stressed the importance of safeguarding the security of energy supply in the Baltic Sea region. Substantial investments and active work will be needed in adequate and safe energy transmission and transport systems that would cover the whole region. The future prospects in the energy markets also call for further development of integrations between the separate gas and electricity markets. The need for diversification of energy production and for reducing greenhouse gas emissions favour e.g. increased use of renewable energy sources and natural gas, along with continuous improvements in energy efficiency.

Sustainable energy development has been the leading topic of the energy co-operation since it was initiated. As one indication of this the energy sector activities of Baltic 21 were integrated into BASREC work during the first activity period of 2000-02, and Baltic 21 became an observer in BASREC.

The main task of the political decision makers and authorities is in creating legal and regulatory framework conditions that are uniform and consistent enough for a favourable develop0ment of the regional energy markets.

The targets approved create the basis for the continuation of the regional energy co-operation within BASREC for the period of 2003-05, as decided by the energy ministers and the EU Commission in the meeting.

BASREC (Baltic Sea Region Energy Co-operation) was initiated in 1999 to resume the projects in the energy sector that were launched by the EU and the Prime Ministers of the Nordic countries. The ministers received a report covering the activities in 2000-02 from the Group of Senior Energy Officials, which is in charge of organising and steering the co-operation. The areas in the focus of the activities are the electricity and gas markets, energy efficiency, use of renewable energy sources, and climate policy in the region. The co-operation is organised within the framework of the Council of the Baltic Sea States.

In consequence, the following BASREC parties (the signatory parties), meeting in Göteborg on 29 September 2003 announce, that by signing the Testing Ground Agreement they are ready to proceed with the testing ground and its policy implications: Denmark, Finland, Germany, Iceland, Lithuania, Norway, Sweden.

The Testing Ground Agreement is a regional initiative, but must be understood in the context of the global use of the Kyoto flexibility mechanisms. Likewise the interplay with climate change policies and instruments in the context of an enlarged EU are to be taken into consideration. An emission trading within the EU is to begin in 2005. The linkage of JI and CDM to this allowance trading within the EU is to begin in 2005. The linkage of JI and CDM to this allowance trading is now under discussion in the EU. In view of this, the signatory parties intend to follow developments in global and EU climate policy very closely and where relevant take into account these developments within the framework of this Testing Ground Agreement.

The signatory parties look forward to the rapid adhesion to the Testing Ground Agreement of their neighbours in the Baltic Sea region, the remaining BASREC parties. The signatory parties will make efforts to aid the remaining BASREC parties in adhering to the Testing Ground Agreement as soon as possible.

3.9. Spain

3.9.1. Introduction

The Spanish Carbon Fund is a public/private partnership administered by the World Bank on behalf of the Government of Spain, with the objective of purchasing greenhouse gas emission reductions from

renewable energy, energy efficiency and other projects that contribute significantly to sustainable development in developing countries and countries with economies in transition.

The Fund-a public/private partnership administered by the World Bank-will purchase a minimum of 34 million tons of carbon dioxide equivalent. The emission reductions generated by the projects included in the Fund's portfolio could be eligible to be considered for registration under the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI) Mechanism, as well as the Emissions Trading Scheme (ETS) of the European Union.

The Fund, which started operations using financial resources provided by the Spanish Government, is open to the participation of Spanish public and private entities. The minimum contribution for private sector participants is set at US$2.5 million payable under annual instalments.

3.9.2. The Fund's Objective

Spain has decided to achieve its greenhouse gas emission reduction target through a combination of implementation of domestic reduction measures and the use of the flexible mechanisms defined by the Kyoto Protocol. The Fund is one of the initiatives implemented by the Spanish Government to achieve this goal.

The main objectives of the Spanish Carbon Fund are:

- To purchase greenhouse gas emission reductions to contribute to Spain's emission reduction target at a competitive cost.
- To promote renewable energy and energy efficiency projects in developing countries and countries with economies in transition.
- To acquire knowledge and experience on carbon finance and to share that experience with the Fund's participants and stakeholders.

Through the projects included in its portfolio, the Spanish Carbon Fund will contribute to improving the knowledge and the governance schemes of the projects' host countries, complementing other development programs and projects managed and coordinated by the World Bank.

The Fund will also promote active participation of project developers, technological innovators and certifying institutions in the growing market for carbon finance.

3.9.3. Spanish Carbon Fund Portfolio

The Fund is designed to include projects from many regions, including Latin America, North Africa, East Asia, South Asia, Eastern Europe and the Russian Federation.

Projects that may be eligible under the Spanish Carbon Fund comprise an array of technologies that include:

- **Renewable energy.** Projects aimed at maximizing the share of renewable in the energy generation profile, including small or medium hydro projects and wind projects.
- **Biomass and agricultural waste products**. Generation of heat and electricity using crop waste such as rice husks, sugar cane bagasse, paper plant residues, among others.
- **Urban waste management**. Improving liquid and solid waste treatment systems, creating an opportunity to generate heat and/or power from the gases captured in the process while contributing to the welfare of local communities.
- **Industrial processes.** Reducing greenhouse gas emissions through improving industrial processes or by reducing end-of-pipe gases, concurrently improving environmental and social conditions in the project host country through "green" energy projects developed through carbon revenue.

3.10. Italy

3.10.1. Introduction

In fall 2003 the World Bank entered into an agreement with the Ministry for the Environment and Territory of Italy to create a fund to purchase greenhouse gas emission reductions from projects in developing

countries and countries with economies in transition that may be recognized under such mechanisms as the Kyoto Protocol's CDM and JI.

The Italian Carbon Fund has an initial endowment from Italy of US$15 million. This amount is expected to increase over time, as the Fund will be open to the subscription of Italian entities for 24 months from its constitution. The minimum contribution from each additional participant is set at US$1 million.

3.10.2. A Diversified Approach

The project portfolio of the Italian Carbon Fund will be fairly diversified with support being provided to a wide range of technologies, including carbon sequestration, and regions, including The People's Republic of China, the Mediterranean Region, the Latin and Central America regions, as well as the Balkans and the Middle Eastern countries.

Italy has an ambitious emission reduction objective which would be difficult to achieve through domestic measures without an exorbitant investment. The Fund provides one alternative to obtaining emission reductions which may be used to help meet the Italian emission reduction target.

At the same time, the Italian Carbon Fund will help developing countries achieve sustainable development by leveraging substantial investments in modern energy services and technologies.

As with other carbon funds facilitated by the World Bank, the income from payments by the participants in the fund will be held in a separate trust and used for project identification and preparation activities such as capacity-building, outreach and research-thus leading to the creation of supportive project approval systems in host countries.

3.10.3. The Fund

The Ministry for the Environment and Territory of Italy has entered into an agreement with the World Bank to create a fund to purchase ERs from projects that both benefit the global environment and transfer clean technologies for sustainable development to developing countries and countries with economies in transition (Fund).

The Fund supports projects that generate emission reductions eligible under the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI), as well as the emerging Emissions Trading scheme of the European Union.

The Fund is a public-private partnership administered by the World Bank. It has an initial endowment of US$15 million provided by the Ministry for the Environment and Territory of Italy.

The Fund is open to the participation of Italian private and public entities (e.g. municipalities). The minimum contribution from each additional participant is set at US$1 million, payable in annual instalments if desired. The target size for the Fund is US$80 million.

3.10.4. Rationale

Italy has an ambitious emission reduction objective which would be difficult to achieve solely through domestic measures without an exorbitant investment. The Fund provides one alternative to obtaining ERs which may be used to help meet the Italian emission reduction target.

The Italian Carbon Fund has three main objectives:

- Purchasing ERs at a competitive price to reach the reduction targets of the domestic program for the allocation of quotas of permissible emissions;
- Promoting international projects in renewable energy and energy efficiency; and
- Acquiring knowledge and experience on carbon finance and the carbon market.

At the same time, the Italian Carbon Fund is designed to assist developing countries achieve sustainable development by leveraging substantial investments in modern energy services and technologies, including investments from the private sector.

As with other carbon funds facilitated by the World Bank, the income from payments received from the participants in the fund will be held in a separate trust and used for capacity-building, outreach and research-thus leading to the creation of supportive project approval systems in host countries.

3.10.5. Potential Projects

The Fund's project portfolio is proposed to include support for a wide range of technologies and regions, including the People's Republic of China, the Mediterranean Region, as well as the Balkans and the Middle Eastern countries.

Examples of types of projects which may be eligible under the Fund's project portfolio criteria include:

Energy services: Medium-size hydroelectric project provides electricity to under-served region.

Electricity from agricultural waste: Power plant uses crop wastes such as empty palm oil fruit bunches, sugar cane bagasse and rice husks as fuel.

Urban Landfill Gas: Town captures methane gas for electric power or industrial uses, mitigates environmental impacts of open-dump sites, and improves the welfare of surrounding communities.

Coalbed methane capture: Methane gas associated with coal mining operation is captured and utilized as fuel for power generation-prevents large quantities of highly disruptive greenhouse gas from entering the atmosphere.

Gas flaring: Reducing gas flaring and venting in oil extraction will help mitigate climate change and reduce its impact on human health, water systems, agriculture and fishery.

3.11. Canada

3.11.1. Introduction

Canada established the $100 million Canada Climate Change Development Fund (CCCDF) in 2000 to promote activities addressing the causes and effects of climate change in developing countries, while helping to reduce poverty and promote sustainable development. Originally a five-year fund, the CCCDF was extended for 2005-2006.

Climate change requires cooperation on a global scale to develop and implement solutions. The international community is tackling climate change through a number of agreements, such as the **United Nations Framework Convention on Climate Change** to reduce greenhouse gases. Canada is a party to this Convention and to its **Kyoto Protocol**, both of which call for financial and technological transfers to developing countries.

Developing countries are particularly vulnerable to the potential impacts of climate change such as floods, drought, hurricanes, and changing disease vectors, which could create a barrier to reducing poverty. Industrialized countries have been responsible for the majority of **greenhouse gases**, but some developing countries such as China, India, and Brazil are growing contributors.

As of 2005, the CCCDF had supported projects in over 50 countries, in addition to making a $10 million contribution to the **Least Developed Countries Fund** (LDCF) managed by the United Nations and the **Global Environment Facility**. The LDCF supports developing countries to prepare and implement national adaptation programmes of action (NAPAs): tools to identify priority activities that respond to the urgent needs of developing countries regarding adaptation to climate change.

The CCCDF has made a valuable contribution to meeting Canada's international commitments on climate change. Its activities have contributed to Millennium Development Goal 7: ensure environmental sustainability.) Because environmental degradation can have a serious impact on development, Goal 7 can be seen as a foundation for the achievement of all other **Millennium Development Goals**.

3.11.2. Objectives

The CCCDF was created based on the three objectives of the 1998 Government of Canada International Strategy on Climate Change:

1. Maximize Canada's ability to meet its UNFCCC commitments and Kyoto climate change targets at the lowest cost;

2. Contribute to the achievement of global climate change objectives and ensure a level playing field with Canada's competitors by maximizing participation of major developed and developing economies in the Kyoto Protocol; and,

3. Maximize opportunities for Canadian business in international projects and initiatives on climate change.

3.11.3. Programmes

Article 4.4 of the UNFCCC identified the commitment of developed countries to financially support adaptation to the negative impacts of climate change in developing countries. The Buenos Aires Plan of Action reinforced this commitment, as have subsequent COPs. The adaptation program area was designed to help Canada meet this UNFCCC commitment. Actual spending on adaptation projects was higher than designated. This is consistent with the general opinion that CIDA's mandate and expertise is more grounded in adaptation and the fact that adaptation has achieved a higher profile as the UNFCCC negotiations have proceeded.

Table 1 Program area projects and expenditures

PROGRAM AREA	% OF FUND BUDGETED	% ALLOCATED of $80 million for Program Areas (Approx.)
Emissions Reduction	37-43%	47% ($38 million)
Sequestration	18-23%	17% ($14 million)
Core Capacity-Building	20-25%	14% ($11 million)
Adaptation	10-15%	21% ($17million)
Small Funds & Multi-lateral		$20 million

The second objective focuses on participation of major developing country economies in the Kyoto Protocol. Each of the program areas contributes to this objective as well. The MFBP does not identify the 'major' developing countries, but the 5 largest GHG generators including China, India, Indonesia, Brazil, and Argentina, received approximately 40 % of the CCCDF funding. China is by far the largest recipient (~17%) followed by Indonesia (~8%), India (~7%), and Brazil and Argentina (~ 3.5 - 4% each). Without putting too fine an analysis on these numbers it is fair to say that the Fund did achieve the objective of targeting major developing countries, especially in comparison to the dispersed nature of CIDA's overall ODA portfolio. There may also be a case to be made that Brazil was underrepresented and Argentina perhaps over-represented in the Fund. Table 2 lists fund allocation by country/region.

Table 2 Expenditures by country/region

COUNTRY/REGION	EXPENDITURE OF PROGRAM FUNDS Approximate Percentage
China	17 % ($17 million)
India	7 % ($6.6 million)
Indonesia	8 % ($7.1 million)
Brazil	3.5-4 % ($3.5 million)
Argentina	3.5-4 % ($3.75 million)
Other	60%

With respect to the third objective, the Fund has provided significant opportunities for Canadian business. There is Canadian private sector involvement in approximately 40% of the projects, not including the small project funds. Other major players included Government of Canada departments (~25%), NGOs (~32%) and Research Institutions and Universities (~10%). Table 3 details the sectoral participation in the Fund.

Table 3 Sectoral participation in the Fund (% of projects)

SECTOR	PERCENTAGE PARTICIPATION (Approx.)
Canadian Private Sector	40 %
Canadian Government Agencies	25 %
-Governmental Organizations (NGO)	32%
Research Institutions and Universities	10%

Country	Fund	Managed by	Joint Implementation				Clean Development Mechanism			
			Host Countries	Amount		Tender	Host Countries	Amount		Tender
				mln tCO_2e	Money			mln tCO_2e	Money	
Austria	Austrian JI/CDM Programme		Bulgaria Czech Republic Estonia Hungary Latvia New Zealand Poland Romania Russia Slovakia Ukraine	35			Bhutan Bolivia Brazil China Colombia Ecuador Egypt Ethiopia Georgia India Indonesia Israel Malaysia Paraguay Serbia and Montenegro	35		
	Community Development Carbon Fund (CDCF)	World Bank					Least developed countries		5 mln$	
	Austrian CDM Project Procurement and CER Sale Facility	EcoSecurities	Central and Eastern Europe				Latin and South American countries	1.25		
Denmark	DanishCarbon.dk		Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Kyrgyzstan, Latvia, Moldova, Poland, Romania, Slovakia, and Ukraine			01/08/06 01/11/06				01/08/06 01/11/06
	EcoSecurities-Standard Bank Carbon Facility	EcoSecurities	Central and Eastern Europe				Central Asia			
	Danish Carbon Fund	World Bank								
	Baltic Sea Region Testing Ground Facility (TGF)	NEFCO	Poland. Lithuania, Latvia, Estonia, and Russia, and later Ukraine	1	32.5 mln€	Ukraine 31/07/06				
	NEFCO Investment Fund	NEFCO			113.4 mln€					

Country	Fund	Managed by	Joint Implementation				Clean Development Mechanism			
			Host Countries	Amount		Tender	Host Countries	Amount		Tender
				mln tCO_2e	Money			mln tCO_2e	Money	
	Nordic Environmental Development fund - NMF	NEFCO			Grant 300 mln DKK (40 mln€)					
Netherlands	Ministry of VROM CDM Division									
	IFC-Netherlands Carbon Facility (INCaF)									open
	CAF-Netherlands CDM Facility						Latin America and the Caribbean			
Sweden	Swedish International Climate Investment Programme (SICLIP)		Estonia, Latvia, Lithuania, Poland and the Russian Federation		350 mln SEK (37 mln€)		Brazil India	2		
Finland			Latvia, Lithuania, Poland, Ukraine, Hungary and Estonia	10			El Salvador, Nicaragua Costa Rica Honduras China			
Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia, Sweden	BASREC									
Spain	Spanish Carbon Fund	World Bank	Latin America, North Africa, East Asia, South Asia, Eastern Europe and the Russian Federation				Latin America, North Africa, East Asia, South Asia, Eastern Europe and the Russian Federation			

Country	Fund	Managed by	Joint Implementation				Clean Development Mechanism			
			Host Countries	Amount		Tender	Host Countries	Amount		Tender
				mln tCO_2e	Money			mln tCO_2e	Money	
Italy	Italian Carbon Fund	World Bank	China Mediterranean Region Latin and Central America Balkans Middle Eastern		15-80 mln$					
Canada	Canada Climate Change Development Fund						China India Indonesia Brazil Argentina		100 mln$	

Table 4 Synthesis of existing Carbon Funds

4. Ukraine's approach

4.1. Website of Ministry of Environment Protection

4.1.1. Ukrainian-English Glossary from Centre for Sustainable Development in the Americas

Glossary from **Center for Sustainable Development in the Americas**
(http://www.csdanet.org/English/publications/glossary.htm)

Аналіз зисків і витрат

Методика економічної оцінки, яка застосовується при прийнятті рішень і дозволяє визначити у грошових одиницях як переваги (зиски), так і недоліки (витрати), пов'язані з певним проектом чи політикою.

Benefit-cost analysis

Economic technique applied to public decision making that attempts to quantify in monetary terms the advantages (benefits) and disadvantages (costs) associated with a particular policy or project.

Альтернативна вартість

Вартість економічної діяльності, від якої відмовились на користь іншої діяльності.

Opportunity cost

The cost of an economic activity foregone by the choice of another activity.

Баланс вуглецю

Сумарний баланс обміну вуглецю (надходження і втрати) між резервуарами вуглецю (напр., атмосфера і біосфера) у вуглецевому циклі.

Carbon budget

The balance of the exchanges (incomes and losses) of carbon between carbon reservoirs (e.g., atmosphere and biosphere) in the carbon cycle.

Біопаливо

Органічні матеріали, такі як деревина, відходи та спирти , що використовуються для виробництва енергії.

Biofuels

Organic materials, such as wood, waste, and alcohol fuels, burned to produce energy.

Бульбашка

Географічний район чи сукупність виробництв, для яких встановлений єдиний спільний ліміт викидів. Наприклад, якщо підприємство з кількома джерелами викидів розглядається як "бульбашка", то регулюючі органи оцінюють відповідність ліміту рівня викидів тільки по сумарним викидам підприємства, а не по кожному окремому джерелу.

Bubble

A specific area or group of facilities where emission reductions from all sources have a common total emission limit. For example, if a plant with multiple emissions sources is treated as being "under an emissions bubble," regulators assess only the total emissions of the plant, not the emissions of each individual source, in determining compliance.

Бульбашкова зона ЄС

У контексті міжнародних переговорів із проблем зміни клімату, ідея про те, що Європейський Союз (ЄС) у цілому погодився б із деяким сукупним обмеженням на зниження викидів вуглецю, однак за умови, що це обмеження не повинно бути пропорційно розділене між усіма членами.

EU bubble

In the context of international climate change negotiations, the notion that the European Union (EU) as a whole would accept some aggregate limit on carbon reductions but that the limit would not have to be shared proportionately by all members.

Варіанти пом'якшуючих заходів "без каяття"

Варіанти пом'якшуючих заходів, вартість переваг яких (як наприклад, знижена ціна енергії і зниження викидів місцевих чи реґіональних забруднень) дорівнює або перевищує витрати суспільства на їх проведення, коли не враховувати переваг, пов'язаних з пом'якшенням зміни клімату. Варіанти проведених "без каяття" заходів іноді називають "заходами, які варто провадити в будь-якому випадку".

"No-regrets" mitigation options

Those mitigation options whose benefits, such as reduced energy costs and reduced emissions of local/regional pollutants, are equal to or exceed their cost to society, excluding the benefits of climate change mitigation. They are sometimes known as "measures worth doing anyway."

Викиди (скиди)

Речовини, викинуті в атмосферу (скинуті у водний басейн) в результаті промислової діяльності, функціонування комунального сектору чи транспортних засобів.

Emissions (effluents)

Pollutants released into the air or waterways from industrial processes, households or transportation vehicles.

Вимірювання та верифікація (для проектів СВ)

Підтвердження того, що базові рівні були точно визначені, а також визначення фактичних заощаджень, отриманих в результаті реалізації проектів СВ.

Measurement and verification (for JI projects)

Confirms that baselines were accurately defined and determines the actual reductions achieved by a JI project.

Вище по течії

Відноситься до будь-якого пункту, де викопне паливо надходить в економіку, наприклад, нафтопереробні і вуглезбагачуючі заводи.

Upstream

Refers to any point where fossil fuels enter the economy, e.g., oil refineries, coal processing plants.

Вразливість

Можливий розмір збитків чи шкоди системи від зміни клімату. Це залежить не тільки від чутливості системи, але також від її здатності адаптуватись до нових кліматичних умов.

Vulnerability

The extent to which climate change may damage or harm a system. It depends not only on a system's sensitivity but also on its ability to adapt to new climatic conditions.

Встановлені обсяги

Кількісні зобов'язання зі зниження викидів відносно базового року, ухвалені країнами Додатку Б Кіотського протоколу.

Assigned amounts

Binding emission reduction commitments agreed upon by Annex B countries in The Kyoto Protocol that are based on the base year emissions.

Вуглецевий цикл

Кругообіг вуглецю (у різних формах, наприклад, у вигляді двоокису вуглецю) між атмосферою, океаном, біосферою та надрами Землі.

Carbon cycle

The term used to describe the exchange of carbon (in various forms, e.g., as carbon dioxide) between the atmosphere, ocean, terrestrial biosphere and geological deposits.

Галоїдні вуглеводні

Сполуки що містять хлор, бром або фтор і вуглець. В атмосфері такі сполуки можуть діяти як потужний парниковий газ. Хлоро- і бромовміщуючі галоїдні вуглеводні також беруть участь у виснаженні озонового шару.

Halocarbons

Compounds containing either chlorine, bromine or fluorine and carbon. Such compounds can act as powerful greenhouse gases in the atmosphere. The chlorine and bromine containing halocarbons are also involved in the depletion of the ozone layer.

Гаряче повітря

У світлі переговорів з питань зміни клімату означає таке зниження викидів парникових газів, яке відбулося, наприклад в колишньому Радянському Союзі, в результаті економічної кризи, а не зусиль по зниженню викидів.

Hot air

In the context of climate change negotiations, reductions in greenhouse gas emissions, for example, in the former Soviet Union, due to economic crisis, as opposed to intentional efforts to curb emissions.

Географічні інформаційні системи (ГІС)

Інформаційно-обчислювальна система, призначена для фіксації, збереження, модифікації, керування, аналізу і відображення усіх форм географічної інформації. ГІС використовується багатьма дослідниками в галузі вивчення проблем навколишнього середовища, для визначення різних показників на географічній сітці.

Geographic information systems (GIS)

Organized collections of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information. GIS is being used by many researchers in the environmental field to view a number of different indicators simultaneously as data layers on a geographic grid.

Глобальне потепління

Прогресуюче поступове підвищення температури поверхні Землі, що пов'язується з парниковим ефектом і призводить до зміни клімату у глобальних масштабах.

Global warming

Progressive gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns.

Глобальний екологічній фонд (ГЕФ)

Незалежний міжнародний фінансовий суб'єкт, чия діяльність реалізується через Програму розвитку ООН, Програму охорони навколишнього середовища ООН, і Світовий Банк. ГЕФ надає фонди для фінансування додаткових витрат для того, щоб проект став екологічно привабливим.

Global Environment Facility (GEF)

An independent international financial entity with the United Nations Development Programme, the United Nations Environmental Programme, and the World Bank as implementing agencies. The GEF provides funds to defray the added cost of making planned projects environmentally friendly.

Гнучкі механізми

Встановлені Кіотським Протоколом механізми, що надають можливість збільшити гнучкість і зменшити витрати на зниження викидів. В рамках Протоколу зазначені три основні механізми: Механізм чистого розвитку, торгівля викидами і спільне впровадження.

Flexibility mechanisms

The mechanisms established by The Kyoto Protocol that seek to increase the flexibility and reduce the costs of making emissions reductions. The three primary mechanisms contained in the Protocol are the Clean Development Mechanism, emissions trading, and Joint Implementation.

Динамічний базовий рівень

Базовий рівень викидів, що періодично коректується при уточненні оцінок того, що могло б відбутися при відсутності заходів зі зменшення викидів парникових газів.

Dynamic baseline

An emissions baseline that is adjusted periodically to reflect a revised view of what would have happened in the absence of a climate change mitigation project.

Диоксид вуглецю, вуглекислий газ CO_2

Неотруйний газ, без кольору і запаху, що є природною складовою атмосфери. Вуглекислий газ є продуктом спалювання викопного палива. Він має парникові властивості, тобто сприяє утриманню тепла на поверхні Землі і вносить основний вклад у глобальне потепління.

Carbon dioxide, CO_2

A colorless, odorless, non-poisonous gas that is a normal part of the ambient air. Carbon dioxide is a product of fossil-fuel combustion. It is a greenhouse gas that traps the earth's heat and contributes to the potential for global warming.

Діяльність, що впроваджується спільно (ДВС)

ДВС започаткована в рамках Конвенції ООН про зміну клімату і полягає у тому, що промислово розвинені країни виконують свої зобов'язання зі зниження викидів парникових газів шляхом отримання квот в результаті фінансування заходів зі зниження викидів в країнах, що розвиваються, і в країнах з перехідною економікою. ДВС є пілотною фазою реалізації механізмів чистого розвитку і спільного впровадження (СВ).

Activities implemented jointly (AIJ)

Introduced under the UNFCCC where industrialized countries meet their greenhouse gas emission reduction obligations by receiving credits for investing in emissions reductions in developing countries and countries in transition. AIJ is the pilot phase of the Clean Development Mechanism and Joint Implementation (JI).

Добровільні заходи

Заходи для зменшення викидів парникових газів, що застосовуються фірмами або іншими діючими суб'єктами при відсутності урядових зобов'язань.

Voluntary Measures

Measures to reduce GHG emissions that are adopted by firms or other actors in the absence of government mandates.

Додатковий вуглецевий ефект

Розрахункове зниження викидів, очікуване в результаті реалізації запропонованого проекту, відносно викидів, що могли б мати місце у відсутності проекту.

Incremental carbon impact

Estimated reductions in carbon emissions expected to result from a proposed project compared to the emissions that would result if the project were not implemented.

Дозвіл на викиди

Виділення державою окремому підприємству дозволу на викид визначеної кількості речовини.

Emission permit

An allocation of entitlements by a government to an individual firm to emit a specified amount of a substance.

Доповнюваність

Вимога, щоб зменшення викидів або збільшення поглинання парникових газів обов'язково відбувалося в результаті виконання проекту в рамках механізмів чистого розвитку і спільного впровадження та не могло б трапитися у відсутності проекту.

Additionality

The requirement that greenhouse gas emissions reduction or sequestration in a Joint Implementation or Clean Development Mechanism project occurs over and above the baseline and constitutes a new reduction that would not have otherwise occurred without the existence of the project.

Дополнительность

Требование, чтобы уменьшение выбросов или увеличение поглощения парниковых газов обязательно происходило в результате выполнения проекта в рамках механизмов чистого развития и совместного осуществления и не могло бы произойти при отсутствии проекта.

Зміна клімату

В контексті проблеми цим терміном визначають зміни клімату, що виникають в результаті безпосередньої або опосередкованої діяльності людини, яка змінює склад атмосфери Землі. Такі зміни накладаються на природну кліматичну мінливість, що спостерігається за порівняльні періоди часу.

Climate change

A change of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is additional to natural climate variability observed over comparable time periods.

Зовнішні чинники

Побічні продукти діяльності, що впливають на добробут людей або завдають шкоди навколишньому середовищу, але не знаходять своє відображення в ринкових цінах. Витрати (або зиски), зв'язані з зовнішніми чинниками, не входять у схеми стандартних розрахунків вартості.

Externalities

By-products of activities that affect the well-being of people or damage the environment, where those impacts are not reflected in market prices. The costs (or benefits) associated with externalities do not enter standard cost accounting schemes.

Квота на викиди

Частка дозволів на викиди, що приділяється країні або групі країн.

Emission quota

The portion or share of total allowable emissions assigned to a country or group of countries within a framework of maximum total emissions.

Кіотський протокол

Міжнародна угода, укладена на Третій Конференції Сторін у грудні 1997 року. Угода наклала на 38 розвинених країн зобов'язання зі зниження викидів парникових газів. Угода містить підписи більш ніж 160 країн, однак поки що не ратифіковано.

Kyoto Protocol

An international agreement reached at the Third Conference of Parties in December 1997. The agreement committed 38 developed countries to targets for GHG emission reductions. The agreement has more than 160 signatories, but has yet to be ratified.

Клімат

Клімат звичайно визначається як "багаторічний режим погоди" або більш точно, як статистичний опис погоди, використовуючи пересічні значення та їх відхилення температури, опадів, вітрів за періоди в декілька десятиліть (за звичай, три десятиліття, як це прийнято у ВМО).

Climate

Climate is usually defined as the "average weather", or more rigorously, as the statistical description of the weather in terms of the mean and variability of relevant quantities over periods of several decades (typically, three decades as defined by WMO). These quantities are most often surface variables such as temperature, precipitation, and wind, but in a wider sense the "climate" is the description of the state of the climate system.

Коефіцієнт викидів

Коефіцієнт для обчислення величини викидів на основі даних про процес - питома величина викидів на одиницю діяльності (наприклад, кількість викидів вуглекислого газу на одиницю використаного палива).

Emissions coefficient/factor

A unique value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (e.g., amount of carbon dioxide emitted per volume of fossil fuel consumed).

Конференція Сторін (КС)

Вищий орган Рамкової Конвенції ООН з питань зміни клімату. Вона об'єднує більше 170 країн. Роль КС полягає у сприянні виконанню положень Конвенції й контролю за їх виконанням.

Conference of Parties (COP)

The supreme body of the UN Framework Convention on Climate Change. It comprises over 170 nations that have ratified the Convention. The COP's role is to promote the implementation of the Convention and review compliance.

Країни Додатку Б

38 країн, які згідно з положеннями Кіотського протоколу взяли на себе кількісні зобов'язання щодо обмеження викидів. До Додатку В входять промислово розвинені країни та країни з перехідною економікою.

Annex B Countries

The 38 nations that would be committed to quantified emissions limitations under the Kyoto Protocol. This list includes the industrialized nations and those with economies in transition.

Країни Додатку I

У Додатку 1 Конвенції ООН наведено країни, які були членами ОЕСР у 1992 році, 11 країн з перехідною економікою, а також країни Європейської економічної спільноти. Країни, що входять до Додатку I, взяли на себе зобов'язання впроваджувати політичні та технічні заходи з метою пом'якшення антропогенного впливу на зміну клімату.

Annex I countries

Annex I of the UNFCCC lists the countries who were members of the OECD in 1992, 11 countries undergoing the process of transition to a market economy, and the European Union. Annex I parties are committed to adopt national policies and take measures to mitigate climate change.

Марґінальна вартість

Витрата на одну додаткову одиницю роботи. Щодо зменшення викидів, то вона є вартістю зменшення викидів ще на одну одиницю.

Marginal cost

The cost on one additional unit of effort. In terms of reducing emissions, it represents the cost of reducing emissions by one more unit.

Механізм чистого розвитку (МЧР)

Визначений у Кіотському протоколі (Стаття 12) ринковий механізм впровадження проектів між країною з розвинутою економікою і країною, що розвивається, який забезпечує країну, що розвивається, фінансуванням і технологіями для сталого розвитку та допомагає країні з розвинутою економікою виконати зобов'язання зі зниження викидів.

Clean Development Mechanism (CDM)

A market mechanism defined in the Kyoto Protocol (Article 12) as a project between a developed country and a developing county that provides the developing country with the financing and technology for sustainable development and assists the developed country in achieving compliance with its emission reduction commitments.

Міжнародна група експертів з питань змін клімату (МГЕЗК)

Група, створена спільно у 1988 році Світовою метеорологічною організацією і Програмою з проблем навколишнього середовища Організації Об'єднаних Націй, для оцінки наукової інформації, що стосується зміни клімату і формулювання реальних стратегій реагування на ці зміни.

Intergovernmental Panel on Climate Change (IPCC)

A panel established jointly in 1988 by the World Meteorological Organization and the United Nations Environment Programme to assess the scientific information relating to climate change and to formulate realistic response strategies.

Міжнародний Протокол вимірювання та верифікації

Процедури, що дозволяють власникам будівель, енергосервісним компаніям і організаціям, які фінансують проекти з ефективного використання енергії, оцінити ефективність енергозберігаючих технологій і визначати обсяг енергозбереження.

International Performance Measurement and Verification Protocol

Documents procedures that allow building owners, energy service companies and financiers of energy efficiency projects to evaluate the efficacy of energy-efficient technologies and to quantify energy savings.

Моделі загальної циркуляції

Комплексні комп'ютерні імітаційні моделі клімату і його різних складових, що використовуються дослідниками та політичними аналітиками для прогнозування змін клімату. Звичайно моделювання проводиться на "суперкомп'ютерах". Ці моделі можуть дати приблизну уяву про майбутні кліматичні зміни.

General circulation models

Complex computer simulations of climate and its various components used by researchers and policy analysts to predict climate change. Typically run on "super computers," these models can approximate future climates and give some clues to how climate has changed or might change over time.

Накопичення та зберігання

Процедура зберігання та накопичення дозволів на викиди або сертифікованих скорочень викидів для використання в майбутньому, аналогічно депозитним банківським рахункам.

Banking

Saving or storing emissions permits or Certified Emissions Reductions for future use in anticipation that these will accrue value over time.

Обов'язкові технологічні нормативи

Вимоги і норми, що встановлюються урядами для прискорення екологічних досліджень та розробок. Як приклад можна навести стандарт "Середньозважений рівень економічності автомобільних двигунів" (CAFE) та інші енергозберігаючі вимоги.

Technology-forcing regulations

Requirements and standards set by governments to catalyze environmental research and development. Some examples include corporate average fuel economy (CAFE) regulations and other energy efficiency requirements.

Парниковий газ

Газ, що поглинає теплове випромінювання поверхні Землі і хмар (інфрачервона радіація) і відбиває його назад до Землі. До основних парникових газів в атмосфері Землі відносяться водяна пара (H_2O), двоокис вуглецю (CO_2), закис азоту (NO), метан (CH_4) і озон (O_3).

Greenhouse gas

A gas that absorbs infrared radiation emitted by the Earth's surface and by clouds. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (NO), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere.

Парниковий ефект

Прогресуюче поступове потепління атмосфери Землі викликане ізоляційним ефектом вуглекислого газу та інших парникових газів, кількість яких в атмосфері збільшується . Парниковий ефект порушує умови балансу між надходженням і витратою енергії, дозволяючи проникати ультрафіолетовому випромінюванню Сонця і віддзеркалюючи інфрачервоне випромінювання Землі на її поверхню.

Greenhouse effect

Progressive, gradual warming of the earth's atmospheric temperature caused by the insulating effect of carbon dioxide and other greenhouse gases that have proportionately increased in the atmosphere. The greenhouse effect disturbs the way the Earth's climate maintains the balance

between incoming and outgoing energy by allowing short-wave radiation from the sun to penetrate through to warm the earth, but preventing the resulting long-wave radiation from escaping back into the atmosphere.

Первинна енергія

Енергія, зосереджена у природних ресурсах (наприклад, вугілля, сира нафта, сонячне світло, уран), яку не піддавали ніяким штучним змінам чи перетворенням.

Primary energy

Energy embodied in natural resources (e.g., coal, crude oil. sunlight, uranium) that has not undergone any anthropogenic conversion or transformation.

Передача технології

В контексті політики по зм'якшенню кліматичних змін найчастіше відноситься до процесу, в результаті якого енергозберігаючі технології і заходи, розроблені промислово розвинутими країнами стають доступними для країн з менш розвинутою промисловістю. Така передача може проводитись як цілковито зусиллями приватних учасників процесу так і з можливим залученням урядів і міжнародних інституцій.

Technology transfer

In the context of climate change policy, most often refers to the process by which energy-efficient technologies and processes developed by industrialized nations are made available to the less-industrialized nations. These transfers may be conducted solely through the efforts of private parties or may involve governments and international institutions.

Період дії зобов'язань

Період, протягом якого Сторони, що підписали Кіотський Протокол, мають виконати зобов'язання зі зниження викидів парникових газів. Перший період дії зобов'язань - 2008-2012 рр.

Commitment period

A range of years within which parties to The Kyoto Protocol are required to meet their GHG emissions reduction target, which is averaged over the years of the commitment period. The first commitment period will be 2008-2012.

Поглинання вуглецю

Звичайно стосується поглинання вуглецю такими поглиначами, як океани, ліси або ґрунти, які утримують вуглець поза атмосферою.

Carbon sequestration

Generally refers to capturing carbon - in a carbon sink, such as the oceans, or a terrestrial sink such as forests or soils - so as to keep the carbon out of the atmosphere.

Податки на викиди

Податок, що накладається на викиди шкідливих речовин в атмосферу чи на скиди в водний басейн. Податки на викиди стимулюють промислові підприємства та комунальний сектор здійснювати заходи зі зниження викидів і скидів, і таким чином регулюють рівень забруднення.

Emission taxes

Taxes levied on air emissions or water effluents, usually on a per ton basis. Emission taxes provide incentives for firms and households to reduce their emissions and, therefore, are a means by which pollution can be controlled.

Податок на викиди вуглецю

Податок, що сприяє зменшенню використання викопних видів палива, і спрямований на зниження викидів вуглекислого газу шляхом нарахування додаткової плати на вміст вуглецю у використаних нафті, вугіллі та газі.

Carbon tax

A tax to discourage the use of fossil fuels. It aims to reduce carbon dioxide emissions by placing a surcharge on the carbon content of oil, coal, and gas.

Поновлювана енергія

Енергія, отримана з джерел, які є, по суті, невичерпними (на відміну, наприклад, від викопних видів палива, запаси яких вичерпні). До поновлюваних джерел енергії відносяться деревина, відходи, геотермальні джерела, енергія вітру, сонячна енергія.

Renewable energy

Energy obtained from sources that are essentially inexhaustible (unlike, for example, fossil fuels, of which there is a finite supply). Renewable sources of energy include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

Попереджувальний принцип

В контексті Рамкової Конвенції по Зміні Клімату відноситься до ідеї про те, що дії по попередженню великомасштабної, незворотньої шкоди від зміни клімату є правомочними навіть в тому випадку, коли ризики зміни клімату не до кінця зрозумілі.

Precautionary principle

In the context of the Framework Convention on Climate Change, the idea that action to forestall large-scale, irreversible damage from climate change is warranted even though the risks of climate change are not yet fully understood.

Потенціал глобального потепління (ПГП)

Коефіцієнт, наведений у Кіотському Протоколі, що дозволяє проводити рівноцінне порівняння різних парникових газів з точки зору їх впливу на глобальне потепління та/або тривалості їхньої присутності в атмосфері.

Global Warming Potential (GWP)

An index created in The Kyoto Protocol that allows for equal comparison of various greenhouse gases due to their varying power to accelerate global warming and/or the duration of their presence in the atmosphere.

Потенціал зменшення викидів парникових газів

Можливі зменшення викидів парникових газів (представлені у вигляді абсолютних значень або у відсотках до базового рівня), які можуть бути досягнуті в результаті впровадження технологій і заходів.

GHG reduction potential

Possible reductions in emissions of greenhouse gases (quantified in terms of absolute reductions or in percentages of baseline emissions) that can be achieved through the use of technologies and measures.

Принцип "забруднювач платить"

Принцип, за яким ті, хто є причиною промислових забруднень, повинні протиставити його впливу виплату компенсації за завданий збиток, або ж шляхом здійснення превентивних заходів з метою запобігання забрудненням.

Polluter Pays Principle

The principle which states that those who cause industrial pollution should offset its effects by compensating for the damage incurred, or by taking precautionary measures to avoid creating pollution.

Проведення аукціонів

Підхід, за яким дозволи на викиди парникових газів можуть бути розподілені серед підприємств, що викидають парникові гази, шляхом проведення торгів.

Auctioning

A method by which permits for greenhouse gas emissions may be allocated among emitters in a domestic emissions trading regime based upon willingness to pay for these permits.

Радіаційне демпфування

Величина, на яку збільшується випромінювання інфрачервоної радіації у космічний простір при даному збільшенні температури.

Radiative damping

The amount by which emissions of infrared radiation from atmosphere to space increase for a given increase in Earth's temperature.

Радіаційний вплив

Порушення енергетичного балансу системи Земля - атмосфера що відбувається наприклад після зміни концентрації двоокису вуглецю або зміни в випромінюванні Сонця. Позитивний радіаційний вплив має тенденцію до нагрівання поверхні, а негативний до охолодження поверхні.

Radiative forcing

The perturbation to the energy balance of the Earth-atmosphere system following, for example, a change in the concentration of carbon dioxide or a change in the output of the Sun. A positive radiative forcing tends to warm the surface and a negative radiative forcing tends to cool the surface.

Радіаційно-активні гази

Гази, що абсорбують вхідну сонячну радіацію або вихідне інфрачервоне випромінювання, впливаючи на вертикальний температурний профіль атмосфери.

Radiatively active gases

Gases that absorb incoming solar radiation or outgoing infrared radiation, affecting the vertical temperature profile of the atmosphere.

Рамочна Конвенція ООН по зміні клімату (РКЗК ООН)

РКЗК є стрижнем зусиль світової спільноти по відверненню глобального потепління. Конвенція була прийнята в червні 1992 року на Світовому самміті в Ріо-де-Жанейро і введена в дію в березні 1998 року. Головною метою Конвенції є "стабілізація концентрації парникових газів в атмосфері на рівні, що запобігає небезпечному антропогенному втручанню в кліматичну систему."

United Nations Framework Convention on Climate Change (UNFCCC)

UNFCCC is the centerpiece of global efforts to combat global warming. It was adopted in June 1992 at the Rio Earth Summit, and entered into force in March 1998. The Convention's primary objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

Рівноважне реагування

Реакція кліматичної системи на змушуючий вплив радіаційного потоку у напрямі збереження рівноважного стану.

Equilibrium response

The steady state response of the climate system to an imposed radiative forcing.

Розподіл

Розподіл дозволів на викиди серед джерел викидів парникових з метою створення ринку торгівлі дозволами на викиди. Існує декілька можливих підходів до розподілу дозволів, включаючи "історичний підхід" та проведення "аукціонів з продажу дозволів".

Allocation

The division of emissions permits or allowances among greenhouse gas emitters for the purpose of establishing a market in tradable permits. There are several possible methods for allocating permits, including "grandfathering" and permit auctioning.

Розподіл дозволів на викиди за досягнутими в минулому рівнями ("історичний метод")

Метод розподілу дозволів на викиди парникових газів між джерелами викидів і компаніями в режимі внутрішньої торгівлі викидами відповідно до досягнутого в минулому рівня викидів.

Grandfathering of emission permits

A method by which permits for greenhouse gas emissions may be allocated among emitters and firms in a domestic emissions trading regime according to their historical emissions.

Сертифіковані скорочення викидів (ССВ)

Верифіковані та засвідчені одиниці зниження викидів парникових газів, отримані при реалізації проектів зі зменшення викидів або збільшення поглинання, що здійснюються в рамках механізмів чистого розвитку чи спільного впровадження.

Certified Emission Reductions (CERs)

Verified and authenticated units of greenhouse gas reductions from abatement or sequestration projects that are certified under the Clean Development Mechanism or Joint Implementation.

CO_2 - еквівалент

Обсяг двоокису вуглецю, що має такі ж парникові властивості, як дана суміш парникових газів. CO_2 - еквівалент для кожного газу (наприклад, метану) обчислюються шляхом перемноження його кількості на відповідний коефіцієнт потенціалу глобального потепління.

Carbon dioxide equivalent

The concentration of carbon dioxide that would cause the same amount of radiative forcing as a given mixture of greenhouse gases. Carbon dioxide equivalents are generally computed by multiplying the amount of the gas of interest (for example, methane) by its estimated global warming potential.

Спільне впровадження (СВ)

Концепція, коли промислово розвиті країни виконують свої зобов'язання зі зниження викидів парникових газів, шляхом одержання кредитів за інвестиції в заходи зі зниження викидів у країнах, що розвиваються, і в країнах з перехідною економікою.

Joint Implementation (JI)

A concept where industrialized countries meet their obligations for reducing their greenhouse gas emissions by receiving credits for investing in emissions reductions in developing countries or economies in transition.

Стійкий розвиток

Загальна концепція стосовно необхідності встановлення балансу між задоволенням сучасних потреб і захистом інтересів майбутніх поколінь, включаючи їх потребу в безпечному і здоровому довкіллі.

Sustainable development

A broad concept referring to the need to balance the satisfaction of near-term interests with the protection of the interests of future generations, including their interests in a safe and healthy environment.

Стратосфера

Сильно стратифікована і стійка область атмосфери вище тропосфери, що поширюється приблизно від висоти в 10 км до приблизно 50 км.

Stratosphere

The highly stratified and stable region of the atmosphere above the troposphere extending from about 10 km to about 50 km.

Технічний потенціал

Кількість, на яку можливо знизити викиди парникових газів, якщо підвищити енергоефективність шляхом використання технології або практики у всіх випадках коли це технічно можливо, без врахування їхньої вартості або практичної можливості.

Technical potential

The amount by which it is possible to reduce GHG emissions or improve energy efficiency by using a technology or practice in all applications in which it could technically be adopted, without consideration of its costs or practical feasibility.

Торгівля викидами

Програма економічного стимулювання, за якою джерелам певних забруднень (найчастіше - забруднюючих атмосферу) надаються дозволи на викиди певної кількості тон забруднювачів. Уряд видає тільки обмежену кількість дозволів, що відповідає бажаному рівню викидів. Власники цих дозволів, можуть, користуючись ними, викидати дозволену кількість забруднюючих речовин, або, знизивши об'єм власних викидів, продати ці дозволи. Той факт, що дозволи мають товарну вартість, стимулює власника до зменшення викидів.

Emissions trading

An economic incentive-based program where sources of a particular pollutant (most often an air pollutant) are given permits to release a specified number of tons of the pollutant. The government issues only a limited number of permits consistent with the desired level of emissions. The owners of the permits may keep them and release the pollutants, or reduce their emissions and sell the permits. The fact that the permits have value as an item to be sold or traded gives the owner an incentive to reduce their emissions.

Тропопауза

Границя між тропосферою і стратосферою.

Tropopause

The boundary between the troposphere and the stratosphere.

Функція збитку

Зв'язок між змінами в кліматі і спадами економічної діяльності у порівнянні з тим, що було б, як би клімат не змінювався.

Damage function

The relation between changes in the climate and reductions in economic activity relative to the rate that would be possible in an unaltered climate.

Функція марґінальної вартості пом'якшення впливу

Відношення між загальною кількістю знижених викидів і марґінальною вартістю одиниці останнього зниження. Марґінальна пом'якшення впливів звичайно збільшується разом із загальною кількістю викидів.

Mitigation marginal cost function

The relation between the total quantity of emissions reduced and the marginal cost of the last unit reduced. The marginal cost of mitigation generally increases with the total quantity of emissions reduced.

Чутливість

Міра, з якою система відповідає на зміни в кліматичних умовах.

Sensitivity

The degree to which a system will respond to a change in climatic conditions.

Чутливість клімату

Довготермінові зміни глобальної середньої температури в результаті подвоєння вмісту CO_2 (або CO_2 - еквіваленту) в атмосфері. У більш широкому значенні - зміна стану рівноваги кліматичної системи, викликана зміною пропускних властивостей атмосфери.

Climate sensitivity

Long-term change in global mean surface temperature as a result of a doubling of atmospheric CO_2 (or CO_2 equivalent) concentration. More generally, it refers to the equilibrium change in surface air temperature following a unit change in radiative forcing.

4.1.2. GHG Emissions in Ukraine

In 1990 base year Ukraine ranked fifth in the Annex I among the largest GHG emitters. Due to the reduction of emissions levels, in 1998 Ukraine possessed the tenth place, with USA, Russia, Japan, Germany, Canada, Great Britain, France, Italy and Australia preceding.

To reduce anthropogenic impact on the environment, nations around the world are taking measures to mitigate climate change. In this regard, among other sectors of economy, Ukraine gives priority to:

- Energy
- coal-bed methane
- district heating
- transport

Ukraine signed the United Nations Framework Convention on Climate Change (UNFCCC) in June 1992, the Parliament ratified it in October 1996, and Ukraine became a Party to it in August 1997. In compliance with the UNFCCC, Ukraine should submit to the UNFCCC Secretariat annual national inventories of greenhouse gas (GHG) emissions and removals, as well as national communications on climate change.

Ukrainian Country Study on Climate Change under the framework of the US Country Studies Program was the first large-scale program in this direction. This program is a nationally integrated effort that seeks to expand knowledge of the processes that affect climate change and to develop integrated models to predict these effects. Within this program, the first inventory of GHG emissions and removals for base year 1990 was developed, mitigation measures were analysed, and vulnerability and adaptation strategies were designed. This activity was the basis of the First National Communication on Climate Change of Ukraine.

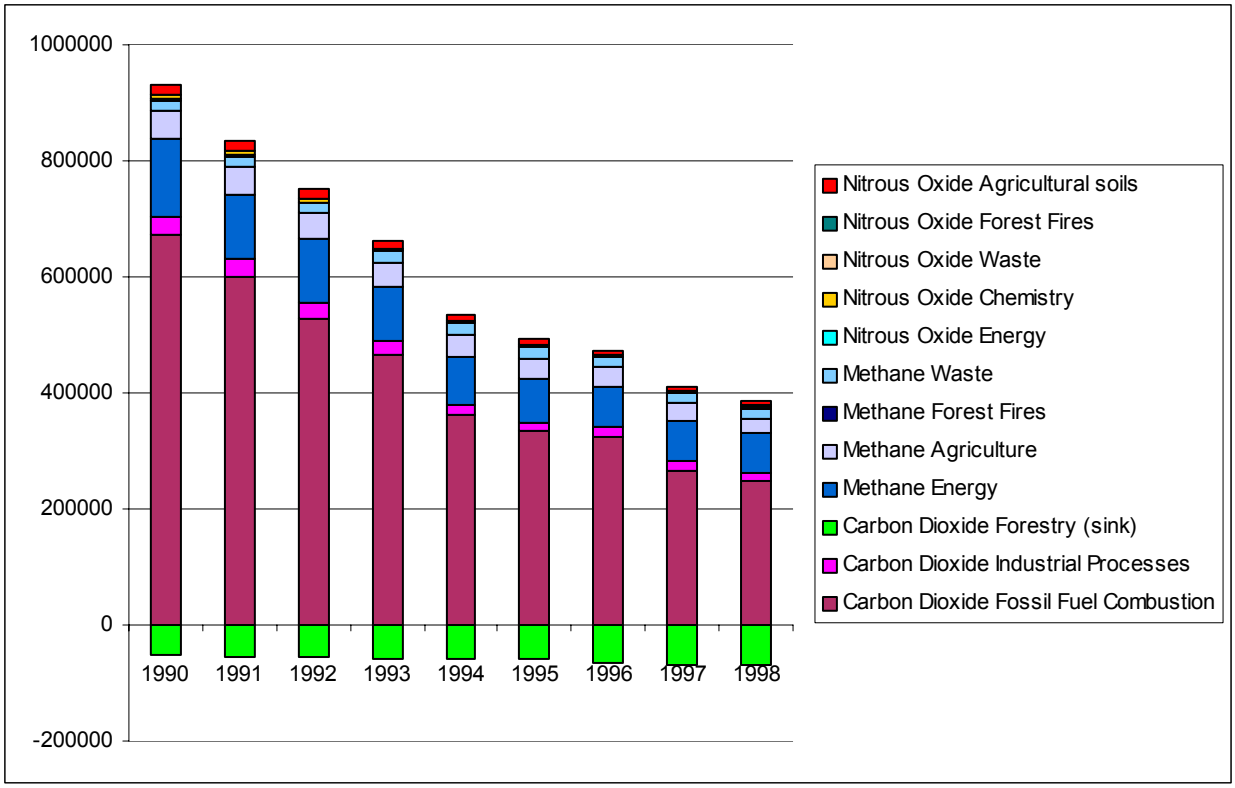
The elaboration of Ukrainian First National Communication was supervised by the Ministry of Environmental Protection and Nuclear Safety of Ukraine, with contribution from other relevant ministries, agencies and organizations. The First National Communication was submitted to the UNFCCC Secretariat in February 1998.

4.1.3. National inventories of GHG emissions and removals during 1990-1998 period

In 1999 Ukraine has submitted to the Secretariat of UN Framework Convention on Climate Change (UNFCCC) national inventories of GHG emissions and removals during 1990-1998 period. GHG emissions and removals have been assessed according to Revised guidelines of Intergovernmental Panel on Climate Change (IPCC, 1996). The results presented below are also available at the UNFCCC web-site.

Gas/Source	**Emissions, Gg CO_2e**								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Net Carbon Dioxide	**652,734.4**	**574,460.5**	**499,766.9**	**431,295.0**	**322,864.8**	**289,522.2**	**273732.3**	**213,595.0**	**194,114.5**
Fossil Fuel Combustion	672,074.8	600,700.7	527,415.7	466,289.3	362,693.9	332,853.4	325223.8	266,518.3	246,913.5
Industrial Processes	32,766.7	29,394.7	28,900.7	22,451.1	18,184.1	15,882.4	14659.2	15,883.2	15,909.3
Total	704,841.5	630,095.5	556,316.4	488,740.4	380,878.0	348,735.9	339882.9	282,401.5	262,822.8
Forestry (sink)	-52,107.1	-55,635.0	-56,549.5	-57,445.4	-58,013.2	-59,213.7	-66150.6	-68,806.4	-68,708.3
Methane	**199,201.7**	**177,795.9**	**171,307.9**	**155,413.0**	**139,057.4**	**129,829.7**	**122189.7**	**117,611.4**	**110,992.4**
Energy	133,013.0	112,829.0	108,017.9	94,500.1	79,648.7	74,037.3	70039.1	69,842.1	67,806.2
Agriculture	47,338.1	46,190.1	44,478.8	42,122.7	40,690.5	37,258.2	33775.9	29,699.6	25,111.7
Forest Fires	112.4	97.0	94.9	56.7	54.8	31.4	43.1	23.4	30.4
Waste	18,738.2	18,679.9	18,716.2	18,733.5	18,663.4	18,502.8	18331.6	18,046.3	18,044.0
Nitrous Oxide	**28,531.6**	**27,088.6**	**22,390.6**	**17,221.1**	**14,704.4**	**13,062.9**	**11345.4**	**11,532.0**	**10,789.5**
Energy	1,550.0	1,259.1	1,245.2	1,135.6	890.0	871.8	717.1	625.0	572.9
Chemistry	7,099.4	7,146.3	4,745.9	2,321.2	2,316.0	1,514.2	1626.9	2,669.2	2,704.7
Waste	1,592.1	1,488.8	1,418.7	1,347.1	1,270.5	1,203.7	1137.8	1,097.4	1,046.0
Forest Fires	55.0	36.6	229.5	44.8	194.4	79.0	294.3	25.5	96.9
Agricultural soils	17,592.7	17,157.8	14,751.3	12,372.4	10,033.5	9,394.2	7569.3	7,114.9	6,369.1
Net Emissions	**879,825.3**	**779,345.0**	**693,465.3**	**603,929.0**	**476,626.6**	**432,414.8**	**407267.4**	**342,738.4**	**315,896.4**

Table 5 National inventories of GHG emissions and removals during 1990-1998 period



4.1.4. The First National Communication on Climate Change

4.1.4.1. Executive Summary

4.1.4.1.1. Introduction

Climate change may be the most critical and complex environmental issue facing humanity in the last century. The United Nations Framework Convention on Climate Change (UN FCCC) is the first and major international legal instrument to address climate change issues at a global scale.

The ultimate objective of the Convention is "*stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*".

Ukraine signed the Convention in June 1992, the Parliament ratified it in October 1996, and Ukraine became the Party in August 1997. In compliance with Article 4.2b, Ukraine has adopted 1990 as a base year for estimating anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol.

Article 4.6 of the Convention gives countries with economies in transition to market economies "a certain degree of flexibility" to meet their commitments under the UN FCCC. Due to the deep uncertainties of the transition period and the futility of developing a "business-as-usual" scenario, there is a lack of sufficient quantitative information about some of the mitigation and adaptation measures, and future projections in Ukraine.

This document is the First National Communication, by which Ukraine is complying with the obligation to communicate information to the Secretariat of the Intergovernmental Negotiating Committee for a UN FCCC, according to Article 4.2 and Article 12 of the Convention.

The elaboration of Ukrainian First National Communication was supervised by the Ministry of Environmental Protection and Nuclear Safety of Ukraine. The document was prepared by the Agency for Rational Energy Use and Ecology in cooperation with relevant ministries, agencies and organizations.

4.1.4.1.2. National Circumstances

Ukraine is the second largest country in Europe (after the Russian Federation) with an area of 603.7 thousand km². The population of the country (1995) is 51.7 million people.

Climate of Ukraine is of the moderate-continental type, except for a narrow belt of the Southern coast of Crimea that has features of a subtropical climate.

Since 1990 the Ukrainian economy has been facing a very deep economic crisis and it is expected that a recovering trend will begin only after a period of depression and stagnation. The main reason is that Ukraine is not in the best position for a quick recovery because its limited energy resources and its obsolete and deformed industrial infrastructure.

Since 1990 production has maintained an increasingly negative trend reaching up to a 50% decrease in 1995 of industrial production (Table 1-1). Now the trend has been maintained and a change is not foreseeable until the end of 1998.

Ukraine is one of the least energy efficient countries in the world. Ukraine's use of energy relative to GDP is much higher than that of Western Europe or the USA. The worst is that the trend toward growing energy consumption per unit of GDP has also increased (Table 1-1).

Table 1-1. GDP, Inflation, Unemployment and Energy Intensity Trends

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
GDP, $10^9$$	73.62	67.21	60.56	51.96	40.01	35.29
Unemployment, thousand person	-	9.8	128	180.9	216	126
Inflation, %	-	-	1310	4830	990	420
Energy Consumption, PJ	10342.9	10017.7	8907.2	7931.5	6900.2	6630.6
Energy Intensity, PJ per billion $	141	149	147	152	172	188

Although the Ukrainian economy is in transition now, the Ukrainian Government pays a great deal of attention to the environmental protection. Many environmentally sound legislative documents have been adopted lately.

4.1.4.1.3. Inventory of greenhouse gas emissions and removals in Ukraine

The Framework Convention on Climate Change calls upon Parties to: "*periodically update, publish, and make available to the Conference of Parties … national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties*". This commitment was included in the Convention because it was clear to all countries that any effective climate policy must begin with an accurate inventory of gases that may influence global warming.

The GHG emissions presented here were calculated using the IPCC Guidelines for National Greenhouse Gas Inventories to ensure that the emission inventories submitted to the Framework Convention are consistent and comparable across sectors and among nations. Ukraine has followed these guidelines, except where more detailed data or methodologies were available for major sources of emissions.

According to IPCC Methodology the Ukrainian inventory deals with the following five categories of GHG sources and sinks: energy systems (including transportation), industrial processes, agriculture, forestry and land-use change, and wastes.

Greenhouse gases Inventory in Ukraine include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO) directly contributing to the greenhouse effect. In addition, indirect greenhouse gases, such as carbon monoxide (CO), oxides of nitrogen (NO_x), and non-methane volatile organic compounds (NMVOCs) were taken into account.

For the 1990 base year, total GHG emissions in Ukraine were 232 882 Gg of carbon equivalent. CO_2 emissions were partly offset by an uptake of carbon in Ukrainian forests of 14 175 Gg of carbon equivalent in 1990 (Table 1-2).

Table 1-2. Ukrainian Greenhouse Gas Emissions, 1990, Gg

Gas/Source	Emissions (Full Molecular Weight)	Emissions Carbon Equivalent
Greenhouse Gases		
Net Carbon Dioxide	648 131	176 763
Fossil Fuel Combustion	668 332	182 272

Industrial processes	31 775	8 666
Total	700 107	190 938
Forestry (sink)	-51 976	-14 175
Methane	9 453	54 140
Energy	6 265	35 881
Agriculture	2 254	12 909
Waste	934	5 349
Nitrous Oxide	23.412	1 979
Energy	6.708	567
Chemistry	6.160	521
Waste	0.132	11
Forest fires	0.175	15
Agricultural soils	10.237	865
Photochemically Important Gases		
Carbon Monoxide (CO)	7 481	-
Nitrogen Oxides (NO_X)	1 243	-
Non-methane Volatile Organic Compounds (NMVOCs)	656	-
Net Emissions		232 882

Due largely to fossil fuel consumption, carbon dioxide emissions accounted for the largest share - approximately 76 percent. Methane accounted for 23 percent of total emissions, which included contributions from agricultural activities and landfills, among others. The nitrous oxide emissions is less important comprising 1 percent of total emissions.

The relative and absolute contributions of indirect GHG to climate change is uncertain.

4.1.4.1.4. Policies and Measures to Mitigate Climate Change

4.1.4.1.4.1. Overall policy context

During the last years the whole number of programs for the economic development of Ukraine was elaborated and adopted, the most important of them were as follows:

- Program of Restructuring of Ukrainian Economy, 1996;
- National Energy Program, 1996;
- Comprehensive State Energy Conservation Program of Ukraine, 1996;
- National Development Programs of Industrial Sectors.

Resolutions, presented in these documents, were assumed as a basis to form the baseline scenario of the development of economy and its sectors, to assess projected GHG emissions levels and mitigation measures.

In correspondence with the baseline scenario of the economic development it is planned to provide main indices of the socio-economic development of the country (Table 1-3) in the period considered, up to 2015.

Table 1-3. The main features of socio-economic development of Ukraine up to 2015

Indices	1990	1995	2000	2005	2010	2015
GDP, billion $	73.62	35.26	41.30	58.82	84.07	97.17
GDP, %	100.0	47.9	56.1	79.9	114.2	132.0
Fuel combustion, PJ	9246.3	5531.5	6965.1	7557.7	8022.5	8551.9
Population, million of people	51.9	51.5	50.2	51.0	51.5	51.8
Housing fund, million of m^3	922.1	978.5	1018.5	1169.6	1255.0	1360.5

Alongside with the baseline scenario the indices for the optimistic and pessimistic scenarios of the economic development were forecasted. The differences for pessimistic and optimistic scenarios are generally in volumes of energy saving, which in optimistic scenario will be approximately 10-12% higher, and in pessimistic one - 25-30% lower.

4.1.4.1.4.2. Overall mitigation potential

Two groups of mitigation measures were considered in mitigation analyses: policy instruments and technological options.

All these measures have a high degree of a governmental support, since they are included in the programs of the development of the economy and its sectors in Ukraine, adopted by the administrative bodies of the state, as well as in the draft documents, which at present are being under consideration of the Cabinet of Ministers, of the Parliament and the administration of the President of the country. However the possibility of realization of these measures will to a great extent depend on the investments.

Realization of such options as implementation of energy efficiency technologies, machinery, equipment, appliances, pursuing an active energy saving policy and use of the additional renewable and nuclear energy will provide the annual energy saving at a level of 2000 - 1000-1100 PJ, 2005 - 1950-2100 PJ, 2010 - 3100-3200 PJ, 2015 - 4100-4200 PJ. These measures will require around $29-32 billion investments.

The analysis of measures effectiveness, according to the criterion of a relative effectiveness, shows, that measures, connected with the decrease of natural gas losses, with DSM, with the realization of cross-sectoral energy saving programs, are the most effective ones.

The implementation of non-traditional sources, optimisation of the electric power and heat utilities, the sets for pure coal combustion, installation of constructions for the refining of wastewater silt at purification stations, are the most expensive measures for GHG emissions decrease from the economic view point.

However, it must be taken into consideration, that for a whole number of measures considered the GHG emissions decrease is an indirect effect. Expedience of their realization is conditioned, as a rule, by other economic and social factors.

4.1.4.1.5. Projections of Greenhouse Gas Emissions and Reduction Potentials in Ukraine

In the future direct GHG emissions are projected to be lower than the emissions of 1990 in any scenario of the economic development, despite the essential growth of GDP in a baseline and especially in optimistic scenarios of the economic development of Ukraine. This is supposed to be achieved by the whole set of measures for GHG emissions decrease and the increase of CO_2 uptakes in the Forestry.

Summaries of projections of anthropogenic emissions of CO_2, CH_4, N_2O and precursors are presented in the Table 1-4, Table 1-5, Table 1-6, Table 1-7.

Estimates for direct GHG emissions are slightly different from the Ukrainian Inventory. The difference between the assessments of indirect greenhouse gases is more essential.

The largest difference is due to updating of recent Guidelines from the Intergovernmental Panel on Climate Change. Other differences include updates in sources list (non-energy emissions in food sector, metallurgy, chemistry and construction).

Table 1-4. Summary of projections of anthropogenic emissions of CO_2, Gg

	1990	*1995*	*2000*	*2005*	*2010*	*2015*
Fuel combustion: energy and transformation industries	191296	135447	151037	173122	178539	189474
Fuel combustion: industry	220202	117182	149722	159284	168893	179562
Fuel combustion: construction	3890	4615	3462	3646	3845	4431
Fuel combustion: residential	97506	78860	91649	91317	96818	100047
Fuel combustion: agriculture	35611	22721	32255	34044	36085	37908
Fuel combustion: transport	49831	17922	41060	45985	52749	61866

Fuel combustion: other	64296	25648	34343	34072	32861	31848
Industrial processes	48815	22905	26514	27678	28225	29214
Total	711447	425299	530042	569149	598016	634352

Table 1-5. Summary of projections of anthropogenic emissions of CH_4, Gg

	1990	*1995*	*2000*	*2005*	*2010*	*2015*
Fuel combustion	292	215	233	208	209	200
Fugitive emissions from fuels	6227	4044	52737	4653	4107	3356
Industrial processes: Iron and Steel	333	98	104	104	104	105
Industrial processes: Food	68	71	57	58	57	58
Industrial processes: Construction	5	3	4	5	5	6
Livestock	2240	1700	1764	2001	2077	2154
Rice cultivation	15	11	12	13	16	22
Waste	934	1009	937	909	891	837
Total	10115	7150	8383	7951	7467	6738

Table 1-6. Summary of projections of anthropogenic emissions of N_2O, Gg

	1990	*1995*	*2000*	*2005*	*2010*	*2015*
Transport	0.4	0.2	0.2	0.2	0.2	0.2
Other energy sources	4.5	3.3	4.0	4.2	4.3	4.6
Industrial processes	23	7	22.5	25.8	26.0	26.1
Agricultural soils	10.2	5.1	7.6	8.5	9.4	10.2
Waste	0.1	0.1	0.4	0.6	0.9	1.2
Total	38.2	15.7	34.7	39.3	40.8	42.3

Table 1-7. Summary of projections of anthropogenic emissions of precursors, Gg

	1990	*1995*	*2000*	*2005*	*2010*	*2015*
CO	7295	4046	5964	5958	6255	6607
NO_2	2043	1140	1564	1605	1613	1666
$NMVOC_S$	1007	471	844	884	949	1043

In the Forestry it is projected to provide the increase of CO_2 uptakes Ukraine in 2015 approximately on 20 800 Gg CE (Table 1–8).

Table 1-8. Summary of projections of removals of CO_2 by sinks and reservoirs, Gg

	1990	*1995*	*2000*	*2005*	*2010*	*2015*
Forestry	-51555	-64490	-66265	-68189	-70361	-72461
Land-use change	-421	-396	-378	-359	-341	-323
Total removals	-51976	-64886	-66643	-68548	-70702	-72784

GHG emissions and removals in the considered period are given in Table 1-9 for the baseline scenario. The overall reduction potential of mitigation measures is approximately 100,000 Gg CE, and projected emissions decrease in 2015 is 45,889 Gg compared to 1990.

Table 1-9. Total GHG emissions/removals in the baseline scenario

	1990	*1995*	*2000*	*2005*	*2010*	*2015*

Direct GHG emissions						
CO_2, Gg	711447	425299	530042	569149	598016	634352
CO_2, Gg CE	194031	115991	144557	155222	163095	173005
CH_4, Gg	10115	7150	8383	7951	7467	6738
N_2O, Gg	38.2	15.7	34.7	39.3	40.8	42.3
Total, Gg CE	255192	158268	195503	204082	209310	215172
Total, % compared to 1990	100	62.02	76.61	79.97	82.02	84.32
CO_2 uptakes in forestry						
CO_2 uptakes, Gg	-51976	-64886	-66643	-68548	-70702	-72784
CO_2 uptakes, Gg CE	-14175	-17696	-18175	-18695	-19282	-19850
Net						
CO_2, Gg	659471	360413	463399	500601	527314	561568
Total, Gg CE	241017	140572	177328	185387	190028	195322
CO_2, % compared to 1990	100	58.32	73.57	76.92	78.84	81.04

In optimistic scenario of the economic development, the net GHG emission levels in 2015 will total above 220 Tg CE, that is approximately 10.7% lower than in 1990.

In pessimistic scenario net GHG emissions on the level of 2015 will total above 180 Tg CE or about 73% from the level of 1990.

A very wide range of change of indices, characterizing the future economic development and expected emission levels, is connected with a very high grade of uncertainty of future development of Ukrainian economy (Table 1-10).

Table 1-10. Ranges of fuel consumption and GHG emissions in 2015

	Pessimistic scenario	*Optimistic scenario*	*Range*	*Average deviation, %*
Fuel, PJ	7596.4	9787.2	2190.8	12.8
Direct GHG Emissions, Tg CE	195.2	245.4	50. 2	11.5
Sinks in Forestry, Tg CE	-19.9	-23.9	-4.0	9.1
Net GHG Emissions, Tg CE	175.3	221.5	46.2	11.6

4.1.4.1.6. Vulnerability and Adaptation Assessment in Ukraine

Given the country's unstable economy and critical ecological problems, the consequences of climate change in Ukraine could be serious. The results of scientific research during the last few years show that climate change in Ukraine has significant impacts on agriculture, forestry, water and coastal resources. It is highly probable that crop yields could be changed significantly. Transformation of types, species composition, productivity and stability of forests is likely to take place in the course of climate warming within the territory of Ukraine. Coastal zone vulnerability is already a reality: the Black Sea level is rising 1.5 mm per year.

Thereby the following measures are to be realized in the nearest future:

- Optimisation of current system of water resources management (for Dnepr basin, first and foremost), including increase of reservoirs usable storage, elevation of normal afflux horizons and lowering of draw down level; alter regulations for runoff management through reservoirs;
- Providing alternative ways to cover peak loads in the power system in case of decrease of power production by Cascade of Dnepr hydropower plants;
- Development of National Program of Agriculture Development in Ukraine, which will include set of political, economic and technical measures, that will enable to prevent negative climate change impact on agricultural production. Acceleration of the land reform in Ukraine could be the first step in such direction;

- Promoting development of research programs to increase the genetic potential of domestic agricultural crops and animal breeds;
- Development of National Program on Coast Protection Measures that would include two main parts: scientific substantiation of trend and intensity of erosion processes within coastal zone of the Black and Azov Seas; and detailed plan of adaptation measures considering the most "unfavourable" sea level rise scenarios designed up to 2050;
- Facilitating implementation of technological, administrative and financial measures to support forestry in climate change conditions, including measures on elongating timber stands life-time, forest protection against pests and diseases; introduction of stable wood species, which provide the best productivity under climate conditions being formed; rise of responsibility level of forest users for forestry integrity and others.

4.1.4.1.7. Research and Public Education

Paramount to successfully mitigating and adapting to climate change is an ability to understand, monitor, and predict future changes. This, in turn, requires substantial research on the global climate system and the dissemination of such information to better enable society to respond appropriately.

Ukrainian Country Study in the frames of US Country Studies Program Support for Climate Change Studies was the first large-scale program in such direction. This program is nationally integrated effort that seeks to expand knowledge of these processes that affect climate change and to develop integrated models to predict these effects.

Ultimately, of course, the public is the true arbiter of national response strategies and policies. Thus, the public must have a solid understanding of global change science, particularly the consequences of policy options. To promote this understanding, relevant ministries and agencies direct efforts to general education, communication, and dissemination of climate change information.

4.1.4.1.8. The Future

Ukraine is currently examining the question of its future participation in the intergovernmental activities relating to the UN Framework Convention on Climate Change.

National Action Plan for GHG emission reduction and adaptation options implementation will be developed and submitted to Government for consideration. Public education concerning climate change problems is the essential element of National Action Plan implementation. The different forms of public education will be used, for example, training courses, issues of brochures, TV-programs, articles, etc.

Participation in U.S. Initiative on Joint Implementation (USIJI), which is a pilot program to reduce net GHG emissions and establish an empirical basis and framework for approaches to joint implementation, is envisaged.

4.1.4.2. Introduction

Climate change may be the most critical and complex environmental issue facing humanity in the last century. There are many uncertainties about the effects of increasing concentrations of carbon dioxide and other greenhouse gases (GHG) on temperatures; on the effects of temperature increases on other aspects of climate; and the causal effects on crops, rangelands, forests, and other parts of natural environment. But it is clear that global warming entails risk, risk not only that the kind of changes described above will take place but of other unexpected things. Small forcing can bring about changes in wind and ocean currents that greatly alter existing conditions. Strange and unforeseen effects can and probably will occur. With the carrying capacity of many parts of the world under stress from present level of population and economic activity, and the prospect of continuing and large increases in both in the decades immediately ahead, it might not take much more change to bring about the gravest consequences for people and most of Earth's present life systems.

The United Nations Framework Convention on Climate Change (UN FCCC) is the first and major international legal instrument to address climate change issues at a global scale. In June 1992 the representatives of 176 countries met at the highest level in Rio-de-Janeiro at the UN Conference to search for ways of joint activity for environmental protection. Signature of the UN FCCC by around 150

countries indicated that climate change is potentially a major threat to the world's ecology and economic development. 167 countries have ratified the Convention by September 1997.

The ultimate objective of the Convention is "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

Ukraine signed the Convention in June 1992, the Parliament ratified it in October 1996 and became the Party in August 1997.

Ukraine is included in Annex 1 of the Convention. All of Annex 1 Parties are obliged to present the First National Communication composed of an inventory and projections of GHG emissions, national policies and measure to mitigate climate change, adaptation strategies within a six month period after it entering into force.

In compliance with Article 4.2b Ukraine has adopted 1990 as a base year for the estimating of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol.

Article 4.6 of the Convention gives countries with economies in transition to market economies "a certain degree of flexibility" to meet their commitments in the frames of the FCCC. Due to the deep uncertainties related to transition period, futility of "business-as-usual" scenario development, there is a lack of sufficient quantitative information about some of mitigation and adaptation measures, and future projections in Ukraine.

This document is the First National Communication, by which Ukraine is complying with the obligation to communicate information to the Secretariat of the Intergovernmental Negotiating Committee for a UN FCCC, according to Article 4.2 and Article 12 of the Convention.

The elaboration of Ukrainian First National Communication was supervised by the Ministry of Environmental Protection and Nuclear Safety of Ukraine, relevant ministries, agencies and organizations taking an active part. The document was prepared by Agency for Rational Energy Use and Ecology.

4.1.4.3. National Circumstances

Ukraine is the second largest country in Europe (after the Russia) with an area of 603.7 thousand km^2. The population of the country (1995) is 51.7 million people, including urban population - 35.1 million, and rural population - 16.6 million. Around 73% of the total population are of Ukrainian origin. The capital of Ukraine is Kiev.

Ukraine is situated in south-west of Eastern-European Plain. To the west of country Ukrainian Carpathians are located, to the south, along southern coast of the Black Sea - Crimean Mountains; from the south its coasts are washed by Black and Azov Seas. From the north to the south territory of Ukraine stretches from N52° 22' 54'' to N44° 23' 18'', almost for 900 km, and from the west to the east - from E22° 08' 42'' to E40° 13' 05'', for 1,300 km.

The flat part of the country covers 95% of overall area (573.5 thousand km^2). In the northern part Polissya is situated - swampy lowland; left-bank region of Dnepr is occupied with Prydneprovskaya Lowland. From extreme north-east spurs of Middle-Russian Hills penetrate into Ukraine. In south-east Donetsk Ridge and Pryazovskaya Hills are situated. Central and western parts of right-bank of Dnepr are occupied with Prydneprovskaya, Volyn' and Podol'sk Hills.

In the south of the country the Prychernomorskaya Lowland is located, which is connected with Northern-Crimean Plain through Perekop's Isthmus.

Within flat territory natural zones are rather clearly marked. In the north zone of mixed forests is situated (19% of the territory). Forest-Steppe zone occupies 34% of country territory. Steppe zone is situated to the south of Ukraine and occupies about 40% of the territory. Carpathian and Crimean Mountains are characterized with altitudinal zonality of present landscapes.

Ukraine has rather dense river system. Rivers mostly belong to basins of Black and Azov Seas. The largest river of Ukraine is Dnepr, basin of which occupies a half of the country territory, and average runoff of which is 53.3 km^3.

There are significant deposits of a number of treasures of the soil in Ukraine - coal, oil, gas, iron ore, manganese, titanium, uranium, bauxites, nephelines, alunites, kaolines, rock-salt, potassium sulphate, etc.

Fertile soils are the most important resources for agriculture of the country. The most fertile soils in Ukraine are chernozioms with humus content from 3 to 7% and with thickness of humus layer of 130 - 150 cm. They occupy more than 10% of territory. Besides, considerable areas are occupied with Grey Forest soils in Forest-Steppe zone and with Chestnut ones - in Steppe zone, which are featured with high fertility as well.

Table 3-1 presents general information on economical and natural potential of Ukraine.

Table 3-1. General information on economical and natural potential of Ukraine (1995)

Population,	millions of persons	51.7
Population increment,	%	0.35
Urban population,	millions of persons	35.1
Gross Domestic Product,	billions of US dollars	35.3
Income per capita,	US dollars	657
Share of industry in GDP	%	67.3
Water consumption, including	km^3 (%)	26.93 (100)
agriculture		1.66 (6.2)
irrigation		6.2 (23)
industry		13.5 (50.1)
drinking water demands		4.64 (17.2)
other demands		0.93 (3.5)
Land fund, including	million ha	36
crops under cultivation	%	55.3
forested area	%	15.4
pastures and hay-fields	%	12.4
under water	%	4.0
perennial plantations	%	1.8
wood-bush plantations	%	1.5
swamps	%	1.5
other lands	%	8.1

4.1.4.3.1. Climate

Climate of Ukraine is of moderate-continental type, except of narrow belt of Southern Coast of Crimea with features of subtropical climate. Rather important factor of Ukraine climate formation is atmospheric circulation: prevailing western direction of air transfer presumes inflow of Atlantic air masses, from time to time air masses invade territory of the country from Asia continent, from northern latitudes, from Mediterranean Sea. Differences in circulation conditions of the west and the east are clearly manifested in increase of continentality of climate from the west to the east. In regions of Carpathian and Crimean Mountains changes of climatic elements depend greatly upon altitude of region and exposure of mountainsides: with increase of altitude atmospheric pressure and temperature are lowered, amount of precipitation is increased, period of time with snow cover becomes longer, wind speed is increased. Influence of Volyn'-Podol'sk Plateau and Donetsk Ridge upon climatic conditions is of less significance. It results mainly in small decrease of temperature, changes of duration of snow cover laying.

Black and Azov Seas influence climate of Ukraine significantly too. Increase of air humidity and smoothing of diurnal cycle of air temperature are marked in coastal regions.

In Polissya region the climate is temperate, humid and is characterised with prevailing transfer of Atlantic air. Western part of Polissya is featured with increased cloudiness in summer season, relatively cool summer, soft winter and excessive precipitation. Average temperature in January is -4...-5° C, while in eastern part it reaches -7...-8° C. The most severe winters are in eastern part of Polissya, where their duration is 20 days longer approximately. Spring and autumn in Polissya are protracted, since inflow of humid sea air is accompanied with significant cloudiness and precipitation, which hinder air from heating in spring and its cooling in autumn. During summer seasons the lowest temperatures are observed in western part of Polissya, where average temperature in July is 17...18° C; to the east it increases up to

19...20° C. Annual precipitation makes 500 - 600 mm. During warm period about 70% of total precipitation falls, while 30% are referred to cold period. Sometimes droughts and dry winds are marked in Polissya.

Climate of Forest-Steppe zone is temperate continental. The lowest average temperatures of January are observed in eastern Forest-Steppe (-7...-8° C); to the west they increase to -4...-6° C. Summer is warm: average temperature in July to the west of the zone is 18...19° C, while to the east it equals to 19...21° C. Annual totals of precipitation are decreased from 700 - 550 mm in western region to 575 - 500 mm in eastern region. In Forest-Steppe zone number of days with hot dry winds is increased in comparison with Polissya zone. In eastern regions it approaches 11 days, in western - from 1 to 8 days.

Region of steppe atlantic-continental climate occupies whole Steppe zone of Ukraine, including steppe part of the Crimea. Climate there is featured with the most continentality and aridity, when compared with other zones of Ukraine. Summers are hot, winters are cold, in most cases with poor snowing. Average temperatures of January vary from -7° C in north-east to -2° C in south-east of the zone. Winters here are characterized with strong thaws, followed often by sharp cooling. Average monthly temperature in July is 21...30° C. Annual totals of precipitation are decreased from the north to the south. In southern regions of the zone they amount to 250 - 300 mm. Ukrainian Steppe is a region with the least relative air humidity, therefore droughts, dry winds and dusty storms are marked here most frequently.

In Carpathian Mountains significant rising of terrain causes sharp vertical zonality in distribution of climatic elements.

Lower in altitude Crimean Mountains are characterized with vertical zonality as well.

4.1.4.3.2. Economics

The economy of Ukraine, up to declaration of independence in 1991, was developing as a part of an economic system of the USSR under circumstances of both central planning system and practically insulated markets of the USSR and COMECON countries. Structure and levels of prices of goods and services differed from those on the world market highly. The regional and global ecological problems were practically ignored.

Proceeding from general economical interests of the former USSR and available natural resources potential top priority was given to the development of heavy industrial sectors (Fuel & Energy Complex, Metallurgy, Machinery & Equipment) and Agriculture.

In 1991 Ukraine set about restructuring of the economy towards the market development and democratic state formation. However, the transient period turned very painful, and the country entered serious and growing economic crisis, which was featured by the following:

- drop of industrial output, especially in industries of low energy intensity, and, as a consequence, GDP decrease and its energy intensity growth;
- swelling problems of payment for critical energy carriers import, that determines constant negative external trade balance and problem energy supply in the country;
- steady rising budget deficit;
- high inflation rates;
- abrupt standard of living decrease for the most part of population;
- social tension growth (Table 3-2).

Table 3-2. Economics. GDP, Inflation and Unemployment Trends

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
GDP, 10^9 $	73.62	67.21	60.56	51.96	40.01	35.29
Unemployment, thousand person	-	9.8	128	180.9	216	126
Inflation, %	-	-	1310	4830	990	420

Source: Ministry of Economy

At present, the economy escape from the crisis is considered to be connected with the following: production stabilization and its following progress, privatisation passage, legislation settling, improvement of taxation sphere and currency regulations, restoration of economic contacts with CIS countries and support of developed ones.

4.1.4.3.3. Energy Use

Ukraine belongs to high energy intensity countries. In 1990 specific energy consumption per GDP unit produced exceeded that of developed countries. For the posterior years this index has been dropping back due to considerable production fall in the country (Table 3-3).

Table 3-3. Energy Intensity

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
GDP, 10^9 $	73.62	67.21	60.56	51.96	40.01	35.29
Energy Consumption, PJ	10342.9	10017.7	8907.2	7931.5	6900.2	6630.6
Energy Intensity, PJ per billion $	141	149	147	152	172	188

The high level of outdated and outworn energy intensive production together with low privatisation rates and absence of bankruptcy mechanism, deficiency of domestic fuel and energy resources, not sufficient amount of capital stock at enterprises and environmental problems have led to high energy cost levels, low efficiency of social production and energy crisis deepening.

Production decrease and energy recession have resulted in balance of payments crisis, external indebtedness growth and non-payment problems aggravation. According to the Government estimates (as for the fall 1995), energy supply matter has transformed into the national security problem. Ukrainian trade balance for 1996 showed that costs for raw stuff and materials for Fuel and Energy Complex made up more than 50%. Energy carriers deficit is covered mainly by import from Russia, that leads to the necessity of diversification of energy carriers import sources. In 1995 Ukrainian total needs in primary domestic energy resources were met for 40-50%, including coal - for 83%, gas - for 21%, oil - for 16% (Table 3-4). For the latest years, production of main types of energy resources, mainly coal, tends to decrease.

Table 3-4. Primary Energy Production and Consumption

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
Production						
Coal (mln t)	130.7	108.7	105.4	91.0	75.9	65.6
Oil (mln t)	5.3	4.9	4.2	4.1	4.0	4.1
Natural gas (bln m^3)	28.1	24.3	20.9	19.2	18.3	18.2
Biomass (mln t)	4.3	4.0	3.7	4.1	4.0	3.9
Import						
Coal (mln t)	21.1	12.7	11.7	8.7	7.5	16.0
Oil (mln t)	54.3	49.6	35.3	19.7	15.8	13.3
Natural gas (bln m^3)	87.3	89.5	89.1	79.8	69.1	66.3
Oil products (mln t)	11.5	13.1	5.0	6.2	6.5	9.5
Export						
Coal (mln t)	20.0	13.7	7.8	3.5	4.6	2.4
Oil products (mln t)	11.3	8.4	6.4	1.1	1.7	1.4
Consumption						
Coal (mln t)	131.8	107.7	109.3	96.2	78.8	79.2
Oil and oil products (mln t)	59.6	59.2	38.4	29.0	24.8	25.4
Pure natural gas (bln m^3)	118.7	118.2	114.1	102.799	92.5	85.4
Biomass (mln t)	4.3	4	3.7	4.1	4	3.9

Power production and consumption structure in Ukraine have undergone considerable transformation. Total power production decreased from 296.3 to 192.5 bln kWh between the years 1990 and 1995 (Table 3-5), though fixed capacity did not change and made about 54.6 GWt, from these - 66.5% of electricity

was generated at TPP, 25% - at NPP, 8.5% - at HPP and HPSP. The heat generation dropped from 68% in 1990 to 56% in 1995.

Table 3-5. Electric Power Production Trends, billion kWh

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
Thermal Power Plants	201.7	182.5	162.4	135.9	115.8	107.0
Hydropower Plants	10.7	11.9	8.1	11.2	12.3	10.1
Blockstations	7.7	7.2	6.8	6.0	4.6	4.9
Nuclear Power Plants	76.2	75.1	73.7	75.2	68.8	70.5
TOTAL	296.3	276.7	251.0	228.3	201.5	192.5
Balance with CIS countries	0.16	1.14	1.12	1.56	0.57	1.27
Export excluding CIS	-28.13	-15.44	-5.77	-2.71	-1.59	-4.10
Export Netto	-27.97	-14.31	-4.65	-1.15	-1.02	-2.83
Total Consumption	268.33	262.39	246.35	227.15	200.48	189.67

In electricity consumption volume, industry's share decreased from 64% in 1990 to 54% in 1995, while residential sector's share grew up from 9% to 19% (Table 3-6).

Table 3-6. Electric Power Consumption Trends, billion kWh

	1990	1991	1992	1993	1994	1995
Industry	146.2	137.7	126.3	108.0	88.6	81.1
Agriculture	20.5	20.7	19.1	18.4	16.8	13.6
Transport	14.4	13.6	12.5	12.1	10.8	10.3
Service	17.6	17.8	17.2	16.7	15.7	14.8
Others	7.5	7.5	6.1	5.8	4.9	4.5
TOTAL	206.2	197.3	181.2	161.0	136.8	124.3
Household	21.1	24.2	24.9	26.9	26.8	27.0
Urban				17.5	17.4	18.0
Rural				9.4	9.3	9.0
Total Netto	227.3	221.5	206.1	187.9	163.6	151.3
Total Brutto	268.3	262.4	246.3	227.2	200.6	189.8

Since 1991, the state has been paying much attention to the energy sector development. In 1994 Ukrainian Parliament adopted the Concept on Fuel and Energy Complex Development up to 2010; based on which National Energy Program of Ukraine was developed in 1996.

The Concept and the Program determine energy policy of the state, its main priorities: energy conservation, domestic energy resources use, renewable energy sources development, targeted investments into strategic fields of the economy.

To fulfil national energy conservation policy Ukrainian Parliament adopted Law of Ukraine "On Energy Conservation", and special state body - State Committee for Energy Conservation was formed. The Government of Ukraine elaborated Comprehensive National Program on Energy Conservation, which was approved by the Parliament in 1996.

In 1995 Parliament of Ukraine approved Program of Restructuring of Ukrainian Economy, which envisaged considerable decrease of energy intensive production processes.

As energy sector is under reformation, the problem of development and adoption of general economic regulations becoming more actual. Such regulations are designed for the functioning of state monopoly and competition in energy sector, state regulation (role and terms of licensing, terms for granting subsidies, concessions, energy carriers exchange functioning), improving taxation and price policy.

4.1.4.3.4. Environment

In the former Soviet Union the environmental legislation was very poor. The Law of the Parliament "On Environmental Protection" was among the first legislation acts of the independent Ukraine. Later the following legal provision was adopted by the Parliament of Ukraine: Law of Ukraine "On Protection of Atmosphere" (1992), Law of Ukraine "On Wildlife" (1994), Law of Ukraine "On Changes and Amendments to the Code of Ukraine with concern to Administrative Infringements" (1993), which empowers the bodies of the Ministry for Environmental Protection and Nuclear Safety of Ukraine to take legal steps in the case of administrative infringements in the field of environmental safety, Resolution of the Parliament of Ukraine "On the Red Book of Ukraine" (1992), Resolution of the Parliament of Ukraine "On Adopted Terms and Conditions of Restriction, Temporary Suspension (Stoppage), or Cessation of Activities of Enterprises, Institutions, Organizations and Projects in the Case of their Infringement of the Law on Environmental Protection Provisions" (1992), Resolution of the Parliament of Ukraine "On Conditions of Import (or Transit) of Waste Products and Utility Waste on the Territory of Ukraine" (1993), Law of Ukraine "On Changes and Amendments to the Criminal Code and Criminal Procedure Code of Ukraine" (1994), which specify criminal and fiduciary responsibilities for infringement of conditions of import (or transit) of waste products and utility waste on the territory of Ukraine, Law of Ukraine "On Ecological Examination" (1995).

Besides, some Decrees of the President of Ukraine were enforced, namely: "On Protection and Development of Natural Reserves of Ukraine" (1993), "On Wildlife Reserves in Ukraine" (1993).

In 1997 the National Climate Program was adopted by the Cabinet of Ministries.

4.1.4.4. Greenhouse Gas inventory

Central to any study of climate change is the development of an emission inventory that identifies and quantifies a country's primary sources and sinks of GHG. The inventory process is important for two reasons: (1) it provides a basis for the ongoing development of a comprehensive and detailed methodology for estimating sources and sinks of greenhouse gases, and (2) it provides a common and consistent mechanism that enables all signatory countries to the United Nations' Framework Convention on Climate Change to estimate emissions and to compare the relative contributions of different emission sources and greenhouse gases to climate change. Moreover, systematically and consistently estimating emissions at the national and international levels is a prerequisite for evaluating the cost-effectiveness and feasibility of pursuing possible mitigation strategies and adopting emission reduction technologies.

This chapter summarizes the sources and sinks of Ukraine GHG emissions and uptakes. The emission estimates presented here were calculated using the IPCC Guidelines for National Greenhouse Gas Inventories [6, 18], to ensure that the emission inventories submitted to the Framework Convention are consistent and comparable across sectors and among nations. Ukraine has followed these guidelines, except where more detailed data or methodologies were available for major sources of emissions.

4.1.4.4.1. Ukrainian Greenhouse Gas Emissions

Greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapour and ozone (O_3) directly contributing to the greenhouse effect.

Chlorofluorocarbons (CFCs), a family of human-made compounds, its substitute hydrofluorocarbons (HFCs), and other compounds, such as perfluorinated carbons (PFCs), are also greenhouse gases. In addition, there are other "photochemically important" gases, such as carbon monoxide (CO), oxides of nitrogen (NO_x), and non-methane volatile organic compounds (NMVOCs) that are not greenhouse gases, but contribute indirectly to the greenhouse effect. These are commonly referred to as "tropospheric ozone precursors" because they influence the rate at which ozone and other gases are created and destroyed in the atmosphere.

Although carbon dioxide, methane, and nitrous oxide occur naturally in the atmosphere, their recent atmospheric build-up appears to be largely the result of human activities. This build-up has altered the composition of the Earth's atmosphere and may affect future global climate. Since 1800, atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased by 30, 145 and 15 percent respectively [18].

Use of chlorofluorocarbons is phased out under the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer.

Ukrainian Inventory carrying out in accordance with UN FCCC commitments, touches upon three direct GHG: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and three "photochemically important" gases: carbon monoxide (CO), oxides of nitrogen (NO_x), and non-methane volatile organic compounds (NMVOCs).

The concept of global warming potential (GWP) has been developed to compare the abilities of each greenhouse gas to trap heat in the atmosphere. Carbon dioxide was chosen as the "reference" gas. Gases are presented in units of gigagrams of carbon equivalent (Gg CE). Carbon comprises 12/44 of carbon dioxide by weight.

The GWP of a greenhouse gas is a ratio of global warming - or radiative forcing (both direct and indirect) - from one kilogram of a greenhouse gas to one kilogram of carbon dioxide over a period of time. This report uses the 100-year GWPs recommended by the IPCC (Table 4-1).

Table 4-1. Global Warming Potential of Greenhouse Gases, 100 Years

Gas	GWP
Carbon Dioxide	1
Methane	21
Nitrous Oxide	310

The Ukrainian inventory deals with the following five categories of GHG sources and sinks: energy systems (including transportation), industrial processes, agriculture, forestry and land-use change, and wastes.

The current Ukraine Greenhouse Gas Inventory for 1990 is summarized in Table 4-2. The totals presented in the summary tables in this chapter may not equal the sum of the individual source categories due to rounding. For the base year total GHG emissions were 232 882 Gg of carbon equivalent. CO_2 emissions were partly offset by an uptake of carbon in Ukrainian forests of 14 175 Gg of carbon equivalent in 1990.

Table 4-2. Ukrainian Greenhouse Gas Emissions, 1990, Gg

Gas/Source	Emissions (Full Molecular Weight)	Emissions (Direct and Indirect Effects; Carbon Equivalent)
Greenhouse Gases		
Net Carbon Dioxide	648 131	176 763
Fossil Fuel Combustion	668 332	182 272
Industrial processes	31 775	8 666
Total	700 107	190 938
Forestry (sink)	-51 976	-14 175
Methane	9 453	54 140
Energy	6 265	35 881
Agriculture	2 254	12 909
Waste	934	5 349
Nitrous Oxide	23.412	1 979
Energy	6.708	567
Chemistry	6.160	521
Waste	0.132	11
Forest fires	0.175	15
Agricultural soils	10.237	865
Photochemically Important Gases		
Carbon Monoxide (CO)	7 481	-
Nitrogen Oxides (NO_X)	1 243	-
Non-methane Volatile Organic Compounds	656	-

(NMVOCs)		
Net Emissions		232 882

Figure 4-1 illustrates the relative contribution of the primary greenhouse gases to Ukrainian emissions in 1990. The shares of different sectors in GHG emissions are presented at the Figure 4-2.

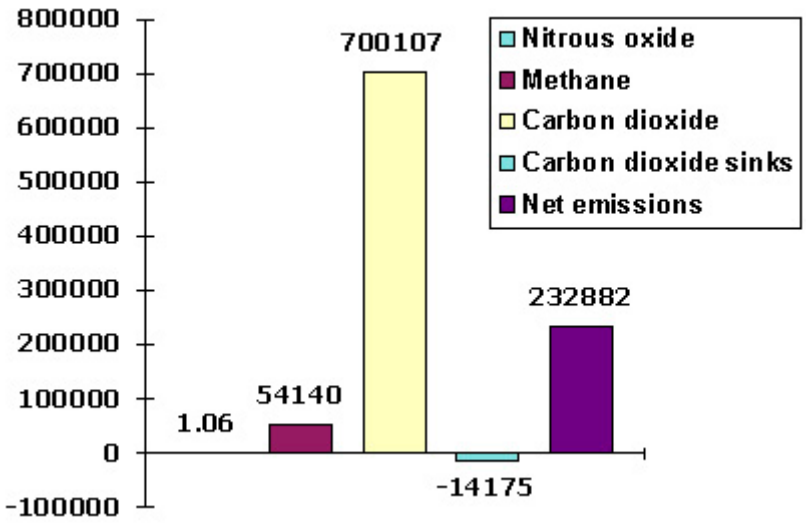


Figure 4-1. Greenhouse Gases emissions in 1990, Gg

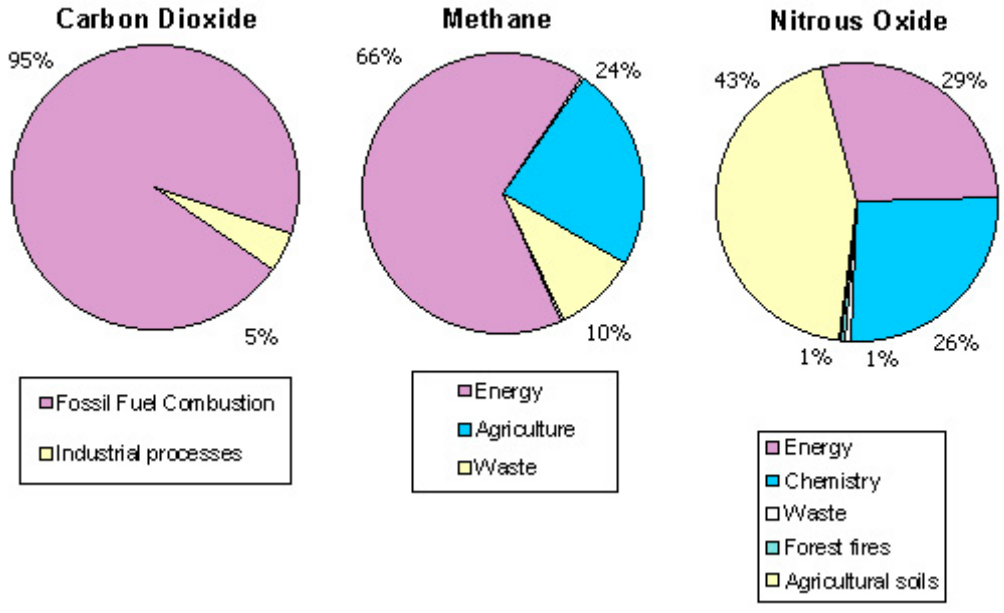


Figure 4-2. Sources of Greenhouse Gases in 1990, %

Due largely to fossil fuel consumption, carbon dioxide emissions accounted for the largest share - approximately 76 percent. Methane accounted for 23 percent of total emissions, which included contributions from agricultural activities and landfills, among others. The nitrous oxide emissions are less important comprising 1 percent of total emissions.

The emissions of the photochemically important gases CO, NO_x, and NMVOCs are not included in Figure 4-2, because there is no agreed-upon method to estimate their contribution to climate change. These gases only affect radiative force indirectly.

Statistical data for the development of the National GHG Emission Inventory for 1990 were collected and analysed according to the IPCC Methodology. Official statistical data from Ukrainian Ministries and Departments were used. Information gaps in several emission source categories have produced a high level of uncertainty in the results. All statistical data used and emission assessments have previously appeared in official Ukrainian publications [14].

The following sections present the anthropogenic sources of greenhouse gas emissions, briefly discuss the emissions pathway, summarize the emissions estimates, and explain the relative importance of emissions from each source category.

4.1.4.4.2. Energy Sector and Transportation

Fuel combustion and fugitive emissions from fuels were considered in category “Energy sector and transportation” as the main sources of greenhouse gases.

After the disintegration of the Union of Soviet Socialist Republics (USSR), the most important problem for Ukraine was dependence from energy import. However, for the last few years, domestic fossil fuel production has been diminishing steadily. Coal production decreased from 164.2 million metric tons (MMT) in 1990 to 130 MMT in 1994; oil production decreased from 5.2 MMT in 1990 to 4.2 MMT in 1993; and natural gas production decreased from 19.8 billion m^3 in 1990 to 19.4 billion m^3 in 1993 [11,21]. Despite the low level of domestic oil production, Ukraine has large facilities for oil refining, which are capable of processing 60 MMT of oil per year [11,15]. Gas is transported from Russia to a number of European countries through the Ukrainian territory at a rate of more than 100 billion m^3 per year.

In 1990 total fossil fuel consumption in Ukraine totalled 9,365.73 PJ (Table 4-3). The main consumers of fuel are electricity and heat production, and industry (Figure 4-3).

Table 4-3. Fossil Fuel Consumption in Ukraine by Sectors

Sector	PJ	Percent
Energy	4,046.33	43.20
Industry	2,834.39	30.26
Transportation	791.78	8.45
Agriculture	325.14	3.47
Household & Services	1,263.31	13.49
Others	104.78	1.12
Total	9,365.73	100

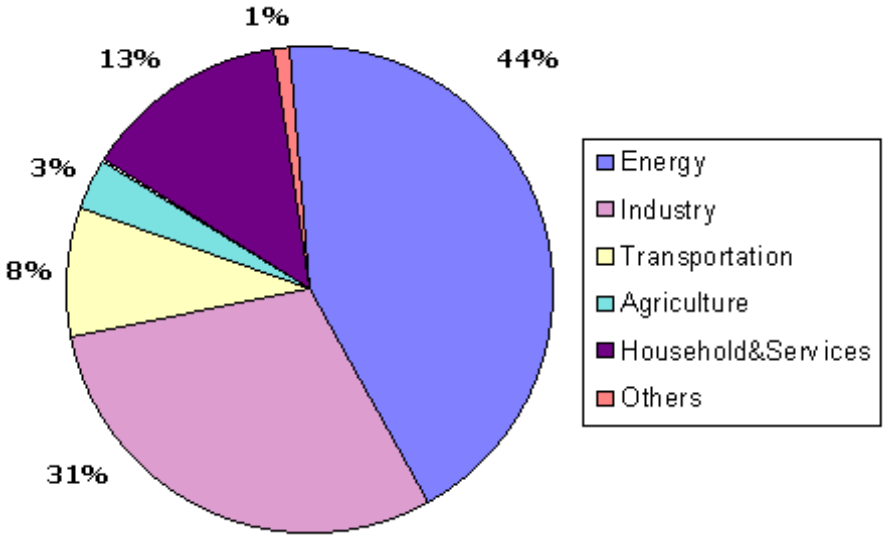


Figure 4-3. Fossil Fuel Consumption by Sectors in Ukraine

The 1990 Energy Balance of Ukraine [15] was the main source of statistical data of fuel consumption. However, the types of fuel and sectors included in this document differ from the IPCC Methodology. Therefore special software was designed to reformat the official statistical data according to the IPCC

worksheets format; to calculate fuel production, import, export, and other parameters; and to transform the data into the units used by the IPCC.

Carbon dioxide (CO_2) emissions for 1990 were estimated according to both the "bottom-up" and "top-down" methods. The bottom-up method used data on fuel and energy resources consumed in seventeen sectors of the Ukrainian economy. The top-down method used data on total values of fuel consumption. Carbon dioxide emission factors were taken from the IPCC Methodology [6].

Estimates of emissions from fuel combustion are presented in Table 4-4. Non-CO_2 emission assessments were taken from national statistical information [13] for stationary sources.

Table 4-4. GHG Emissions for Fossil Fuel Combustion for stationary sources, Gg

Source	CO_2	CH_4	N_20	CO	NO_x	NMVOCs
Fuel Combustion	668,332.0	35.6	6.7	3,273.0	760.7	265.1

Methane emission factors for fuel production, transportation, and primary processing were assessed according to Ukrainian experts data and IPCC Guidelines. Table 4-5 presents CH_4 emission estimates in Ukraine for 1990, and Table 4-6 - the corresponding emission factors. In order to account Ukrainian circumstances minimum and maximum emissions and emission factors were calculated by national experts.

Table 4-5. CH_4 Emissions for the Fuel Production, Transportation, Processing and Storage in Ukraine, Gg

Sources	Base	Minimum	Maximum
Coal	2,784.87	2,180.35	3,610.12
Oil and gas	3,444.52	1,696.38	4,558.65
Total	6,229.39	3,876.73	8,168.77

Table 4-6. CH_4 Emission Factors for the Production, Transportation, Processing, and Storage of Fossil Fuels in Ukraine

Activity	Units	Emissions Factor
Underground mining		
Coal mining (Donetsk Basin)	m^3 CH_4/t	25.5
Coal mining (Lviv-Volyn Basin)	m^3 CH_4/t	12.8
Postmining activity	m^3 CH_4/t	2.0
Surface mining		
Coal mining	m^3 CH_4/t	1.2
Postmining activity	m^3 CH_4/t	0.2
Oil-refining systems		
Prospecting and drilling	kg CH_4/drill-hole	no data
Production	kg CH_4/PJ	4,500
Transportation	kg CH_4/PJ	745
Processing	kg CH_4/PJ	1,000
Storage	kg CH_4/PJ	180
Natural gas systems		
Extraction	kg CH_4/PJ	450,000
Processing, distribution, and storage	kg CH_4/PJ	600,000
Venting and Flaring	kg CH_4/PJ	14,000

There are no published statistical data on GHG emissions from mobile sources in Ukraine for 1990. The main source of emissions is road vehicles, which in 1990 consumed more than 10 MMT of petroleum, 14 MMT of diesel fuel, about 48 thousand metric tons of propane-butane, and 284 million m^3 of natural gas

[3]. Road vehicles in Ukraine have a very low fuel efficiency; they use 1.4 to 1.5 times more fuel than similar automobiles and buses in developed countries. Consequently, GHG emissions per km are higher. Table 4-7 presents estimates of GHG emissions from mobile sources.

Table 4-7. GHG Emissions from Mobile Sources in Ukraine

Source	Annual Fuel Consumption	Aggregate Emission Factors (g/kg)			Total Emissions (Gg)		
	(10^3 tons)	CO	NO_x	NMVOCs	CO	NO_x	NMVOCs
Heavy-Duty Trucks							
Gasoline	5,184.00	400	40	36	2,073.60	207.36	186.62
Diesel	2,560.00	20	20	5	51.20	51.20	12.80
Butane	31.70	150	25	30	4.76	0.79	0.95
Natural gas	162.40	140	22	25	22.74	3.57	4.06
Cars							
Gasoline	3,800.00	400	40	36	1,520.00	152.00	136.80
Natural gas	12.00	150	25	30	1.80	0.30	0.36
Buses							
Gasoline	1,301.00	400	40	36	520.40	52.04	46.84
Diesel	320.00	20	20	5	6.40	6.40	1.60
Butane	4.40	150	25	30	0.66	0.11	0.13
Natural gas	29.14	140	22	25	4.08	0.64	0.73
Total					4,205.64	474.41	390.89

4.1.4.4.3. Industrial Processes

Greenhouse gas emissions from industrial processes were calculated according to the IPCC Methodology [6, 18]. The following industrial chemical processes were considered: nitric acid manufacture [2], adipic acid manufacture [9], CO_2 production and use (the main source is ammonia manufacture, the main consumer is carbamide manufacturing), cement production (calculations were based on clinker production volume), lime production and use (the main consumers are the sugar industry and construction), limestone use (the main consumers are iron and steel production [20], and glass manufacture), and soda manufacture and use.

Emission estimates for carbon dioxide and nitrogen oxides (Table 4-8 and Table 4-9) are based on statistical data on production volumes [14] and national emission factors obtained from stoechiometric equations for chemical reactions.

Table 4-8. CO_2 Emissions from Industrial Processes in Ukraine, Gg

Source	Emissions
Cement production	8,745.31
Lime manufacture and use	4,531.40
Soda manufacture and use	987.41
Limestone and Dolomite use	10,968.95
CO_2 use and production	6,543.38
Total	31,776.45

Table 4-9. NO_x Emissions from Nitric and Adipic Acids Production in Ukraine, Gg

Source	Emissions
Nitric acid manufacture	7.51
Adipic acid manufacture	0.82
Total	8.33

Table 4-10 contains CO, NO_X, NMVOCs emissions estimations for a number of industrial processes. Production volumes were obtained from the national statistics, and emission factors were taken from industrial emission standards for the former USSR.

Table 4-10. Indirect Greenhouse Gas Emissions from Industrial Processes

Production	Volume 1000 tons	Emission Factors, kg/t			Emissions, Gg		
		CO	NO_x	NMVOCs	CO	NO_x	NMVOCs
Blast-Furnace Sinter	60,926.50	32.80	0.40	-	1,998.49	24.37	-
Iron-Ore Pellets	27,916.80	0.27	0.31	-	7.54	8.65	-
Coke	34,666.80	3.11	0.30	-	107.81	10.40	-
Rolled Ferrous Metal Produce	38,600.00	1.63	0.41	-	62.92	15.83	-
Steel Pipes	6,500.00	1.63	0.41	-	10.60	2.67	-
Steel	52,600.00	2.35	0.62	-	123.61	32.61	-
Pig-Iron	44,900.00	-	0.09	-	-	4.04	-
Nitric Acid	2,780.20	3.19	-	-	8.87	-	-
Ammonia	5,149.59	1.06	0.77	-	5.46	3.97	-
Phosphate Fertilizers	593.00	0.21	0.04	-	0.12	0.02	-
Oil, primary refining	58,981.30	0.03	0.001	0.90	1.77	0.06	53.08
Clinker	17,500.00	20.00	2.28	-	350.00	39.90	-
Lime	8,677.00	59.30	3.19	-	514.55	27.68	-
Soda Ash	1,119.50	7.02	0.15	-	7.86	0.17	-
Acetic Acid	156.34	24.76	-	59.58	3.87	-	9.32
Formaline	205.21	2.97	-	0.42	0.60	-	0.09
				Total	**2105,998**	**170.37**	**62.49**

4.1.4.4.4. Agriculture

The main sources of GHG emissions in the category “Agriculture” were enteric fermentation and manure management in domestic livestock, rice cultivation and nitric fertilizers use. Crop residue burning is not widely used in Ukraine, so this source of emissions was not considered.

Initial data for the inventory of GHG emissions from agricultural activities were taken from statistics [14] and documents of the Ukrainian Agrarian University.

The emission factors for livestock were taken from the IPCC Guidelines [6]. The factors for manure were based on the fact that the Crimean region has a warm climate, other regions of the Ukraine have a temperate climate. For example, the emission factor for swine manure management is a weighted average based on the percent of total swine in the Crimean region in 1990 (2.4%) and the Eastern Europe emission factor for a warm climate, plus the percent of total swine in other regions (97.6%) and the Eastern Europe emission factor for a temperate climate: (0.024 x 11) + (0.976 x 7) = 7.10 (Table 4-11).

Table 4-11. Emissions Factors for Ukrainian Livestock

Source	Enteric Fermentation, (kg CH_4/ head/year)	Animal Wastes, (kg CH_4/ head/year)
Nondairy cattle	56	13.36
Dairy cattle	81	19.40
Goats	5	0.17
Sheep	5	0.16
Swines	5	7.10
Horses	5	0.61

The IPCC Methodology was used for estimating GHG emissions from rice cultivation. Three regions in Ukraine (the Crimean, Kherson, and Odessa regions), have small areas under rice cultivation. The total harvested area in 1990 was 0.0281 Mha. The emission factor was defined using an average temperature of 25°C. The average growing period is 103 days.

Table 4-12 presents CH_4 emissions from agriculture in Ukraine in 1990.

Table 4-12. CH_4 Emissions from Agriculture in Ukraine, 1990

Source	CH_4 Emissions, Gg
Enteric Fermentation	1,702.63
Manure Management	536.40
Rice Cultivation	15.17
Total	**2,254.20**

Assessments of N_2O emissions from nitric fertilizers were based on the IPCC Methodology and national statistics and totalled 10.237 Gg.

4.1.4.4.5. Forestry and Land-Use Change

In forestry and land-use change, CO_2 is mainly emitted as a result of the decay of damaged aboveground biomass and the burning of biomass at harvesting; and forest fires. Forests also sequester carbon (C) in the process of photosynthesis.

Several activities included in the IPCC Methodology for the forestry and land-use change category do not play any significant role in Ukraine. These include conversion of forest to agricultural land, conversion of grasslands and pastures, and abandonment of managed lands, excluding the abandonment zone in the Chernobyl region.

Emissions and uptake of CO_2 from forest management and afforestation of Chernobyl zone were estimated according to the IPCC Methodology [6]. For the calculation of the aboveground biomass growth rate, the C ratio in dry matter, and the wet-to-dry wood-weight ratio, data from national statistical publications were used [7, 8, 10, 19].

A method similar to the IPCC for forest clearing was used to estimate CO_2 emissions from forest fires. The difference between brush fires, which primarily destroy forest floor, and top fires, which destroy the tree layer, was taken into account. Average CO_2 emissions and uptake estimates were obtained for 1990 through an analysis of forest fires during a 9-year period (1986-1994).

Table 4-13 shows the estimates of CO_2 emissions and uptake from forestry and land-use management.

Table 4-13. CO_2 Emissions and Removals in the Category "Land Use Change and Forestry"

Source	CO_2 Emissions and Removals, Gg
Forest Managed	-72,321.3
Harvests	20,683.7
Forest Fires	81.8
Abandonment of Lands	-420.6
Total	-51,976.4

4.1.4.4.6. Waste

The IPCC Methodology [6] was used to determine CH_4 emissions from solid and liquid wastes.

One of the most important ecological problems in Ukraine is MSW management, annual increment of solid wastes totals 1.5 to 2% [16, 17]. According to national statistics, MSW was estimated to be 11 million tons in 1990, about 8% of which was treated on incineration plants in Kiev, Kharkiv, and Sevastopol. Methane was not recuperated from landfills in Ukraine in 1990 and CH_4 emissions from MSW totalled 885.5 Gg.

N_2O emissions from solid waste incineration were estimated according to IPCC methodology. The volume of incineration totalled 880 thousand tons, emission factor was taken as the average value of 26-270 grams of N_2O per ton of waste. N_2O emissions from waste incineration totalled 0.13 Gg in 1990.

Under Ukrainian conditions, rural wastewater decomposes under aerobic conditions. Therefore only urban wastewater was taken into account. In 1990, 3,684 million m^3 of municipal wastewater were made in Ukraine, of which 3,597 million m^3 (97%) were processed in sewage disposal facilities [12]. Wastewater treated under anaerobic conditions accounts for 15% of the total wastewater in Ukraine. To calculate CH_4 emissions from municipal wastewater, biochemical oxygen demand (BOD) in municipal wastewater was defined as 0.05 kg/person/ day. Applying the IPCC CH_4 emission factor of 0.22 Gg CH_4/Gg BOD, emissions from municipal wastewater were estimated as 40.7 Gg CH_4. Taking into account recuperation of 6.24 Gg CH_4 on sewage disposal facilities in Kiev and Kharkiv [4], methane emissions from liquid wastes totalled 34.46 Gg.

Table 4-14 presents the results of the emissions assessment for industrial wastewater.

Table 4-14. CH_4 Emissions Assessment for Industrial Wastewater in Ukraine

Industry	Annual Wastewater, million m^3	Wastewater Treated at Disposal Facilities, million m^3	CH_4 Annual Emission, Gg
Iron and steel	1,790.0	755.0	1.08
Nonferrous metals	25.9	11.1	0.02
Fertilizer	537.5	320.1	1.94
Food and beverages	197.4	68.7	5.08
Pulp and paper	102.1	93.6	1.04
Petrochemical	26.5	14.9	0.41
Textiles	31.8	31.5	0.94
Miscellaneous*		85.8	3.60
Total		1,380.70	14.11

* Microbiologic industry, transport, construction, and building materials production are accounted.

4.1.4.4.7. References

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4.1.4.5. Policies and measures to mitigate climate change

4.1.4.5.1. Overall policy context

In the last time the whole number of programs for the economic development of Ukraine was elaborated and adopted, the most important of them were as follows:

1. National Energy Program [1];
2. Program of Restructuring of Ukrainian Economy [2];
3. Comprehensive State Energy Conservation Program of Ukraine [3];
4. National Development Programs of Industrial Sectors [4-9].

These documents were assumed as a basis for forming the baseline scenario of the development of economy and its sectors, for assessing projected GHG emissions and mitigation measures.

In correspondence with the baseline scenario of the economic development it is planned to provide main indices of the socio-economic development of the country (Table 5-1) in the period considered, up to 2015.

Table 5-1. The main indices of socio-economic development of Ukraine till 2015

Indices	1990	1995	2000	2005	2010	2015
GDP, billion $	73.62	35.26	41.30	58.82	84.07	97.17
GDP, %	100.0	47.9	56.1	79.9	114.2	132.0
Fuel combustion, PJ	9246.3	5531.5	6965.1	7557.7	8022.5	8551.9
Population, million	51.9	51.5	50.2	51.0	51.5	51.8
Housing fund, million m^3	922.1	978.5	1018.5	1169.6	1255.0	1360.5

Alongside with the baseline scenario the indices for the optimistic and pessimistic scenarios of the economic development were forecasted. These scenarios differ in terms of crisis peak, duration of economic recovery and further rate of development.

An active and consistent reformation and large-scale economic restructuring (firstly in high intensive industrial sectors) and the increase of its liquidity, considerable increase of Ukrainian goods competitiveness, promotion of energy saving problem in Ukraine are projected in the baseline scenario.

The performance of a balanced financial policy is envisaged. Reforms towards simplifying taxation system, expansion of its base and achieving GDP re-distribution through the state budget up to an ultimate level of 40% of GDP is forecasted.

The increase of budget expenses effectiveness, the reduction of dotations and capital transfers structure optimisation are envisaged in budget policy as well as the support of budget deficit at a minimal level (not more than 3.5% from GDP). Realization of money-credit policy should provide the achievement of money stabilization, support of credit system, stimulation of credits towards long-term investment as well as the support of productions, which provide a deep transformation of national mineral-raw resources and build-up the output of import replacing products and export potential of the country.

In correspondence with the forecast of the development of material production sectors in 2001-2005 according to optimistic assessment the accelerated development of metallurgy, chemical and petrochemical industry as well as machine building is envisaged.

Such character of structural shifts will be reflected to a certain extent on the increase of volumes and infrastructure of energy consumption. The change of economic conditions for sectors functioning is also projected, and first of all, the introduction of an active state regulation of energy resources consumption, realization of energy saving measures.

Acceleration of service sector development, in the first turn, due to the development of paid services of the financial economic sector, the increase of a specific weight of paid services in socio-oriented economic sectors, appearance of new types of services, connected with the expansion of informational exchange, etc., are envisaged.

According to optimistic projections of the national economy development positive changes will take place in the period forecasted due to a relative reduction of energy resources import and increase of the Ukrainian coal export. Under these conditions it is possible to achieve a positive net export (1% of GDP) till 2000 with its further growth up to 2% in 2005.

The performance of an active state policy regarding a stimulation of export production in Ukraine is forecasted. The analysis shows, that in the years of crisis the less production recession was marked in those sectors, which have an access to external trade markets. Under the limited domestic demand of some sectors' products it was export-oriented production which allowed to avoid their degradation. To regulate export production the forecast envisages the revision of production structure, active search of new external markets and restitution of lost ones, structural and technological rehabilitation of production. Mutual coordination of scientific-technical policy with the policy of currency, external economic and taxation-budget regulation should be provided.

Forecast show, that in 1998-2010 a real achievement of economic stabilization with a further development of the country economy is possible. This conclusion is based on economic potential for the development of a number of sectors (agriculture, metallurgy, machinery and equipment, light industry) as well as on the possibility of a gradual solution of energy supply problem in the country.

Activation of investment processes through the increase of a share of basic capital accumulation in a total volume of capital creation should be important for a forecasted period.

Country's withdrawal from crisis is possible only in conditions of the activation of a positive state influence on the production and social processes towards all-round stimulation of producers and strengthening a real social defence of population.

4.1.4.5.2. Overall mitigation potential

Two groups of mitigation measures were considered in mitigation analyses: policy instruments and technological options (Table 5-2).

Table 5-2. The assessments of mitigation options through 2015

Option	Annual GHG emissions reduction, Gg			
	CO_2	CH_4	N_2O	C
Energy consumption metering	17114.3	0.383	0.161	4683.3
DSM	4315.78	0.097	0.041	1181.1
Industrial processes improving	1078	156	10.25	2054.0
Energy efficiency,	230671	5.167	2.17	63123.3
including				
cross sectoral:	**59528**	**1.333**	**0.56**	**16289.9**
efficiency lighting	4836.65	0.108	0.046	1323.6
improvement of motor drive systems	26415.55	0.592	0.249	7228.7
efficient combustion of low-energy fuel	1302.175	0.029	0.012	356.3
improvement of heat supply systems	10789.45	0.242	0.102	2952.6
utilization of secondary energy resources	12649.7	0.283	0.119	3461.6
sectoral:	**168724.7**	**3.779**	**1.587**	**46171.6**
energy efficiency in FEC,	35344.75	0.792	0.333	9672.2
Including:				
optimisation of generating capacities, technological improvements	21578.9	0.483	0.203	5905.1
high efficiency gas supply system	2604.35	0.058	0.025	712.7
up-to-date technologies of coal production	2046.28	0.046	0.019	559.9
energy efficiency in industry,	76642.3	1.717	0.721	20973.2
Including:				
energy efficiency in metallurgy	19346.6	0.433	0.182	5294.2
energy efficiency in mechanical engineering	6324.85	0.142	0.060	1730.8
energy efficiency in chemical industry	8557.15	0.192	0.081	2341.7
energy efficiency in constructing materials industry	6696.9	0.15	0.063	1832.6
energy efficiency in food industry	13393.8	0.3	0.126	3665.2
energy efficiency in others industrial sectors	22323	0.5	0.21	6108.7
energy efficiency in constructing sector	930.125	0.021	0.009	254.6
energy efficiency in agriculture	11161.5	0.25	0.105	3054.4
energy efficiency in residential sector	24183.3	0.542	0.228	6617.8
energy efficiency in transport sector	20462.8	0.458	0.193	5599.7
Implementation of 3 GW at NPPs	14882	0.333	0.14	4072.5
Untraditional resources	42785.8	0.958	0.403	11708.4
Reducing methane emissions in coal mining	0	710	-	4066.4
Shift from oil motor fuel to gas	1850	1.115	0.06	516.0
Reduction of leaks in gas systems	0	1400	0	8018.2
Waste treatment	0	540	-0.9	3016.6
Installation of equipment for processing of waste water sediment	0	19	0	108.8
Total	310241.3	2832.998	12.301	101876.6

4.1.4.5.2.1. Policy instruments

State regulation of rational energy use in all sectors, including:

- legislation, supporting energy saving and environmental protection policies;

- standard regulations on fuel and energy consumption, GHG emissions etc.;
- fees, taxes, subsidies, prices, stimulating implementation of efficiency technologies and equipment;
- research, development and demonstration programs to improve and disseminate information;
- energy and environmental audit, R&D centres, information and personnel training centers, energy management at the enterprises, licensing requirements, patent rules, etc.;
- demand side management;
- energy consumption metering.

This portfolio of policy instruments will promote sustainable development of Ukraine and lead to the restructuring of economy. A strong role of energy-intensive sectors (energy, metallurgy, heavy mechanical engineering, etc.) will not be continued under market conditions. Low energy use sectors, services and agriculture are favourable.

4.1.4.5.2.2. Technological options

Implementation of energy efficient technologies are the most important for reducing GHG emissions.

Sectoral energy saving options:

The most effective measures are follows:

Energy Supply: technological and efficiency improvements in power sector, high efficiency gas supply system etc. Energy conservation assessment is 450-500 PJ with an investment of $ 5-6 billion.

Metallurgy**:** improvements in coke making, recycling of blast furnace, coke oven and converter gases, wide implementation of electric arc furnaces, decrease of output of the most energy intensive production etc. Energy conservation assessment is 240-280 PJ with an investment of around $ 2 billion.

Mechanical Engineering**:** implementation of efficiency technologies of metal processing, use of high quality raw materials etc. Energy conservation assessment is 75-90 PJ with an investment of $ 800-900 mln.

Chemical industry: improvement of the technologies of ammonia, calcium soda and phosphoric fertilizers production etc. Energy conservation assessment is 105-120 PJ with an investment of $ 825-925 mln.

Building materials industry**:** improvement of technological processes of cement, glass, brick, wall materials production, etc. Energy conservation assessment is 75-95 PJ with an investment of $ 320-350 mln.

Food industry: improvement of technological processes of sugar, spirit, vegetable oil production, etc. Energy conservation assessment is 170-190 PJ with an investment of $ 600-650 mln.

Construction sector: improvement of technological processes of concrete, cement, asphalt, brick production etc. Energy conservation assessment is 10-15 PJ with an investment of $ 60-70 mln.

Agriculture**:** reduction of a share of energy intensive plants, improvement of post-harvest drying and storage, switch to low carbon energy sources, etc. Energy conservation assessment is 140-160 PJ with an investment of $ 1-1.3 billion.

Residential sector: switch to energy sources/equipment with low-carbon emissions, improvement of insulation for existing and new building shells, shift to more efficiency household equipment, etc. Energy conservation assessment is 300-350 PJ with an investment of $ 750-850 mln.

Transport: transport demand management, improvement of vehicle technical efficiency, fuel switch, improvement of traffic flow, etc. Energy conservation assessment is 250-300 PJ with investment of $ 2.5-3 billion.

Cross-sectoral energy saving options:

Implementation of efficiency lighting, motor drive systems improvement, more efficient poor fuel combustion, improvement of the heat supply systems, utilization of secondary energy resources etc. Energy conservation assessment is 800 PJ with an investment of $ 2 billion.

Fuel substitution: Increase share of nuclear fuel, renewable, secondary and non-traditional energy resources. Shift from coal and petroleum to natural gas, utilization of coalbed methane and biogas.

Reduction of losses in gas supply system: Replacement of high-bleed devices with pneumatic, pipeline leak mitigation, improved maintenance. Methane reduction potential is 2-2.2 billion $m^3$with an investment of $ 4-6 mln.

Improvement of industrial processes: not related to energy saving. Investment assessment is approximately $ 200 mln.

Improvement of waste treatment: The integrated management of the wastes and at first place their reduction and construction of regional centres for their treatment and detoxication would provide annual utilization of 5.8-6.2 mln tons of wastes and require investments of approximately $ 1-1.1 billion.

Realization of such options will provide the annual energy saving at a level of 2000 - 1000-1100 PJ, 2005 - 1950-2100 PJ, 2010 - 3100-3200 PJ, 2015 - 4100-4200 PJ. These measures will require around $29-32 billion investments.

The differences for pessimistic and optimistic scenarios are generally in volumes of energy saving, which in optimistic variant will be approximately 10-12% higher, and in pessimistic one - 25-30% lower.

All these measures have a high degree of a governmental support, since they are included in the programs of the development of the economy and its sectors in Ukraine, adopted by the administrative bodies of the state, as well as in the draft documents, which at present are being under consideration of the Cabinet of Ministers, of the Parliament and the administration of the President of the country.

However the possibility of realization of these measures will to a great extent depend on the investments. If until the recent time a state budget had been considered as a major source of investments, then today it is clear, that the state can be not only a single source, but just a considerable source of investments. Therefore the problem of investments is being the main one.

That is why the analysis of measures effectiveness, which was carried on according to some criteria, where the criterion of a relative effectiveness played a major role, is of a considerable interest. It was determined as a relation of direct GHG emissions decrease to the necessary investments for their realization in particular measures. The executed ranging of measures according to this criterion shows, that measures, connected with the decrease of natural gas losses, with DSM, with the realization of cross-sectoral energy saving programs, are the most effective ones.

The implementation of non-traditional sources, optimisation of the electric power and heat utilities, the sets for poor coal combustion, installation of constructions for the refining of wastewater silt at purification stations, are the most expensive measures for GHG emissions decrease from the economic view point.

However, it must be taken into consideration, that for a whole number of measures given the GHG emissions decrease is an indirect effect. Expedience of their realization is conditioned, as a rule, by other factors.

Realization of measures mentioned above will give a considerable social effect, first of all by the creation of new working places, for example in machinery and equipment sector, construction, energy saving management, etc. A total number of new working places according to evaluations of national experts on the level of 2010-2015 can make up to 250-300 thousand.

4.1.4.5.3. References

1 National Energy Program, 1996.

2 Program of Restructuring of Ukrainian Economy, 1995.

3 Comprehensive State Energy Conservation Program of Ukraine, 1996.

4 National Program of the Development of Mining and Smelting complex, 1995.

5 National Program of the Ukrainian Motor-car-construction Development, 1993.

6 National Program of Receptacles and Packing Materials Production, 1993.

7 National Program of the Development of Aluminium Production, 1993.

8 National Complex Program of the Development of Titanic Industry of Ukraine «Titanium of Ukraine», 1994.

9 Complex Program of the Development of Copper Production, its Alloys and Intermediate Goods «Copper of Ukraine»,1995.

4.1.4.6. Projections of greenhouse gas emissions and reduction potentials in Ukraine

4.1.4.6.1. Energy sector

In order to assess GHG emissions and mitigation options the following sectors and sub-sectors of economy were considered:

- Fuel Energy Complex (FEC) and sub-sectors:
  - Electric Power & Heat Supply
  - Coal Industry
  - Oil Gas Industry
  - Oil Refining

Electric Power & Heat Supply subsector fuel consumption was forecasted only for utilities supervised by Ministry of Energy of Ukraine. Heat and electric power generation by industrial and residential power units was taken into account in corresponding sectors, because of historical planning practice orientated not to functional but sectoral approach.

- Industry and main sub-sectors:
  - Metallurgy
  - Chemical Industry
  - Machinery and Equipment
  - Building Materials Industry
  - Food Industry
  - Other Industrial Sectors
- Construction Sector
- Agriculture
- Residential and Commercial Sector
- Transport
- Other Sectors of Economy

These sectors are selected as a result of historical planning practice and economic development forecasting together with the fact that these sectors are the main sources of GHG emissions.

A deep crisis of Ukrainian economy considerably complicates the assessment of future GHG emissions. It is extremely difficult to project the terms of economy stabilization, directions and rates of further economic development, up-to-date technologies implementation and energy efficiency improvement.

Also it is impossible to apply mathematical models and methodologies used in the developed countries and earlier used for planning development of Ukrainian economy including the regressive analysis, production functions and input - output models.

Accounting and iterative equilibrium models to forecast the development of economy and GHG emissions were used. Optimisation models were applied to develop mitigation scenarios and to estimate mitigation options.

Coal, natural gas, coalbed methane, residual fuel oil, diesel oil, other oil products were considered as primary fuels. In metallurgy coke and coke gas, and in a residential sector coal briquettes and firewood, were taken into account.

As a basis for forecasting fuel for combustion national experts used National Programs of the development of Ukrainian economy, FEC, some sectors adopted or being under consideration by the Ukrainian Government (see Chapter 5).

While forecasting fuel combustion in sectors and sub-sectors (Table 6-1) mitigation options included in a baseline scenario were evaluated (see Chapter 5, [1]).

Table 6-1 Fuel combustion in baseline scenario, PJ

Fuel	1990	2000	2005	2010	2015
Gas*	4208	3099	3419	3727	4033
Fuel oil	834	471	508	536	536
Coal**	2634	2247	2348	2382	2508
Gasoline	497	371	405	445	506
Diesel oil	629	511	524	534	561
Others	444	376	354	399	408
Total	9246	6965	7558	8023	8552

* including natural, coke and oil refining gases etc.

** including coal, coke, coal briquettes etc.

The study results of projected GHG emissions are summarized in Table 6-2 and Figure 6-1.

Table 6-2 GHG emissions from fuel combustion in baseline scenario

Gas	1990	1995	2000	2005	2010	2015
CO_2, Gg	662633	402394	503528	541471	569791	605138
CO_2, Gg CE	180718	109744	137326	147674	155398	165038
CH_4, Gg	291.7	215.0	233.1	207.5	209.3	200.0
N_2O, Gg	4.9	3.5	4.2	4.4	4.5	4.8
Direct GHG emissions, Gg CE	182803	111271	139016	149234	156977	166589

Note: GWP factors for CO_2 - 1, for CH_4 - 21, for N_2O - 310 (IPCC, 1995)

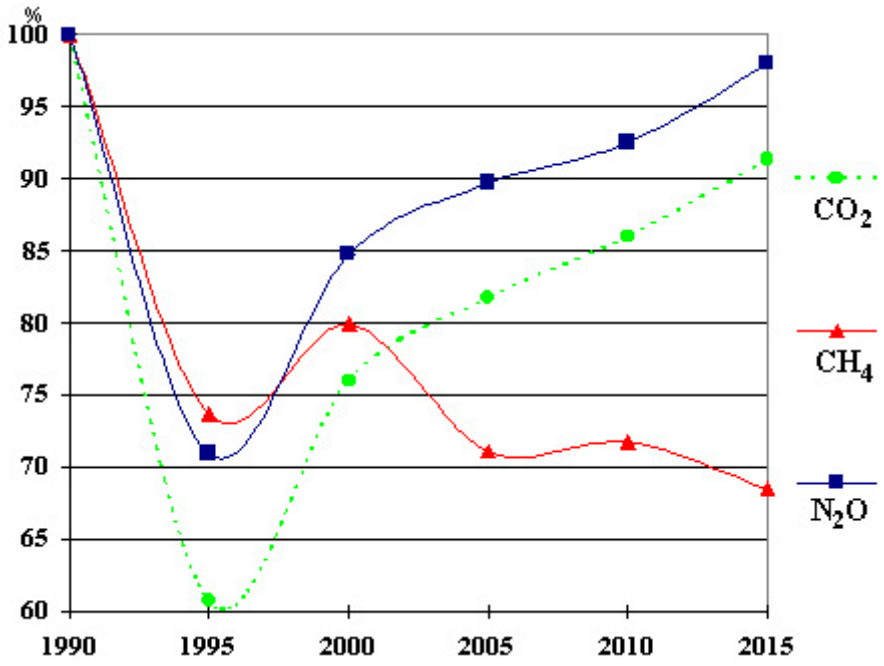


Figure 6-1. Trends of GHG emissions from fuel combustion in baseline scenario

As Table 6.2 shows GHG emissions from fuel combustion in a baseline scenario during the considered period are expected to be lower than levels of 1990.

In order to estimate prospective GHG emissions from industrial processes, production trends for chemical industry, metallurgy, building materials industry and other industrial sectors were forecasted.

GHG emissions trends from industrial processes are presented in Table 6-3.

Table 6-3 GHG emissions trends from industrial processes

Gas	1990	1995	2000	2005	2010	2015
CO_2, Gg	48815	22905	26514	27678	28225	29214
CO_2, Gg CE	13313	6247	7231	7549	7698	7967
CH_4, Gg	406.5	172.7	164.7	166.4	166.5	168.5
N_2O, Gg	23.0	7.1	22.5	25.8	25.9	26.0
Direct GHG emissions, Gg CE	17586	7836	10077	10683	10841	11130

Summary of projections of anthropogenic emissions of precursors is given at the Table 6-4.

Table 6-4 Summary of projections of anthropogenic emissions of precursors, Gg

	1990	1995	2000	2005	2010	2015
CO	7295	4046	5964	5958	6255	6607
NO_2	2043	1140	1564	1605	1613	1666
NMVOCs	1007	471	844	884	949	1043

4.1.4.6.2. Forestry

Ukraine is a country with a forestry deficit. Forest land fund totals 10 million hectares, 8.6 million hectares being covered by afforestation, which makes 14.3% of a country area (this is the forested lands index). For Ukraine the 20% average level is regarded as the optimal forested lands index (that is such one, when forests influence on the environment the most favourably, fulfil their functions effectively).

Total timber stock of Ukraine is estimated in 1.3 billion m^3. Evergreen plantations occupy 45% of a total area, including pine (Pinus silvestris L.) - 36%. Hard deciduous plantations total 41%, including oak (Quercus robur L.) and beech (Fagus sylvatica L.) - 33%.

Average growing-stock volume of forested area totals 4.0 m^3/hectar/yr and varies from 5.0 m^3/hectar/yr in the Ukrainian Carpathians up to 2.5 m^3/hectare/yr in steppe zone.

It is determined in the Ukrainian legislation (Forest Code), that forests of Ukraine carry out ecological functions predominantly and as a consequence have a limited exploitation importance.

According to the economic destination, sites and functions carried out, Ukrainian forests are divided into two groups.

The first group includes forests carrying out predominantly defence functions, forest reserves, plantations, having scientific and historical importance (including genetic reserves, etc.). The second group includes forests, having defence and limited exploitation importance. The area of the first group forests totals 5.1 million hectares or 52% of a forest fund.

All forests are a state property. 72% of them are in a constant use of state forestry enterprises, the rest being transferred to agricultural enterprises for use (24%), residential and other organizations (4%).

Five natural zones are distinguished in Ukraine, each of them having its own peculiarities in forestry (Figure 6-2).

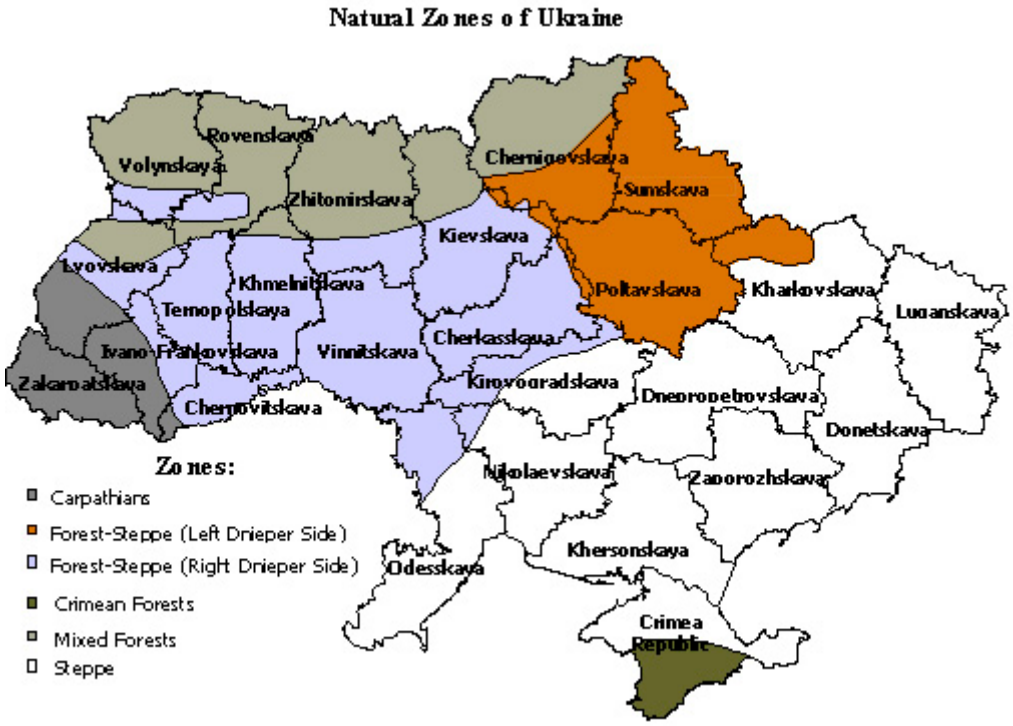


Figure 6-2. Natural zones in Ukraine

An increase of forested lands of Ukraine will allow to improve in general the unfavourable ecological situation, since a forest is a powerful natural factor, which influences the climate, soils, surface drainage forming, produces oxygen, filtrates air and water, prevents floods.

Ukraine has land areas not used in agriculture and available for afforestation (not less than 500 thousands hectares). Shelterbelts plantations were created only for 50% of agricultural areas. Intensity of erosion processes still remains a considerable one. Today legislation does not stimulate wide croplands shelterbelts planting. Besides the importance of agroforest-melioration effect of shelterbelts is misjudged by farmers.

Plantations' decline withering is one of the serious problems, significantly influencing on forests productivity for the last decade. Any scientific conception to explain the decrease of forest plantations sustainability to unfavourable factors does not exist yet. The withering of oak, pine and other plantations is periodically marked in various regions of Ukraine.

Methods, proposed by IPCC and national experts [2, 3], were used for the assessment of GHG emissions in forestry.

Baseline and mitigation scenarios of the forestry development in Ukraine were developed.

"Program of the Development of Forestry and Forest Industry in Ukraine for the Period till 2015" and "National Program of the Development of Agricultural Production in Ukraine for 1996-2005" were put into the basis of a baseline scenario. The extensive development (increasing forest plantations) and only inconsiderably qualitative improvement of forests, are established in this scenario, taking into account a difficult financial situation of the state. Fire control measures and measures of fight with forest vermin and diseases are planned with inconsiderable qualitative and quantitative improvements are planned.

In baseline scenario natural process of a slow reforestation without creating artificial plantations is envisaged on lands in the abandonment zone of the Chernobyl NPP.

The data of the National Academy of Sciences of Ukraine, given in the "Program of the Development of Forestry and Forest Industry in Ukraine for the Period till 2015", taking into account not only the extensive increase of forest plantations areas, but a considerable qualitative improvement of a forest fund, were put into the basis of a mitigation scenario. In this scenario the indices, put in the project of "Program of Liquidation of ChNPP Accident Consequences for 1996-2000" and scientific elaboration of the Ukrainian Research Institute of Forestry and Agrosilviculture (UkrRIFA) and the Ukrainian Scientific-Research Institute of Mountain Forestry (UkrSRIMF), were used.

Compared to the baseline scenario the mitigation scenario takes into account the following factors:

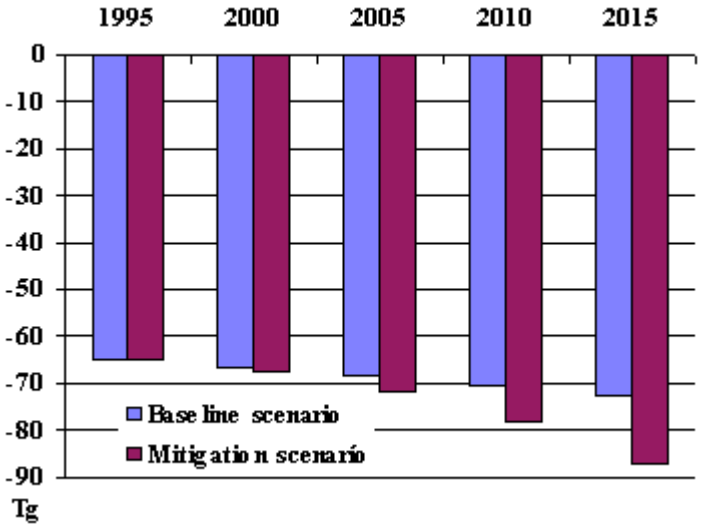
- Scientific optimisation of volumes and structure of forest harvesting
- Afforestation of eroded lands in ravines, washes, sands
- The increase of plantations of shelterbelts forests
- The creation of plantations of forest species (including fast growing) to receive forest products of long-term use
- Afforestation of lands, contaminated as a result of accident at the Chernobyl NPP and not used in agriculture
- The increase of forest plantations biomass productivity due to the use of a genetically improved species in forest plantations
- The optimal increase of regions under forests in Ukraine
- Improvement of forests protection from fires (gradual 70% decrease of average annual level of fires from the level of 1986-1994), the increase of forests protection effectiveness from vermin and diseases (resulted in the growth of biomass increment)

The initial data and balance of carbon dioxide emissions/uptakes in scenarios are given in Table 6-5. Factors presented in Table 6.5 are aggregated ones. For the forest plantations, managed forest and urban forests these factors are calculated by multiplying annual growth rate in dry matter, carbon fraction in dry matter and CO_2/C ratio with account of shares of different species groups [2, 3]. Methodology of other factors estimation is developed by national experts and explained in details in Ukrainian Country Study on Climate Change [2,3].

Table 6-5 Carbon Dioxide Emissions/Uptakes in Forestry in Ukraine

		Baseline scenario				Mitigation scenario			
	1995	2000	2005	2010	2015	2000	2005	2010	2015
Forest plantations, thousand hectares	42.5	45.3	46.3	50.0	53.0	80.0	101.0	117.0	129.0
Factor, t C/hectare	2.31	2.31	2.31	2.31	2.31	2.33	2.37	2.43	2.53
CO_2 Uptake, Gg	359	385	392	425	447	682	879	1041	1195
Managed forest, million hectares	8.78	8.868	8.98	9.106	9.261	9.0	9.32	9.77	10.31
Factor, t C/hectare	2.37	2.40	2.44	2.47	2.51	2.44	2.53	2.65	2.80
CO_2 Uptake, Gg	76298	78038	80341	82470	85232	80520	86460	94930	105849
Urban forests, thousand hectares	95	96	97	98	99	97.5	100	104	108
Factor, t C/hectare	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
CO_2 Uptake, Gg	941	950	960	970	979	964	990	1030	1071
Forest harvests, million m^3	13.1	13.1	13.5	13.5	14.2	15.1	17.0	19.0	21.0
Factor, t C/m^3	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
CO_2 Emissions, Gg	12969	12969	13365	13365	14058	14949	16830	18810	20790
Abandonment of lands, thousand hectares	54.0	51.5	49.0	46.5	44.0	50.0	30.0	5.0	0
Factor, t C/hectare	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO_2 Uptake, Gg	396	378	359	341	323	367	220	37	0
Forest fires, thousand hectares	4.2	4.2	4.2	4.2	4.2	2.1	1.8	1.5	1.2
Factor, t C/hectare	9.16	9.16	9.16	9.16	9.16	9.16	9.16	9.16	9.16
CO_2 Emissions, Gg	139	139	139	139	139	70	59	51	40
Forest rate	14.5	14.7	14.9	15.1	15.3	14.9	15.4	16.2	17.1
Net CO_2 Uptake, Gg	64886	66643	68548	70702	72784	67514	71660	78177	87285

Comparison of emissions/uptakes balances in baseline and mitigation scenarios (Figure 6-3) evidences that the increase of CO_2 uptakes makes about 11 800 Gg in 2015, additional expenses in the mitigation scenario of about $1220 million taking place.



4.1.4.6.3. Carbon dioxide emissions assessment

Projections of anthropogenic emissions/uptakes of CO_2 from fuel combustion, industrial processes and in forestry were considered in previous subchapters.

Summary of CO_2 emissions is presented in the Table 6-6.

Table 6-6 Summary of projections of anthropogenic emissions of CO_2, Gg

	1990	1995	2000	2005	2010	2015
Fuel combustion: energy and transformation industries	191296	135447	151037	173122	178539	189474
Fuel combustion: industry	220202	117182	149722	159284	168893	179562
Fuel combustion: construction	3890	4615	3462	3646	3845	4431
Fuel combustion: residential	97506	78860	91649	91317	96818	100047
Fuel combustion: agriculture	35611	22721	32255	34044	36085	37908
Fuel combustion: transport	49831	17922	41060	45985	52749	61866
Fuel combustion: other	64296	25648	34343	34072	32861	31848
Industrial processes	48815	22905	26514	27678	28225	29214
Total	711447	425300	530042	569148	598015	634350

The high level of uncertainty of the future economic development and its functioning is essential note of all countries with the transition economy including Ukraine. Consequently the projected fuel combustion, industrial production and, hence, emissions vary considerably.

Therefore side by side with the baseline scenario pessimistic and optimistic scenarios have been developed. Variations of CO_2 emissions in these scenarios determine the uncertainty range (Table 6-7).

Table 6-7: The projected CO_2 emissions in the various scenarios of economic development, Gg

Scenario/Category	1990	1995	2000	2005	2010	2015
Baseline						
Fuel combustion	662632	402394	503528	541471	569791	605138
Industrial processes	48815	22905	26514	27678	28225	29214
Total	711447	425299	530042	569149	598016	634352

Pessimistic						
Fuel combustion	662632	402394	466207	494388	517417	541348
Industrial processes	48815	22905	25359	26092	26622	27778
Total	711447	425299	491566	520480	544039	569126
Optimistic						
Fuel combustion	662632	402394	541725	599926	649712	692425
Industrial processes	48815	22905	27360	30708	31602	32107
Total	711447	425299	569085	630634	681314	724532

As a Table 6-7 shows the future direct CO_2 emissions are expected to exceed the 1990 level only in optimistic scenario in 2015 and this excess will total approximately 1%.

4.1.4.6.4. Agriculture

Livestock, rice cultivation and the use of nitric fertilizers were considered as the emissions sources in the Ukrainian agriculture. GHG emissions factors were taken in correspondence with IPCC recommendations. Emissions assessment was carried out for three scenarios of the economic development of Ukraine - optimistic, pessimistic and baseline. Officially ratified documents, where the problems of the economic and agricultural development of the country are considered, were used to form these scenarios.

In accordance with the baseline forecast, livestock and poultry trends in the country, and rice cultivation areas are given in Table 6-8. GHG emissions in agriculture in the baseline scenario are presented in Table 6-9.

Table 6-8: Livestock and poultry trends, and rice cultivation areas in Ukraine

	1990	1995	2000	2005	2010	2015
Dairy cattle, thousand of heads	8 528	7 818	6 800	6 600	6 400	6 200
Beef cattle, thousand of heads	16 667	11 152	13 200	16 400	17 599	18 800
Sheep and goats, thousand of heads	9 003	3 200	4 000	5 010	5 996	7 000
Horses, thousand of heads	754	740	800	897	999	1 300
Swine, thousand of heads	19 950	13 250	15 500	19 000	19 667	20 000
Poultry, million of heads	255	146	190	205	215	230
Rice cultivation areas, hectares	0.0281	0.02	0.023	0.025	0.030	0.040

Table 6-9: Projected methane and nitrous oxide emissions in agriculture

Emission sources	1990	1995	2000	2005	2010	2015
CH_4 emissions, Gg						
Livestock	2240	1698	1763	2001	2077	2154
Rice	15.17	10.79	12.41	13.51	16.19	21.59
Total	2255.17	1708.79	1775.41	2014.51	2093.19	2175.59
N_2O emissions, Gg						
Nitric fertilizers	10.2	5.12	7.6	8.5	9.4	10.15
Direct GHG emission , Gg CE	13777	10227	10814	12259	12782	13321

As it is seen from Table 6.9, future GHG emissions in agriculture in the baseline scenario are expected to be lower, than the emission levels of 1990.

Uncertainty analysis in this category was carried out on the basis of forecasting cattle, poultry, areas under rice and nitric fertilizers use in pessimistic and optimistic scenarios of the economic development.

Variations of methane and nitrous oxide emissions in these scenarios determine the uncertainty range (Table 6.10).

As it is seen from Table 6-10, the emission levels in 2015 are expected to exceed the level of 1990 only in the optimistic scenario of the economic development. However, this excess is comparatively small and totals approximately 1.33% for CH_4 and 8.3% for N_2O.

Table 6-10: Projected methane and nitrous oxide emissions in agriculture in various scenarios

Scenario	1990	1995	2000	2005	2010	2015
CH_4 emissions, Gg						
Pessimistic	2255	1709	1771	1848	1924	2008
Baseline	2255	1709	1775	2014	2093	2175
Optimistic	2255	1709	1801	1981	2135	2285
N_2O emissions, Gg						
Pessimistic	10.2	5.12	6.2	7.1	7.9	8.5
Baseline	10.2	5.12	7.6	8.5	9.4	10.15
Optimistic	10.2	5.12	8.0	9.1	10.1	11.05

The assessment of mitigation options in agriculture are carried on by national and US experts. It is one of series of country studies funded by the United States Environmental Protection Agency (EPA), and was prepared by Winrock International Institute for Agricultural Development for the Global Change Division of EPA. The main attention is paid to the livestock production, especially to cattle industry in Ukraine, a major livestock-producing country. The first steps of this work were reflected in Report [4]. The objectives of the study were to compile information and prepare recommendations regarding the livestock of Ukraine and the potential for reducing methane emissions to: (1) sensitise decision-makers in government, science and agriculture; (2) prepare for a pilot program to demonstrate strategies to reduce the methane emissions; (3) demonstrate the need to increase livestock productivity in Ukraine; and (4) stimulate development of the livestock sector in Ukraine.

The results of this study and interactions with Ukrainian institutions and individuals clearly identify concepts and ideas to reduce methane emissions in cattle while also increasing product output per feed resource input. Most of these have been previously discussed by scientists (World Bank, 1993), including Ukrainian and Russian experts. The economic structure driving producer decisions is changing, and are expected to allow and encourage economically sound and efficient resource use for milk and meat production.

The core of recommendations for mitigating methane emissions in Ukraine is as follows:

1. Improve production efficiency. Efficiency is achieved by increasing milk and meat production per cow, which requires better quality feeds and often more feed per cow. However, the amount of feed units needed to produce a given amount of milk can be reduced as fewer cows are necessary. Meeting the maintenance requirement of the total herd will require a smaller proportion of feed in relation to that needed for milk production. Increasing the production efficiency would result in fewer cows, requiring less total feed to produce the same amount of milk. Increasing the daily weight gain decreases the time needed to bring animals to slaughter weight. Reducing the number of cows and the feed requirement would make more land area available to produce food crops for consumption and export, reduce the labour required per kg of milk and meat produced, and reduce capital expenditures for buildings, equipment, and so forth, while increasing profit.
2. Improve forage quality. Grasses and legumes should be harvested at early bloom stage, thus increasing digestible energy by 10% to 15% and digestible protein by 30% to 50%.
3. Improve crop production. High yielding and drought resistant varieties of maize, soybean, rapeseed, lucerne, and other crops for livestock feed should be developed to produce under Ukrainian conditions. Modern harvesting machines and repair parts are necessary for timely harvest of forages and grains. Storage losses of hay and grain can be reduced by providing adequate on-farm storage facilities.
4. Improve pastures. Improved pastures and pasture rotation practices are not used extensively in Ukraine. Many pastures are overgrazed. Pastures seeded to a mixture of grass and legumes and

properly managed and fertilized could provide high quality feed for dairy cows and heifers during about 5 month of the year.

5. Provide adequate protein, minerals, and vitamins. Improving the quality of forages could be one of the most cost-effective ways to increase protein. An adequate supply of minerals and vitamins is also needed to balance the diets. If domestic sources are not available, these nutrients should be imported.
6. Reduce milk fed to calves. If the price of milk increases and it becomes more economic to feed grain, dry calf starter should replace milk at an earlier age.
7. Provide veterinary supplies. Since few pharmaceuticals are produced in Ukraine, arrangements should be made to import vaccines, antibiotics, and other drugs needed to treat and prevent diseases and parasites of livestock.
8. Install modern milking equipment.
9. Increase the genetic potential. Better methods of production record keeping and sire selection are necessary so that genetically superior animals are used by the artificial insemination centres.
10. Assist private farmers. There is general agreement that independent, privately owned and operated farms are more efficient than state and collective farms.
11. Use of bovine somatotropin. Approximately 12% increased milk production and a 9% decrease in methane output can be immediately achieved by the use of bovine somatotropin.
12. Increase research and education.

4.1.4.6.5. Methane Emissions Assessment

Methane emissions and the analysis of mitigation measures were estimated for the production, transportation, refining and storage of fossil fuel, for solid wastes and wastewater. Emissions from fuel combustion and in agriculture were considered in corresponding categories.

In order to assess fugitive emissions from fuels, production, storage, refining, transportation of fossil fuels and emission factors for three scenarios of the economic development were forecasted.

Fuel production, storage, refining and transportation for the baseline scenario were projected on the basis of National Energy Program of Ukraine and the programs of the development of separate FEC sectors.

While projecting methane emission factors the following matters, caused their considerable future decrease, were taken into account in this category of emission sources.

A considerable share of CH_4 emission is connected with the extremely unsatisfactory exploitation of gas sector, especially in end-use consumers. The reduction of gas losses does not require considerable investment and in the prospective emissions factors are expected to decrease essentially.

Side by side with this, the introduction of up-to-date technologies of oil and gas production should provide the decrease of emission factors to the level of the developed countries.

One of the main tasks, which is put by the Government, is to increase the share of utilized methane on existing mines and to implement preliminary degasation of mine fields, destined for a new construction and reconstruction. This will allow to decrease methane emission factors per ton of produced coal. Hence the emissions in new mines will be considerably lower, than in the old ones.

Methane emission factors in this category are given in Table 6-11, and projections of fuel production, transportation, refining and storage for the baseline scenario - in Table 6-12.

Table 6-11: Methane emission factors trends

Category	1990	1995	2000	2005	2010	2015
Gas production, Gg/billion m^3	25.7	25	20	15	12.5	10
Gas transportation and storage, Gg/billion m^3	18.12	18.12	18	15	12	8
Coal mining and Post-mining activity (new mines), Gg/million t	-	-	12.5	10	9	8.5
Coal mining and Post-mining (old mines), Gg/million t	17	16.9	16	15.5	14.5	13.5

Oil production, Gg/million t	0.1868	0.1868	0.186	0.175	0.17	0.15
Oil refining, Gg/million t	0.04146	0.04146	0.04146	0.04146	0.04146	0.04146
Oil storage, Gg/million t	0.00746	0.00746	0.00746	0.00746	0.00746	0.00746

Table 6-12: Fuel production, transportation, refining, storage and methane emissions trends

	1990	1995	2000	2005	2010	2015
Gas production, billion m^3	28.1	18.2	22	33.55	35.3	35
Gas transportation and storage, billion m^3	149	120	135	125	120	115
Coal mining and Post-mining activity (new mines), million t	0	0	10.155	30.86	44.06	62.66
Coal mining and Post-mining activity (old mines), million t	164.8	83.6	142.045	126.64	125.94	114.84
Oil production, million t	5.3	4.03	4.04	5.7	6.6	6.6
Oil refining, million t	58.1	15.7	47	47	47	49
Oil storage, million t	58.1	15.7	47	47	47	49
Methane emissions, Gg	6227	4044	5273	4653	4107	3356

Methane emissions in this category are projected to considerably decrease and in 2015 total 54% compared to 1990.

In the category "Wastes" municipal solid waste (MSW), municipal and industrial wastewater were taken into account.

To assess methane emissions from MSW the volumes of their generation, processing at waste incineration plants and storage on landfills (see Table 6-13) were forecasted, and to assess emissions from wastewater a number of population and wastewater in industrial sectors were projected.

Table 6-13 Municipal Solid Waste generation, storage and incineration trends, million t

	1990	1995	2000	2005	2010	2015
Annual MSW generation	11	11.8	12.87	14.04	15.31	16.69
MSW landfilled	10.12	11	10.17	9.84	9.61	8.99
MSW incinerated	0.88	0.8	2.7	4.2	5.7	7.7

The implementation of new solid waste treating facilities is the main mitigation measure, allowing to reduce the storage of MSW on landfills and methane emissions, approximately by 530-550 Gg.

The enlarged introduction of technologies (capacity is above 100 thousand of m^3 of wastewater per day) of sediment anaerobic fermentation in methane tanks is planned, that will allow to increase methane recuperation during wastewater refining from 6.24 Gg in 1990 up to 17.5-18.9 Gg in 2015. Methane emissions trends from municipal and industrial wastewater are presented in Table 6-14.

Table 6-14 Methane emissions trends from municipal and industrial wastewater, Gg

	1990	1995	2000	2005	2010	2015
Municipal wastewater	34.46	34.34	31.71	30.85	29.89	28.16
Industrial wastewater	14.07	11.67	14.94	17.44	20.22	22.32
Total	48.53	46.01	46.65	48.29	50.11	50.48

Total methane emissions (Table 6-15) are expected to considerably decrease and on the level of 2015 are 34% lower than the level of 1990.

Table 6-15: Summary of projections of anthropogenic emissions of CH_4,Gg

	1990	1995	2000	2005	2010	2015
Fuel combustion	292	215	233	208	209	200
Fugitive emissions from fuels	6227	4044	5273	4653	4107	3356
Industrial processes: Iron and Steel	333	98	104	104	104	105
Industrial processes: Food	68	71	57	58	57	58
Industrial processes: Construction	5	3	4	5	5	6
Livestock	2240	1700	1764	2001	2077	2154
Rice cultivation	15	11	12	13	16	22
Waste	934	1009	937	909	891	837
Total	10115	7150	8383	7951	7467	6738

Variations of nitrous oxide emissions in optimistic and pessimistic scenarios determine the uncertainty range (Table 6-16). In each scenario of the economic development nitrous oxide emissions are projected to be higher compared to 1990 due to increasing nitric and adipic acids production.

Table 6-16: Nitrous oxide emissions in various scenarios, Gg

Source	1990	1995	2000	2005	2010	2015
Baseline						
Fuel combustion	4.9	3.5	4.0	4.4	4.5	4.8
Industrial processes	23.0	7.1	22.5	25.8	26.0	26.1
Agriculture	10.2	5.1	7.6	8.5	9.4	10.2
Waste	0.13	0.12	0.41	0.63	0.86	1.2
Total	38.23	15.82	34.51	39.33	40.76	42.3
Pessimistic						
Fuel combustion	4.9	3.5	3.9	4.1	4.2	4.4
Industrial processes	23.0	7.1	22.3	24.0	24.2	24.4
Agriculture	10.2	5.1	6.2	7.1	7.9	8.5
Waste	0.13	0.12	0.33	0.48	0.78	1.01
Total	38.23	15.82	32.73	35.68	37.08	38.31
Optimistic						
Fuel combustion	4.9	3.5	4.4	4.9	5.1	5.4
Industrial processes	23.0	7.1	24.1	27.4	27.6	27.7
Agriculture	10.2	5.1	8.0	9.1	10.1	11.1
Waste	0.13	0.12	0.48	0.71	1.01	1.31
Total	38.23	15.82	36.98	42.11	43.81	45.51

4.1.4.6.6. Nitrous oxide emissions assessment

Projections of anthropogenic N_2O emissions from fuel combustion, industrial processes and agriculture were considered in previous subchapters. The IPCC Methodology [6, 18] and waste incineration forecast were used to assess N_2O emissions in the category "Waste".

Summary of projections of anthropogenic emissions of N_2O is presented in the Table 6-17. The increase of relative share of category "Waste" in the total emissions is caused by implementation of new waste incinerated facilities.

Table 6-17: Summary of projections of anthropogenic emissions of N_2O, Gg

	1990	1995	2000	2005	2010	2015
Transport	0.4	0.2	0.2	0.2	0.2	0.2

Other energy sources	4.5	3.3	4.0	4.2	4.3	4.6
Industrial processes	23	7	22.5	25.8	26.0	26.1
Agricultural soils	10.2	5.1	7.6	8.5	9.4	10.2
Waste	0.1	0.1	0.4	0.6	0.9	1.2
Total	38.2	15.7	34.7	39.3	40.8	42.3

Variations of nitrous oxide emissions in optimistic and pessimistic scenarios determine the uncertainty range (Table 6-18). In each scenario of the economic development nitrous oxide emissions are projected to be higher compared to 1990 largely due to increasing nitric and adipic acids production.

Table 6-18: Nitrous oxide emissions in various scenarios, Gg

Source	1990	1995	2000	2005	2010	2015
Baseline						
Fuel combustion	4.9	3.5	4.0	4.4	4.5	4.8
Industrial processes	23.0	7.1	22.5	25.8	26.0	26.1
Agriculture	10.2	5.1	7.6	8.5	9.4	10.2
Waste	0.13	0.12	0.41	0.63	0.86	1.20
Total	38.23	15.82	34.51	39.33	40.76	42.30
Pessimistic						
Fuel combustion	4.9	3.5	3.9	4.1	4.2	4.4
Industrial processes	23.0	7.1	22.3	24.0	24.2	24.4
Agriculture	10.2	5.1	6.2	7.1	7.9	8.5
Waste	0.13	0.12	0.33	0.48	0.78	1.01
Total	38.23	15.82	32.73	35.68	37.08	38.31
Optimistic						
Fuel combustion	4.9	3.5	4.4	4.9	5.1	5.4
Industrial processes	23.0	7.1	24.1	27.4	27.6	27.7
Agriculture	10.2	5.1	8.0	9.1	10.1	11.1
Waste	0.13	0.12	0.48	0.71	1.01	1.31
Total	38.23	15.82	36.98	42.11	43.81	45.51

4.1.4.6.7. Differences between Estimates in the Mitigation Measures Analysis and Inventory

Estimates for direct GHG emissions are slightly different from the National Inventory reported in Chapter 4 of this report. The difference between the assessments of indirect greenhouse gases is more essential.

The largest difference is due to updating of recent Guidelines from the Intergovernmental Panel on Climate Change. Other differences not reflected in Chapter 4 include updates in sources list (non-energy emissions in food sector, metallurgy, chemistry and construction), and improvements in fossil fuel emission coefficients.

Because of these differences, the 1990 Inventory values reported in Chapter 4 cannot be compared to projections of future Ukrainian emissions presented in this chapter to estimate changes in emission levels over time. However, each chapter is internally consistent.

4.1.4.6.8. Summary of GHG Emissions Projections

In the future direct GHG emissions are projected to be lower than the emissions of 1990 in any scenario of the economic development, despite the essential growth of GDP in a baseline and especially in optimistic scenarios of the economic development of Ukraine. This is supposed to be achieved by the whole set of measures for GHG emissions decrease and the increase of CO_2 uptakes in the Forestry.

In the baseline scenario it is projected to implement mitigation measures with overall potential of 100 000 Gg CE and therefore emissions at the level of 2015 will be 45889 Gg CE less than in 1990.

GHG emissions and removals trends are given in Table 6-19 for the baseline scenario.

Table 6-19: Total GHG emissions/removals in the baseline scenario

	1990	1995	2000	2005	2010	2015
Direct GHG emissions						
CO_2, Gg	711447	425299	530042	569149	598016	634352
CO_2, Gg CE	194031	115991	144557	155222	163095	173005
CH_4, Gg	10115	7150	8383	7951	7467	6738
N_2O, Gg	38.2	15.7	34.7	39.3	40.8	42.3
Total, Gg CE	255192	158268	195503	204082	209310	215172
Total, % compared to 1990	100	62.02	76.61	79.97	82.02	84.32
CO_2 uptakes in forestry						
CO_2 uptakes, Gg	-51976	-64886	-66643	-68548	-70702	-72784
CO_2 uptakes, Gg CE	-14175	-17696	-18175	-18695	-19282	-19850
Net						
CO_2, Gg	659471	360413	463399	500601	527314	561568
Total, Gg CE	241017	140572	177328	185387	190028	195322
CO_2, % compared to 1990	100	58.32	73.57	76.92	78.84	81.04

In optimistic scenario of the economic development, the net GHG emission levels in 2015 will total above 220 Tg CE, that is approximately 10.7% lower than in 1990.

In pessimistic scenario net GHG emissions on the level of 2015 will total above 180 Tg CE or about 73% from the level of 1990.

A very wide range of change of indices, characterizing the future economic development and expected emission levels is connected with a very high grade of uncertainty of future development of Ukrainian economy (Table 6-20).

Table 6-20: Ranges of fuel consumption and GHG emissions in 2015

	Pessimistic scenario	Optimistic scenario	Range	Average deviation, %
Fuel, PJ	7596.4	9787.2	2190.8	12.8
Direct GHG Emissions, Tg CE	195.2	245.4	50. 2	11.5
Sinks in Forestry, Tg CE	-19.9	-23.9	-4.0	9.1
Net GHG Emissions, Tg CE	175.3	221.5	46.2	11.6

4.1.4.6.9. References

1 Country study on Climate Change in Ukraine: Greenhouse Gas Mitigation Options Analysis. Final Report, Agency for Rational Energy Use and Ecology, Kyiv,1996.

2 Country study on Climate Change in Ukraine: Development of Greenhouse Gas Emissions Inventory. Final Report. Agency for Rational Energy Use and Ecology, Kyiv,1995.

3 Country study on Climate Change in Ukraine: Development of Greenhouse Gas Emissions Inventory. Final Report. (Supplement). Agency for Rational Energy Use and Ecology, Kyiv,1995.

4 Reducing Methane Emissions from Ruminant Livestock: Ukraine Pre-feasibility Study. Final Report. Winrock International Institute for Agricultural Development, Morrilton, Arkansas, 1995.

5 Country study on Climate Change in Ukraine. Final Report, Agency for Rational Energy Use and Ecology, Kyiv,1997.

4.1.4.7. Vulnerability and Adaptation Assessment in Ukraine

It is a matter of common knowledge that climate conditions have influenced human life and activity from mankind's early days. It is evident that understanding changes in the climate system and climate's interaction with human activities can result in more efficient economic and social decisions.

Given the country's unstable economy and it's critical ecological problems, the consequences of climate change in Ukraine could be serious. The results of scientific research during the last few years show that climate change in Ukraine could have significant impacts on agriculture, forestry, water and coastal resources.

4.1.4.7.1. Climate Change Scenarios

To assess vulnerability of Ukrainian natural resources and economic sectors, General Circulation Model (GCMs) outputs submitted by the National Centre for Atmospheric Research (NCAR) were used. The following models were considered: the Goddard Institute for Space Studies (GISS) model, the Geophysical Fluid Dynamics Laboratory (GFDL) model, the Canadian Climate Centre Model (CCCM), the United Kingdom Meteorological Office (UKMO) model [1]. These outputs are related to equilibrium conditions; that is, they describe climate conditions at an effective doubling of CO_2 in the atmosphere. Transient simulation represents climate conditions more realistically. These scenarios are run by assuming a steady increase in CO_2 concentrations (by 1% per year). In such conditions, it is possible to trace climate system inertia. This inertia is a natural lag of the system's reaction after a change in atmospheric greenhouse gases concentration. Considering the above, an attempt was made to use output from models developed by the GFDL and the Max-Plank Institute in Hamburg (MPI) for transient conditions.

Since none of the models considered reflects regional climate features, the following steps were used to create climate change scenarios for Ukraine:

- interpolation of models outputs obtained for grid boxes into grid points, that is meteorological stations sites;
- evaluation of differences between temperatures under $2xCO_2$ and $1xCO_2$ conditions for each grid point and their addition to actual temperatures;
- assessment of ratios of precipitation under $2xCO_2$ and $1xCO_2$ conditions for each grid point and their multiplication by actual precipitation [2].

4.1.4.7.2. Water Resources Sector

The Dnepr River is the main water thoroughfare of Ukraine. At present, water resources in the Dnepr basin as the main basin in Ukraine are managed through numerous ponds and water reservoirs located at the Dnepr's inflows and within the riverbed, as well as through a network of canals through which Dnepr water is fed to drought-prone regions of Ukraine.

Considering the interests of all water consumers and using water resources rationally is stipulated by the Regulations of Operation for Dnepr Cascade Water Reservoirs (RODCWR) (Ministry for Water Management of Ukraine, 1981, Kiev), as well as by the Interagency Commission on Establishing Water Reservoir Operating Regimes.

Because of Ukraine's dependence on level of its water reservoirs, operating schedules foresee 4 zones.

1st zone — zone of full provision. All consumers are provided with water without restrictions.

2nd zone — zone of economic consumption. All water consumers are provided with water in accordance with norms. Restrictions of auxiliary needs are introduced.

3rd zone — zone of strict water conservation, when water reservoirs are being drawn down below the navigation draw down level not more that 1 m. Restrictions on irrigation and on the auxiliary needs of industry are introduced. River transportation is put into navigation duty with if the drought does not exceed 2.6 m. Water quality is inspected daily.

4th zone — zone of all consumers' restriction. To provide for the needs of inhabitants, strict limits and schedules for water supply are established.

An analysis of existing policy on water resource management gives analysts all reason to assume that under all considered scenarios of future climate change, existing RODCWR may be used since these

regulations were developed for various states of Dnepr water level [3,6]. With that, the needs of various economic sectors are arranged to be met together, and the Interagency Commission may promptly correct the operating regime of water reservoirs in each particular case.

In cases of extreme drops in water level, the following adaptation measures could be considered:

- increasing reservoirs' usable storage; that is, the elevation of normal afflux horizons and the lowering of draw down levels;
- construction of Dnepr-Bug hydro-junction in the Dnepr delta.

However, the measures above are rather expensive and water use restrictions will be necessary when the water level is low.

A decrease in power production by the cascade of Dnepr HPPs will lead to the necessity of searching for alternative ways to cover peak loads in the power system.

Adaptation measures for river transportation given insufficient water for the necessary navigable depths in the Dnepr for the most «unfavourable» climate change scenario may be as follows:

- 1st version - transferring all passengers and load traffic to railway transport. This way, however, is not beneficial, since it is rather expensive and, besides, it strands tremendous capital investments made in navigation, channels and harbours and it distorts seriously the infrastructure formed to date.
- 2nd version - renewal of navigation by creating the necessary navigation depths (3.2-3.9 m). In this case, bottom-dredging is necessary. The overall cost to guarantee navigation will be $140-160 million.

In the «unfavourable» climate change scenario when the water content of Dnepr may be insufficient to meet demands for irrigation, it may be necessary to reduce the area of irrigated land and, consequently, change the structure of crops in favour of drought-resistant crops.

Under climate change scenarios leading to a decreased Dnepr water content, the quality of surface waters may deteriorate. Therefore, bearing in mind present the high level of Dnepr water contamination, it is recommended to use in the nearest future artesian water to meet demands for drinking water.

4.1.4.7.3. Coastal Resource Sector

Erosion of the coasts of the Black and Azov Seas causes serious social problems in coastal regions due to the destruction of housing, numerous resort bases, sanatoria, medicinal spas, industrial enterprises and arable land.

Table 7-1 presents data on land losses under different scenarios of sea level rise.

Table 7-1. Land losses under various sea level rise scenarios

Coastal	2050		2100	
zone	22 cm	46 cm	66 cm	115 cm
Prychernomorje (Black Sea side)				
Erosion	780	1110	1340	2360
Flooding	-	270	410	1600
Firths				
Erosion	365	585	660	1580
Flooding	-	900	1750	4800
Pryazovje (Azov Sea side)				
Erosion	1400	1800	2300	3500
Flooding	-	-	30	100
Crimea				
Erosion	1350	1730	2100	2800
Flooding	-	110	3800	12500
TOTAL				
Erosion	3895	5225	6400	9840
Flooding	-	2270	5990	19000

The most "favourable" scenario is that of a sea level rise of 22 cm by 2050. Under this scenario, the coastal zone will experience more erosion; nevertheless, the coast will almost retain its existing form. Firths, deltas, interspersions, and spits will not disappear.

To decrease losses from coastal erosion to a minimum, it is necessary to reinforce the coast, as stipulated by the General Plan of anti-slump and coastal reinforcement measures. Such work in the Odessa region is to be performed along a 32-km of shoreline (costing about $11 million), in the Nikolayev region - 11-km of shoreline ($33 million), and in Crimea - 141-km of shoreline ($550 million). Along the Azov coastal line, 170 km of eroded cliffs need to be protected and this will cost at least $250 million. Delivery of considerable volumes of sand to the coastal areas should be considered in addition to coastal fortification measures. Taking into account this measure, expenses for regions will amount: Odessa - $211 million, Nikolayev - $93 million, Kherson - $39 million, Crimea - $872 million. Total expenses will equal $1,208 million. With that, existing coastal protection construction (under conditions of their integrity) in the regions of Odessa, and Crimea will be sufficient to protect coasts under the 22-cm sea level rise scenario by 2050. If the sea level rise will be extrapolated up to 2100, the level elevation over the present one will be 41 cm, which will already need additional expenses for modernization of coast protection, and implementation of new measures in certain cases.

The most «unfavourable» scenario predicts a sea level rise of 115 cm by 2100. Taking into account the dynamics of sea level rise, the rate of sea level rise by 2050 may approach 10 mm per year. At any case, large-scale measures for protecting the coastal resources will be needed by 2050 and, especially and for sure, by 2100. Otherwise, the deltas of the Dnepr, Danube and Dniestr will degrade, 9,840 hectares of land will be destroyed and 19,000 hectares of low-lying sections of the coastline will be flooded; many health resort villages will be destroyed completely, spits and interspersions will be disintegrated, all firths of Prychernomorje and Azov Sea will become salinized; thousands of hectares of arable lands will be salinized, and slumps in Prychernomorje and in Crimea will be created.

All of this needs detailed study in order to elaborate the National Program for Coastal Protection. At present, it is obvious that the whole coastal zone needs protection - from active cliffs to meadows. The latter, likely, ought to be fenced from the sea by artificial dams. It is quite clear that coastal protection measures will require considerable investments.

Thus, to ensure an effective adaptation, the following steps will be necessary:

- To take as a basis the General Plan of anti-slump and coastal reinforcement measures with additions concerning fortification of free beaches by transferring large volumes of beach-forming materials to the coastal zone. This plan has no alternative under the scenario of a sea level rise of 22 cm by 2050.
- To develop a National Program on Coastal Protection Measures that would include two main parts: a) scientific substantiation of the trends and intensity of erosion processes within the coastal zones of the Black and Azov Seas; and b) a specific plan of measures up to 2050 to adapt to predictions under the 46-cm scenario by 2050 and 115-cm one by 2100.
- To create models of probable soil salinization in low-lying sections of the coastal zone under various scenarios for sea level rise.

4.1.4.7.4. Forest Resource Sector

Public opinion in Ukraine in recent years is slowly transforming into an understanding of the fact that the importance of forests as raw materials in Ukraine is lagging behind that of their environment-forming functions essentially. At the same time, the legislative base of Ukraine is changing towards substitution of priorities in forestry. So, the Forest Code of Ukraine, adopted in 1994 [4], states that «forests in Ukraine are major means to preserve environmental conditions favourable for human life. They have restrictions in exploitation and perform not so much raw materials supply, as environment-forming and environment-protective functions: water-protective, sanitary-hygienic, recreation, aesthetic, educational and others».

To integrally assess the impact of global climate changes on forestry, a simulation model of the functional response of forestry to changes in indicators of forest conditions in Ukraine was developed. This model allows experts to combine the use of statistical data on forest conditions with experts' assessments of significance and interaction of primary functions of forests [5].

A comparison of after effects of various climate change scenarios for forestry have shown that the most unfavourable changes will take place under the GFDL scenario, and the most favourable ones under the GISS scenario (Figure 7-1).

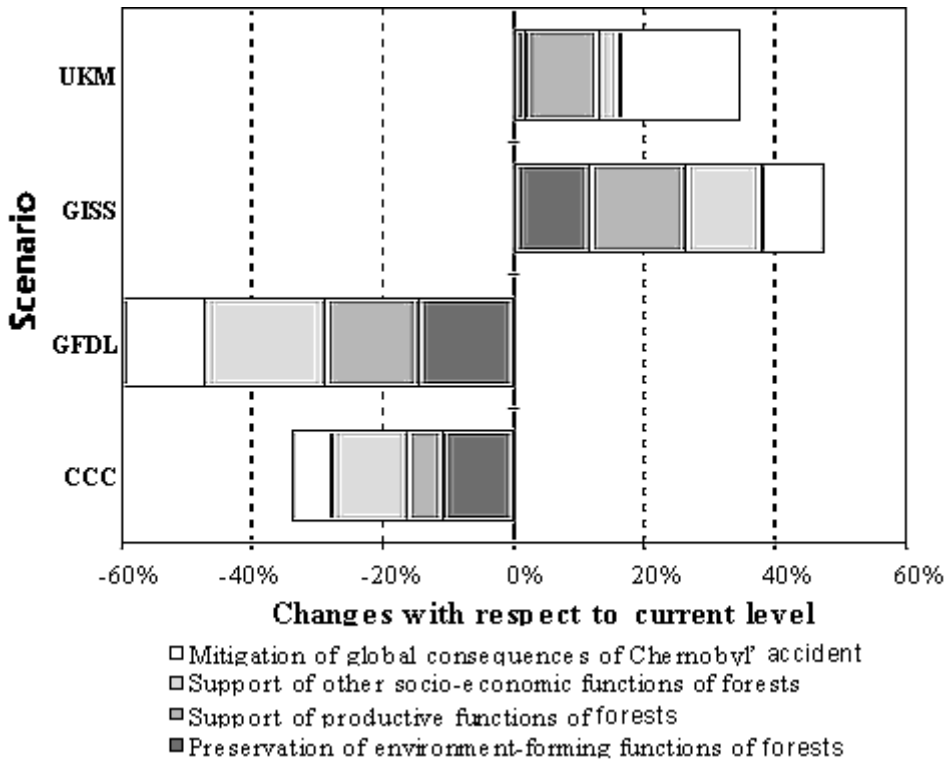


Figure 7-1. Comparative analysis of the functional response of the forestry sector to equilibrium conditions under various scenarios

The most vulnerable forest functions under the CCCM scenario are those relating to recreation, the preservation of ecosystem biodiversity and social protection of the population (primarily in the timber industry), which will be reduced by 62%, 60% and 56%, respectively, as compared with current conditions. The least vulnerable forest functions under the CCCM scenario are: the possibility of transferring agricultural lands to forest use within contaminated zones (this possibility may be improved by more than 40% as compared with current conditions); as well as supplying the timber industry and contributing to global carbon circulation (these will be shortened by 11% and 15%, respectively, as compared with current conditions).

The most vulnerable forest functions under the GFDL scenario are those preventing migration of radionucleides and providing social protection of the population, which will be shortened by 87% and 80%, respectively, as compared with current conditions. The least vulnerable forest functions under the GFDL scenario are those providing water and soil protection, as well as the contribution of forests to global carbon circulation, which will be shortened by 31%, 44% and 47%, respectively.

According to the GISS scenario, forest functions relating to recreation and the preservation of ecosystem biodiversity that could be decreased by 11% and 13%, respectively.

In general, the forecast for the UKMO scenario is similar to that for GISS with the exception of the fact that social protection of the population, involved in the timber industry, is expected to be reduced by 10% under the UKMO scenario.

The main directions of adapting forestry to climate change are as follows: reducing the significance of the most vulnerable forestry functions for the society (exogenous approach), and introducing measures to mitigate damages that may be inflicted on the forests directly (endogenous approach). To develop adaptation strategies, a combined approach is the most effective one.

During the adaptation period of forest ecosystems to climate change according to the most «favourable» scenario, the two following strategies will likely be the most effective.

Strategy 1. Reducing the significance forest functions for the protection of the atmosphere and providing favourable conditions for agriculture and other sectors of the economy in conjunction with endogenous measures to compensate for changes in stocks, area, increment, biomass, age structure and diversity of wood species composition in forests; making forests more accessible to the population for recreation; controlling forest fires, in contaminated areas; preserving historically formed forest types, fundamental types of forest-forming species, protective forest stands and shelter-belt forest stands.

Strategy 2. Reducing the significance of forest functions on wood production, atmospheric protection and providing favourable conditions for agriculture and other sectors of the economy in conjunction with endogenous measures to compensate for changes in area, age structure and diversity of wood species composition of forests.

From a general point of view, the first strategy may be characterized as endogenous with an exogenous compensation of detriment for which reduction by endogenous methods is of low efficiency. The second strategy may be characterized as exogenous with endogenous compensation of detriment of the most vulnerable indicators of forest conditions.

During forest ecosystems' period of adaptation to climate change envisaged by the most «unfavourable» scenario, the strategies given below will likely be the most effective ones.

Strategy 1. Reducing the significance of forest functions on the protection of soil and the atmosphere, wood production, providing favourable conditions for agriculture and other sectors of the economy, as well as preventing the erosive migration of radionucleides in conjunction with endogenous measures to compensate for changes in areas covered with forest and the maintenance of the age structure of forests.

Strategy 2. Reducing the significance of forest functions on the provision of favourable conditions for agriculture and other sectors of the economy, as well as preventing the erosive migration of radionucleides in conjunction with endogenous measures on compensation of changes in area, biomass and the age structure of forests.

The first strategy may be characterized as based on an endogenous approach with compensation of detriment by forest-growing methods, since adaptation to this detriment with endogenous methods is of low efficiency. The second strategy could be characterized as the most exogenous one with endogenous compensation of detriment of the most vulnerable indices of forest conditions.

For all adaptation strategies, the implementation of the following measures is necessary:

forest growth

- enhancement of measures on forest protection against pests and diseases;
- implementation of resistant wood species that provide the highest productivity under the anticipated future climate conditions;

scientific

- development of methods to monitor and forecast forest conditions;
- development of methods to provide information support to the decision-making process for forestry;
- development of a methodology for protecting the forests against pests and diseases;
- extension of research on the selection and introduction of new species;

policy

- development of legislation on criteria for forestry;
- increase in the responsibility of forest users for forest damages;
- financial privileges for those who use forests in accordance with socially stipulated criteria;

financial

- creation of insurance and reserve funds to compensate expenses for maintaining the healthy condition of forests.

4.1.4.7.5. Agricultural Sector

Winter wheat is the main crop in Ukraine. It represents 50% of total crop production [7]. The zone in which winter wheat cultivation is assured will, likely, move in the direction of northern latitudes, on the territories of western Polyssia and right-bank Forest-steppe under changing climate conditions. According to preliminary assessments, winter wheat's share in total grain production could decrease and eventually equal 20-25%. At the same time, the cultivation area will increase for other crops such as barley, oats, corn, legumes (to 20%) as well as for areas under green fodder, and for perennials sowings. This will stimulate the creation of an intensive dairy cattle production zone in western Polyssia and the right-bank Forest-steppe; and meat livestock production - Steppe regions of Ukraine.

It should be noted that about 5.1-5.3 mln tons of grain are to be set aside for feeding the population. Thus, hard grain production demand will grow.

The potential climate change, therefore, will impact agricultural production greatly. At the same, time the sector's readiness to implement adaptation measures to anticipate the expected the climate change is rather low. One important factor affecting agriculture is the reform of ownership relations in agriculture.

A shift in the cultivation of winter wheat, including scarifying, sowing terms, depth of sowing, seed material amount, predecessor rotation, chemical processing of the soil, and agricultural equipment does not provide for a sufficient crop production level and a reduction of its main costs. A positive effect is that production growth is possible only with increased application of chemical fertilizers.

According to the CCCM scenario, the steppe crop yield and quality could be raised by 10-20% compared to indicators obtained under changed meteorological conditions only. For that, the amount of chemical fertilizers (nitrogenous, phosphoric, potassium) applied should be increased. As a result, stalk's productivity and grain mass in an ear are expected to grow because more grains will form on an ear; furthermore, the grain quality will improve. It should be noted also that the main yield increases (by 7-15%) are achieved on account of increased nitric fertilizers.

Under the climate conditions projected by UKMO scenario, the winter wheat yield could be raised by applying increased dosages of chemical fertilizers, in the main, those nitric. If nitric fertilizers are applied, crop yield will grow by 300-600 kg/ha (1-6%).

Thus, crop adaptation options increase under optimal application of complex chemical fertilizers when domestic crops and state-of-the-art cultivation technologies are used. However, increased the application of complex chemical fertilizers will lead to an increase in production cost of $20-30 per 100 kg of winter wheat, according to preliminary assessments [8].

To maintain a stable level of crop production and to reduce production costs under climate change, new domestic crops with high adaptation abilities are to be genetically engineered.

The basic principles of state regulation in agriculture in Ukraine have just started being formed. Foremost it relates to the creation of legislation for land reform, the development of economically well-grounded measures on optimum structure of arable land, implementation of a national inventory and land monitoring program and privatisation in agriculture.

Since climate change could affect the structure of Ukrainian agriculture greatly, a National Program of Agriculture Development in Ukraine is to be developed. This program should include a set of political, economic and technical measures that will help mitigate climate change impacts on geographical, social and economic conditions of agricultural production. Realizing an adaptation policy in Ukraine may start with the acceleration of land reform in Ukraine.

One of the premises behind successful adaptation policies is to increase the genetic potential of domestic agricultural crops and animal breeds. This requires implementation of appropriate research programs.

Educational programs for experts in agriculture, particularly agronomists, specialists on plants protection, agronomists-chemists, and veterinary surgeons should be amended.

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4.1.4.8. Research and Public Education

Key to successfully mitigating and adapting to climate change is a better understanding of the global climate system and the deleterious impacts human activities have on it. Besides requiring further study of the magnitude, timing, and regional and local impacts of climate change, acquiring this understanding also involves substantial additional research on and dissemination of information to enable society to better prevent or - as some change is unavoidable - to accommodate climate change. In short, it calls for programs in both research and public education.

The Ukrainian Country Study in the framework of the US Country Studies Program Support for Climate Change Studies was the first large-scale program in this direction. This program is a nationally integrated effort that seeks to expand knowledge of the processes that affect climate change and to develop integrated models to predict these effects.

Ukraine also participates in the U.S. program to offer technical support to qualified countries for the development of national climate change action plans. The support for national plans will help countries prepare to meet their obligations under the UNFCCC and will also help them to conduct in-depth assessments of opportunities to promote technology transfer.

Ultimately, of course, the public is the true arbiter of national response strategies and policies. Thus, the public must have a solid understanding of global change science, particularly the consequences of policy options. To promote this understanding, Ukrainian Country Study Team direct efforts to general education, communication, and dissemination of climate change information.

The publication of four volumes on Country Study in Ukraine is envisaged. Thus far, the first volume, reflecting the results of the inventory on GHG emissions in Ukraine, has been finished.

4.1.4.9. The Future

Ukraine is currently examining the question of its future participation in the intergovernmental activities relating to the UN Framework Convention on Climate Change.

In December 1997 the Conference of the Parties to the UN FCCC was held in Kyoto. Kyoto Protocol grants countries a certain degree of flexibility in how they make and measure their emissions reductions. In particular, a "clean development mechanism" will enable industrialized countries to finance emission-reduction projects in developing countries and receive credit for doing so. An international "emission trading" regime will be established allowing industrialized countries to buy and sell excess emissions credits amongst themselves. The operational details for these schemes need to be developed.

The UN Framework Convention on Climate Change commits Parties to the Convention to develop national programs, plans and measures to respond to climate change. One of the key responses that countries can make is to prepare a national action plan and to adopt measures to mitigate climate change by reducing GHG emissions and enhancing sinks of greenhouse gases.

The further research is necessary because of uncertainties in meeting commitments to reduce future levels of greenhouse gas emissions and increase sequestration arise from several sources:

- The actual impact of measures may differ from their projected effects - some measures not currently scored at all may yield significant reductions, while some measures may yield lower-than-expected returns because they are not fully funded or are not fully effective for other reasons.
- Future legislative and administrative options that address environmental, energy, agricultural, and forest concerns could significantly increase or decrease net greenhouse gas emissions.
- Changes in the scientific understanding of the relative global warming potentials of different gases could change the estimates of the effectiveness of measures in terms of carbon-equivalent emissions.

- Improvements in the understanding and management of agricultural and forest soil carbon as they relate to the domestic carbon sink could change the net emissions baseline and the effectiveness of measures.

Financial resources for Ukraine to conduct the in-depth climate change research are limited. Therefore, it is necessary to get additional funds for conducting the technology assessments for mitigation and adaptation measures, and for promoting the diffusion of technologies.

The National Action Plan is not a one-policy development exercise, but it rather begins a process of continual improvement in energy, environmental, and economic policy. In developing future steps, Ukraine will continue to seek out opportunities for emission reduction that provide for economic growth and job creation.

4.1.5. Comparison of Activities of USAID, Canada, the World Bank and United Nations Development Programme/Global Environmental Facility[8]

The following charts briefly describe the climate change mitigation activities of four international donor organizations working in Ukraine:

USAID	US-Ukraine Climate Change Initiative, funded by the US Agency for International Development,
CIDA	Canada-Ukraine Environmental Cooperation Program on Climate Change, funded by the Canada International Development Agency (CIDA),
WB/Switzerland	The World Bank's National Joint Implementation Strategy Study for Ukraine, and
UNDP/GEF	United Nations Development Programme/Global Environmental Facility Project Removing Barriers to Greenhouse Gas Emissions Mitigation through Energy Efficiency in the District Heating System.

There are four charts – one for each of four categories of stakeholders: government, industry/enterprise, non-governmental organizations and specialized firms or institutions.

The ***potential areas for technical assistance*** listed for each were developed by the World Bank through its experience in several countries in the CEE and NIS regions and were not specifically formulated to address Ukraine's situation.

Government (National, Regional Or Local)

- Overall Coordination and Information Service
- Devise GHG policies, including integration of these policies with sectoral policies
- Develop Joint Implementation (JI)/Clean Development Mechanism (CDM) specific rules and criteria
- Initiate and support the development of JI-related expertise/capacity at all levels
- Definition of standards/protocols
- Project cycle management (assessment, selection, evaluation)
- Co-financing of projects
- Verification (including: baseline, additionality, monitoring)
- Enforcement
- UNFCCC reporting

Industry/Enterprise

- Plan and propose projects

[8] http://www.climate.org.ua/

- Financial engineering for projects
- Implement projects
- Monitor emissions & baselines
- Report on successful projects and problem areas
- Provide feedback on efficiency of procedures, etc.

Non-Governmental Organizations

- Help in promoting public awareness on climate change
- Watchdog role: policies, procedures, implementation, enforcement
- Help in project identification

Institutions / Firms Providing Special Expertise

- Verification/certification services
- Baseline calculations
- Modelling
- Help mobilize the industrial sector
- Provide technical know-how
- Provide economic know-how
- Provide financing know-how

4.1.5.1. Government (National, Regional Or Local)

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Overall Coordination and Information Service	
Donor	**Activities**
USAID	Assessment/seminar/report on strengthening Ukraine climate change project administration capacity (2.1.6) Database/ electronic newsletter on climate change activities in Ukraine (2.1.2)
CIDA	On-going information exchange on UNFCCC implementation (4.1.1) Database of Canadian climate change-related organizations and persons (4.1.1) Information bulletins (4.1.1)
WB/Switzerland	Information system to address climate change issues to potential stakeholders (T4)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Devise GHG policies, including integration of these policies with sectoral policies	
Donor	**Activities**
USAID	Ad-hoc assistance upon request from GOU and USAID (2.1.1)
CIDA	Analytical report on climate change policies, national action plans and strategies on climate change mitigation (4.1.2) Seminars/workshops/ conferences on national, regional and sector levels addressing political, economic, scientific and technical aspects of climate change (4.3.1)

WB/Switzerland	Project GHG emissions trajectory under varying macro-economic scenarios (T2) Conduct a sector decomposition of actual and projected GHG emissions under varying macroeconomic scenarios and under opportunities and constraints created by Kyoto Protocol (T2) Perform sector analysis of existing technologies in selected sectors and possible emission reduction projects with best available technology/practices (T2) Recommend priority sectors for GHG emission reductions (T2) Analyse prospective international demand for Ukraine's GHG reductions (T3) Describe and analyse the nature of the potential market for GHG emission reductions (T3) Examine the various options for GHG trading consistent with emerging agreements through UNFCCC process (T3) Identify regulatory, institutional and capacity-building requirements for JI (T4) Examine the identified GHG emission reduction choices for addressing climate change in the context of the national development goals and priorities (T4) Examine and review potential for trading GHG emission reductions through JI (T5) Describe GHG reduction scenarios (T5)
UNDP/GEF	Projection of GHG emissions in municipal district heating system under different (baseline and alternative) scenarios Identification of major existing barriers in the following areas: macro-economic conditions; inconsistency of regulatory and legal policies; non-payment crisis; pricing policy; institutional weaknesses; ownership inefficiency; lack of information and experience; high transaction costs for efficiency projects; financial state of district heating companies; consumers and local budgets; reliability of possible borrowers; technical deficiencies of heat supplier and consumer systems Development of a scheme for financing and implementation of supply and demand side energy efficiency improvements in municipal district heating system
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Develop Joint Implementation/Clean Development Mechanism specific rules and criteria	
Donor	**Activities**
CIDA	Assessment of barriers in different economic sectors and recommendations on JI projects realization policy in Ukraine (evaluation, monitoring, registration, verification, certification, reporting and control, selection criteria, protection of interests of parties) (4.3.1)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Initiate and support the development of Joint Implementation-related expertise/capacity at all levels	
Donor	**Activities**
USAID	Training courses for national ministries (2.4) Project-level GHG emission estimation Project preparation and financing Existing courses/workshops (IIE, UN-CC:TRAIN) Short-term consultant support (2.1.4) Ukrainian/Russian glossary on climate change terms and concepts (2.1) Database of GHG mitigation projects (2.3.4)
CIDA	Methods of interaction between local governments, businesses and public organizations in GHG emissions monitoring, evaluating and reporting: local GHG emission reduction action plan for Zaporizhia (4.2.4) Analysis and recommendations on developing efficient management of JI in Ukraine. Draft regulatory documents on a specialized body authorized to register, verify, certify and monitor JI projects (4.2.1) Database for sectors, enterprises, Canadian businesses interest in and potential for JI projects in Ukraine (4.3.2)
WB/Switzerland	Review existing projects and prepare a pipeline of possible JI pilot projects (T6)

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Definition of standards/protocols	
Donor	**Activities**
USAID	Translation of international methodologies and guidelines on GHG emissions estimation, measuring and monitoring protocols, data collection and verification techniques (2.2.1) Manuals on monitoring and evaluation protocols (2.2.1) Guidelines for methodologies and technical procedures for monitoring GHG emissions in Ukraine (2.2.2)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Project cycle management (assessment, selection and evaluation)	
Donor	**Activities**
USAID	RFP, review, evaluate and select projects for energy efficiency project preparation (2.3.1-3) Select CBM project for business plan development (2.3.1) Report “Guidelines for GHG project development” (2.3.5)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Co-financing of projects	
Donor	**Activities**
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Verification (including: baseline, additionality and monitoring)	
Donor	**Activities**
USAID	Short-term consultant support (2.1.4) Workshops/seminars for local governments on monitoring, evaluation and emission protocols in the energy sector (2.1.4)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Enforcement	
Donor	**Activities**
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: UN Framework Commission on Climate Change reporting	
Donor	Activities
USAID	Participation of Government of Ukraine and other Ukrainian climate change experts in, for example, Conferences of Parties (2.1.5)
CIDA	Assessment/proposals on National System of Inventories of GHG Emission and Removals by Sinks in Ukraine (4.2.2) Software for processing and converting national statistical data and compiling Annual Inventories of GHG Emission and Removals by Sinks in the Common Report Format (4.2.2)

4.1.5.2. Industry/Enterprise

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Plan and propose projects**	
Donor	**Activities**
USAID	Short-term consultant support (2.1.4) Training courses for focus industries (2.4) Project-level GHG emission estimation Project preparation and financing Two high level business dialogues and establishment of Industrial Council on Climate Change to support climate change programs, market mechanisms and encourage voluntary actions (2.5)

CIDA	Action plan for GHG emission reduction on the municipal level (Rivne) with subsequent dissemination in other Ukraine oblast centres (4.2.5) Project proposals to Canadian investors for potential JI projects in Rivne (4.2.5) Automated database for sectors and enterprises in Ukraine, Canadian businesses interest in and potential for JI projects in Ukraine (4.3.2)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Financial engineering for projects**	
Donor	**Activities**
USAID	Training course on project preparation and financing (2.4)
CIDA	Feasibility study for district heating renovation in Vinnitsia (4.3.3)
UNDP/GEF	Pre-feasibility study for supply and demand side district heating system energy efficiency improvement in the city of Rivne
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Implement projects**	
Donor	**Activities**
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Monitor emissions & baselines**	
Donor	**Activities**
USAID	Short-term consultant support (2.1.4) Workshops/seminars on project specific monitoring, evaluation and verification protocols in the energy sector (2.2.2)
CIDA	Methods of interaction between local governments, businesses and public organizations in GHG emissions monitoring, evaluating and reporting: local GHG emission reduction action plan for Zaporizhia (4.2.4)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Report on successful projects and problem areas**	
Donor	**Activities**
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Provide feedback on efficiency of procedures, etc.**	
Donor	**Activities**

4.1.5.3. Non-Governmental Organizations

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Help in promoting public awareness of climate change	
Donor	**Activities**
USAID	Two climate change public events (2.5.2) Routine electronic newsletter (2.5.2) Ukraine climate change web-site (2.5.3) NGO network on climate change (2.5.2) Access to Internet and library at CCI Centre (2.5.2)
CIDA	Public event with popular persons, thematic quizzes, etc. (4.1.5) Information brochures, bulletins, posters (4.1.5) Web-page for Internet (4.1.5) Recommendations re media programs on climate change (4.1.5) Educational materials/ lectures for middle school (4.1.5)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Watchdog role: policies, procedures, implementation, enforcement	
Donor	**Activities**

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: Help in project identification	
Donor	**Activities**

4.1.5.4. Institutions / Firms Providing Special Expertise

POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Verification/certification services**	
Donor	**Activities**
USAID	Short-term consultant support (2.1.4)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Baseline calculations**	
Donor	**Activities**
USAID	Informal training seminars on IPCC methodologies by CCI staff (2.1.3) Workshops with experts from national ministries, e.g. Ministry of Energy, on annual inventories, emission accounting system, baseline estimation methods, measuring and metering issues, data collection and reporting protocols (2.2.2) Training courses on project-level GHG emission estimation (2.4)
CIDA	Analysis/recommendations/program of information exchange between Ukraine and Canada on improving assessment methods of GHG emissions and sinks (4.2.3)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Modelling**	
Donor	**Activities**
CIDA	Training seminars on climate change economic modelling: trends analysis, macroeconomic/sector forecasting, optimisation, economic benefits from JI projects and economic efficiency of GHG mitigation (4.1.6)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Help mobilize the industrial sector**	
Donor	**Activities**
USAID	RFP for energy efficiency project preparation (2.3.1) Routine electronic newsletter (2.5.2) Ukraine's climate change web-site (2.5.3)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Provide technical know-how**	
Donor	**Activities**
CIDA	Developing technical design for operating unit for coal bed methane processing and coordinating it with acting legislation (4.3.4)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Provide economic know-how.**	
Donor	**Activities**
CIDA	Training seminars on climate change economic modeling: trends analysis, macroeconomic/sector forecasting, optimization, economic benefits from JI projects and economic efficiency of GHG mitigation (4.1.6)
POTENTIAL AREA FOR TECHNICAL ASSISTANCE: **Provide financing know-how**	
Donor	**Activities**
USAID	Training course on project preparation and financing (2.4)

The charts were developed by the Alliance to Save Energy in its role as secretariat of the USAID-funded Multilateral Climate Change Working Group. They do not represent the work of the implementers.

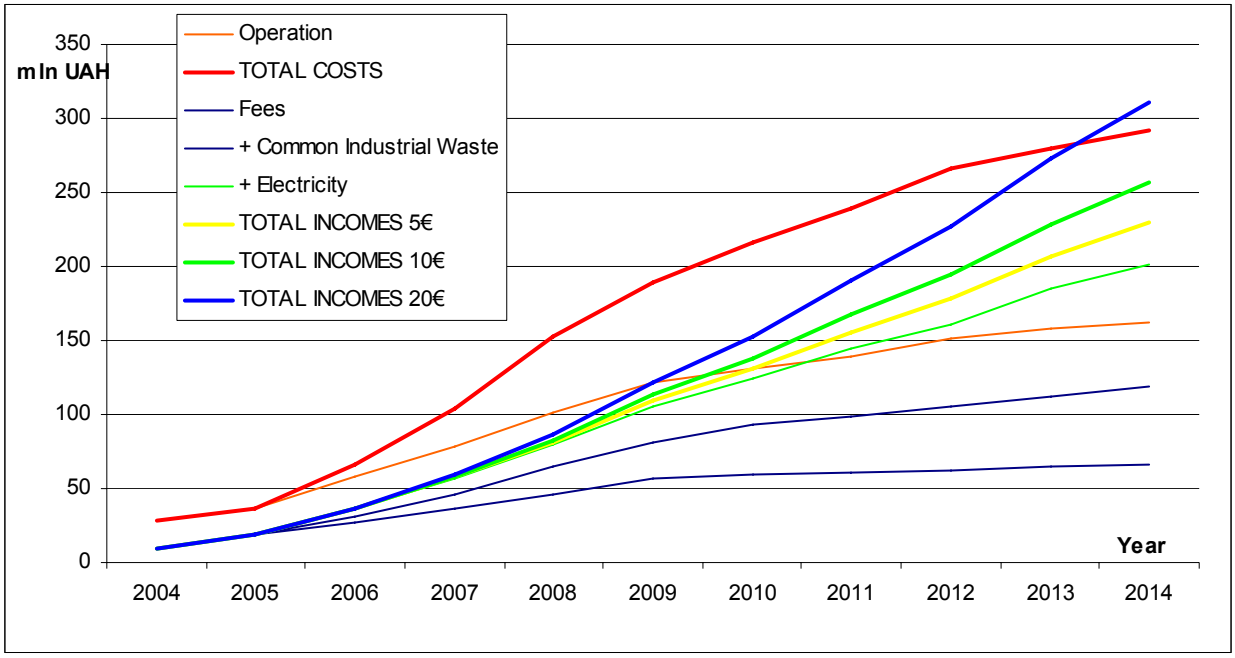
5. Feasibility

Carbon Funds can greatly help the Regional Landfill Programme, and even perhaps they may be a necessary condition of implementation.

The structure of the costs (operation costs + depreciation costs) and of the incomes (fees of the inhabitants, fees of the enterprises, sales of recyclable, sales of electricity, CER of Carbon funds) are recapped in the next table with 3 hypotheses of price of the tonne CO_2e: 5€, 10€ and 20€.

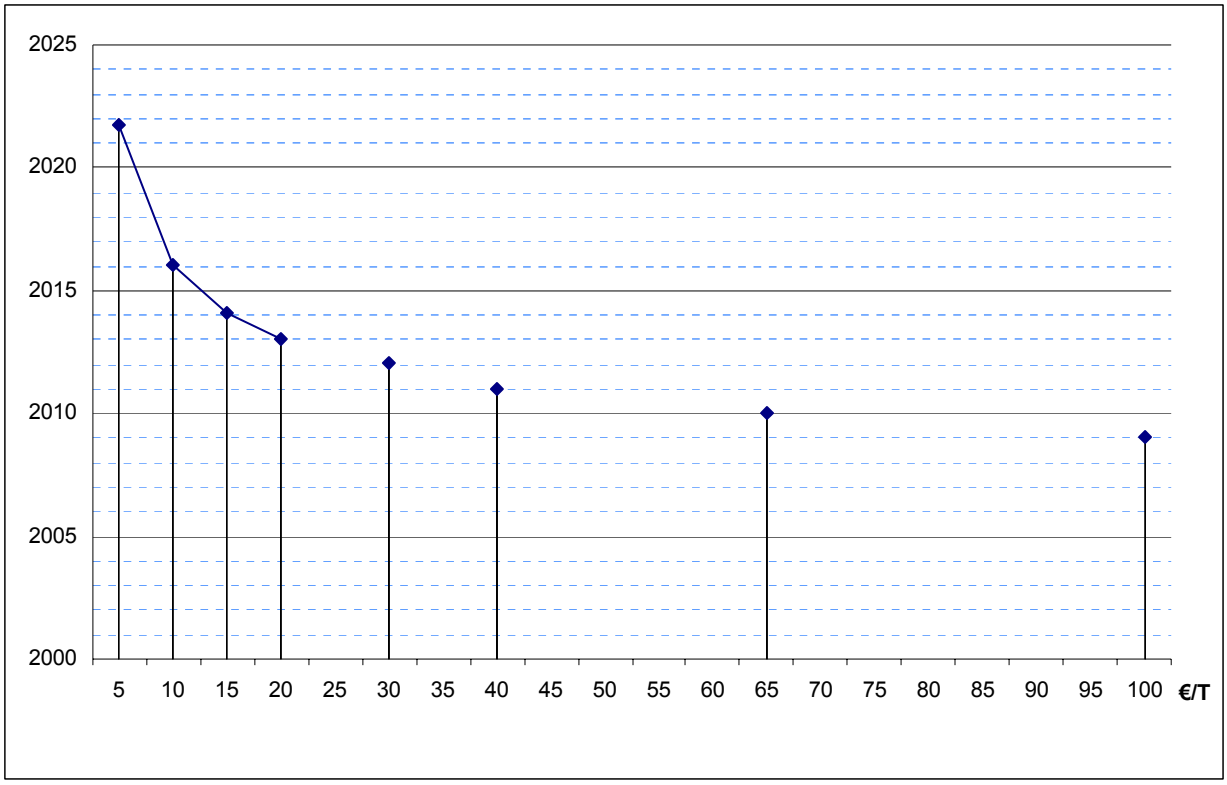
mln UAH	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fees	10,100	18,840	26,560	36,320	45,450	57,300	59,019	60,786	62,600	64,463	66,420
Common Industrial Waste	0,000	0,000	4,800	9,600	19,200	24,000	33,600	38,400	43,200	48,000	52,800
+ Common Industrial Waste	10,100	18,840	31,360	45,920	64,650	81,300	92,619	99,186	105,800	112,463	119,220
Secondary raw materials	0,000	0,000	5,635	11,270	11,270	16,905	16,905	22,540	22,540	28,175	28,175
+ Secondary raw materials	10,100	18,840	36,995	57,190	75,920	98,205	109,524	121,726	128,340	140,638	147,395
Electricity	0,000	0,000	0,000	0,000	3,311	7,824	14,333	22,746	32,905	43,834	54,456
+ Electricity	10,100	18,840	36,995	57,190	79,231	106,029	123,857	144,472	161,245	184,472	201,851
Carbon rights 5€	0,000	0,000	0,000	0,401	1,660	3,921	7,188	11,406	16,497	21,976	27,302
TOTAL INCOMES 5€	10,100	18,840	36,995	57,591	80,891	109,950	131,045	155,878	177,742	206,448	229,153
Carbon rights 10€	0,000	0,000	0,000	0,802	3,320	7,842	14,376	22,812	32,994	43,952	54,604
TOTAL INCOMES 10€	10,100	18,840	36,995	57,992	82,551	113,871	138,233	167,284	194,239	228,424	256,455
Carbon rights 20€	0,000	0,000	0,000	1,604	6,640	15,684	28,752	45,624	65,988	87,904	109,208
TOTAL INCOMES 20€	10,100	18,840	36,995	58,794	85,871	121,713	152,609	190,096	227,233	272,376	311,059
Operation	28,773	36,893	57,819	78,216	101,144	121,136	130,503	139,584	151,051	157,752	162,763
Amortization	0,000	0,000	9,024	25,264	50,898	68,112	86,256	99,375	115,050	121,472	129,713
TOTAL COSTS	28,773	36,893	66,843	103,480	152,041	189,248	216,759	238,958	266,101	279,224	292,476

The graph synthesizing these figures shows that the operation costs are covered in 2010 with 5 €/t and the complete costs are covered in 2013 with 20 €/t.



Another approach is to link the price of the tonne CO_2e with the year the complete costs are covered:

2009 100 €/t
2010 65 €/t
2011 40 €/t
2012 30 €/t
2013 20 €/t
2014 15 €/t
2016 10 €/t
2022 5 €/t



This simulation cannot take into account the funding of the investment by the Carbon Funds and the effect it provokes on the depreciation costs (better financing conditions, grants) neither the grants and subsidies. It's a pure market conditions approach. Some Carbon Funds guarantee 5 €/t all over 2008-2012. The European quotation was recently 26 €/t. In the literacy, it's said that it may be 40 €/t in 2008 and even 120 €/t. The launching of the Programme must take into account the low hypothesis and the funding of the investments should include grants of IFIs and subsidies of the State in aim to reduce the depreciation costs the first years.

6. Annexes

6.1. Memorandum of Intent Ukraine-USA

The Memorandum of Intent signed by Ukraine with the U.S. have addressed cooperation in climate change issues. Finally, the rules and procedures for compliance with the UNFCCC and participation in emissions trading and Joint Implementation are being negotiated at a series of international meetings. Effective participation in these meetings by Ukraine can affect the timing and size of investments under JI and emissions trading.

MEMORANDUM OF INTENT BETWEEN

THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND

THE GOVERNMENT OF UKRAINE ON COOPERATION ON CLIMATE CHANGE INITIATIVES

The Government of the United States of America and the Government of Ukraine - hereinafter referred to as the "Parties" - keeping in mind the need to preserve and improve the environment for this and future generations, and the importance of sustainable development, adhering to the UN Framework Convention on Climate Change of 1992, ratified by both Parties, recognizing that cooperation on climate change issues, including joint activities, could become instrumental in mitigating greenhouse gas emissions on a global scale, and have a positive impact on community, social and economic development, have reached the following understanding:

1. The Parties intend to facilitate long-term cooperation on climate change initiatives by pursuing joint activities that lead to reductions in net greenhouse gas emissions, in accordance with the UN Framework Convention on Climate Change (UNFCCC) and their respective national strategies and action plans, by promoting market-based approaches to climate change mitigation, and by improving the general understanding of climate change and appropriate response measures.

2. The Parties envisage the following activities under the Memorandum, supported, where appropriate, by technical and/or financial assistance provided on a tax-free basis under existing agreements:

2.1. Interaction between the national offices for joint implementation under the UNFCCC of each Party to exchange information on procedures, project criteria and methodologies and mechanisms for measuring and reporting greenhouse gas emissions reductions;

2.2. Encouragement of market-oriented diffusion of greenhouse gas mitigation technologies, including energy efficient, renewable energy, and zero-emissions technologies;

2.3. Support for the development of national systems of measurement and reporting of greenhouse gas emissions by sources and removals by sinks;

2.4. Promotion of joint activities, and other measures that encourage sustainable development and greenhouse gas mitigation among the private and public sectors and NGOs, by disseminating information on the Parties' national strategies through workshops, training programs, conferences and information networks;

2.5. Support at international fora for elaboration of market-based-mechanisms aimed at mitigating global emissions of greenhouse gases;

2.6. Cooperation to enhance understanding of and promote sequestration of atmospheric carbon through effective land use, land use change, and forestry activities;

2.7. Interaction and exchange of information in the areas of climate observation systems, climate behavior forecasting, evaluation of ecosystem and economic vulnerabilities, and development of adaptation and greenhouse gas emissions reduction strategies.

3. Activities and projects under this Memorandum should aim to:

3.1 .Reduce net greenhouse gas emissions and promote sustainable development;

3.2.Pro vide information concerning additional sources of project funding and the policy framework needed to facilitate the access to such funding sources;

3.3 .Facilitate the exchange of information concerning business agreements, joint ventures, and licensing agreements, among companies in the Parties' countries'

4. The Parties intend that, in the event that any activity involves access to and the sharing or transfer of technology that is subject to patents or other intellectual property rights, such access and sharing or transfer should be provided, in accordance with the national legislation of each Party, on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights.

5. Technical and financial assistance which the Government of the United States may provide in connection with projects contemplated by this Memorandum is assistance within the framework of the Agreement Between the Government of the United States of America and the Government of Ukraine Regarding Humanitarian and Technical Economic Cooperation which was signed on May 7, 1992.

6. The Parties intend to confer regularly on the progress of projects-and other activities that occur under this memorandum through the Sub-Group on Climate Change, in consultation with other committees and entities of the U.S.- Ukraine Binational Commission, and other bodies, where appropriate.

7. This Memorandum may be amended in written form by mutual agreement between the Parties.

8. Activities under this Memorandum are expected to occur for five years from the date of signing unless one of the two Parties indicates, by providing six months advance notice, that it no longer intends to continue its cooperation.

Concluded at Washington December 8, 1999, in two copies, in the English and Ukrainian languages.

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA

FOR THE GOVERNMENT OF UKRAINE

6.2. Memorandum of Understanding Canada - Ukraine

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE GOVERNMENT OF CANADA
AND
THE GOVERNMENT OF UKRAINE
ON COOPERATION ON CLIMATE CHANGE INITIATIVES,
INCLUDING JOINT ACTIVITIES

**The government of Canada and the government of Ukraine -
hereinafter referred to as the "Parties" -**

keeping in mind the need to preserve and improve the environment for this and future generations, and the importance of sustainable development;

adhering to the principles and statements of the UN Framework Convention on Climate Change of 1992, ratified by both parties, as well as of the Kyoto Protocol of 1997;

recognizing that cooperation on climate change issues, including joint activities, could become instrumental in mitigating greenhouse gas emissions on a global scale, and have a positive impact on community, social and economic development;

have reached the following understanding:

1. The Parties intend to facilitate cooperation on climate change, and pursue joint projects that reduce net greenhouse gas emissions, in accordance with Article 6 of the Kyoto Protocol, and the First Conference of the Parties (COP 1) Decision 5/CP.1 on activities implemented jointly, by encouraging market-oriented greenhouse gas mitigation technologies, including energy efficient and renewable energy technologies, as well as the exchange of information on national programs.

2. The Parties envisage the following activities under the Memorandum:

2.1 Interaction between the national offices for joint implementation of each Party;

2.2 Exchange of information on project criteria, performance indicators, and procedures for joint activities, based on the priorities of the national programs on climate change;

2.3 Exchange of information on methodologies and mechanisms for determining emission baselines, for monitoring and external verification of net greenhouse gas emissions reduction, and for tracking and allocating these reductions, consistent with the project selection criteria developed by the national programs for joint implementation;

2.4 Promotion of joint activities and other activities that encourage sustainable development and greenhouse gas mitigation, among the private and public sectors and NGOs, by disseminating information of the Parties' national criteria for joint activities, and providing technical assistance through workshops, training programs, conferences and information networks;

2.5 Support, at international fora, for joint projects aimed at mitigating greenhouse gas emissions;

2.6 Interaction and exchange of information in the areas of climate system observation, climate behavior forecasting, vulnerability and adaptation options, and greenhouse gas emissions reduction strategies.

3. Activities and projects to be implemented under this Memorandum should aim to:

3.1 Facilitate private sector investment in joint activities that reduce net greenhouse gas emissions, and promote sustainable development;

3.2 Provide information concerning additional sources of project funding and the policy framework needed to facilitate the access to such funding sources;

3.3 Facilitate the exchange of information concerning business agreements, joint ventures, and licensing agreements, among companies in the Parties' countries;

4. The Parties agree that, in the event that any activity involves access to and the sharing or transfer of technology that is subject to parents or other intellectual property rights, such access and sharing or transfer should be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights.

5. This Memorandum is effective for five years. It becomes effective on the date of signing and remains in effect for the next five years, unless one of the Parties notifies the other Party of its intention to terminate it, at least six months in advance.

6. The Parties will consult regularly on the progress of projects and other activities that occur under this memorandum.

Concluded in Kyiv, on January "28", 1999 in two copies, in English, French and Ukrainian languages, texts in all three languages being valid.

On behalf of the

Government of Canada

On behalf of the

Government of Ukraine

6.3. Memorandum of Understanding Denmark - Ukraine

Memorandum of Understanding between the Government of Denmark and the Government of Ukraine on co-operation in the implementation of the UN Framework Convention on Climate Change and its Kyoto Protocol, particularly in reducing emissions of greenhouse gases in accordance with Article 6 and Article 17 of the Kyoto Protocol

The Government of Denmark, in particular the Danish Ministry of Environment, Danish Environmental Protection Agency being the competent Danish authority for the purpose of this Memorandum, hereinafter referred to as the Danish Signatory
and The Government of Ukraine, in particular the Ministry of Environment and Natural Resources of Ukraine being the competent Ukrainian authority for the purpose of this Memorandum, hereinafter referred to as the Ukrainian Signatory,

Recalling that Denmark and Ukraine are parties to the United Nations Framework Convention on Climate Change and signatories to the Kyoto Protocol to that Convention,

Bearing in mind Article 6 of the Kyoto Protocol which will provide for the transfer from one party to another party of emission reduction units (ERUs) resulting from "Joint Implementation" projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases.

Recalling Article 17 of the Kyoto Protocol providing for the possibility of participation in Emissions Trading for the purpose of meeting quantified emission limitation and reduction commitments,

Underlining the importance of the domestic policies and measures to meet obligations under the Kyoto Protocol and the supplementary role of the activities under its Article 6 and 17,

Taking into account any further Guidelines on Article 6 and Article 17 to be developed by CoP/MoP, and also taking into account future decisions by CoP/MoP on compliance,

Recalling that the Government of Denmark has already ratified the Kyoto Protocol

Presupposing the ratification of the Kyoto Protocol by the Government of Ukraine and its entry into force,

Considering that the further co-operation in the field of Joint Implementation under Article 6 and co-operation in the field of Emissions Trading under Article 17 of the Kyoto Protocol will be efficient contributions to the reduction of greenhouse gas emissions,

Considering the joint priority of Denmark and Ukraine to preserve the environment and to promote sustainable development,

Desirous to express the political will to co-operate in the light of the objective of the UN Framework Convention on Climate Change and its Kyoto Protocol, in particular to facilitate Joint Implementation and explore the possibilities of Emissions Trading,

Have agreed as follows:

Paragraph 1

Objective

The main Objectives of the Memorandum are based on the Article 4 of UN Convention on Climate Change (hereinafter "Convention") and Articles 6 and 17 of the Kyoto Protocol (hereinafter "Protocol") and aiming at preparation and implementation of joint measures, in particular, by means of JI-projects The JI-projects shall be carried out in accordance with the international criteria established under the Convention and the Protocol

If the Danish and the Ukrainian Signatories agree, reductions before 2008 from Joint Implementation projects can be transformed into Assigned Amount Units for the period 2008-2012 and traded with Denmark on the basis of Article 17 of the Kyoto Protocol.

Decisions on transfers will be taken on a case by case basis.

Paragraph 2

Competent Authorities

The responsible authorities for implementing the provisions of this Memorandum are for the Ukrainian Signatory the Ukrainian Ministry of Environment and Natural Resources and for the Danish Signatory the Danish Ministry of Environment, Danish Environmental Protection Agency.

Signatories delegate the power of taking initiatives and the signing of all agreements on JI projects as well as the procurement of ERUs originating from such JI projects to the mentioned authorities. The mentioned authorities have the responsibilities to ensure the management of all issues mentioned in this Memorandum of Understanding. In case of some changes of the responsibilities Signatories will notice each another.

Paragraph 3

Contribution of the Danish Signatories

The Danish Signatory will contribute to the development and implementation of emission reduction projects by the procurement of ERUs originating from those projects or by acceptance and registration of ERUs procured by private companies from the Ukrainian Signatories being the ultimate owners of such

units. The Danish Signatory shall approve the JI-projects in accordance with Article 6.1 in the Kyoto Protocol by the issuing a letter of approval.

Paragraph 4

Contribution of the Ukrainian Signatories

The Ukrainian Signatories will facilitate the development and implementation of projects by supporting private or public companies interested in carrying out emission reduction projects with information, consultation and by formal approval of projects as Joint Implementation projects(in accordance with Article 6.1.a of the Protocol) which meet all national requirements for such projects. The Ukrainian signatories will ensure transfer of proceeds from the sale of ERUs to finance those specific emission reduction projects from which the ERUs originate.

The Ukrainian Signatory will transfer the agreed and prepaid amount of ERUs, within the agreed period for each project in the procurement contract , as long as JI-project generating the ERUs keep generating emission reduction , which can be verified by an independent entity.

The approval must contain binding affirmation of the Ukrainian Signatory that it will transfer the agreed and procured part of the resulting ERUs to Denmark in accordance with Article 6 of the Kyoto Protocol. The letter of approval will also confirm that the transfer will be free of any extra charges beyond the agreed payment for ERUs.

Paragraph 5

Amendments and earlier termination

In case of changes in national policies (energy, environment) of the host country or in Denmark that result in difficulties of generation and delivery of ERUs by the project executors and/ or investors, both Signatories will do their utmost to have the ERUs agreed upon in the letter of approval transferred in a practical manner.

Each Signatory shall be entitled to notify in written form the other Signatory about proposed amendments or cessation of the present Memorandum. However, the projects being executed within the framework of the present Memorandum shall be in force until ERUs provided by the approved projects are transferred.

Paragraph 6

Payment schemes

Payment schemes for Joint Implementation projects will be agreed on a case by case basis.

Paragraph 7

Independent determination of projects

Both Signatories shall agree on companies acting as independent entities until and after the JI Supervisory Committee accredits Independent Entities

Paragraph 8

Entry into Force

The present Memorandum shall come into effect immediately after being signed by the Signatories. The Memorandum is issued in 2 originals, as one original per each Signatory in Ukrainian and English languages, all of equal validity.

Site, Date

Site, Date

For the Government of Ukraine

For the Government of Denmark

Minister of Environment and Natural Resources of Ukraine

Minister of Environment of Denmark

6.4. Memorandum of Understanding Moldova - Denmark

Memorandum of Understanding between the Government of the Republic of Moldova and the Government of the Kingdom of Denmark on co-operation for the implementation of the Kyoto Protocol to the UN Framework Convention on Climate Change.

The Government of the Republic of Moldova, in particular the Ministry of Ecology, Construction and Territorial Development being the competent Moldavian authority for the purpose of this Memorandum, hereinafter referred to as the Moldavian Party,

and

The Government of Denmark, in particular the Ministry of Environment, Danish Environmental Protection Agency being the competent Danish authority for the purpose of this Memorandum, hereinafter referred to as the Danish Party

Taking into consideration that both Parties are parties to the United Nations Framework Convention on Climate Change, (UNFCCC), and have ratified the Kyoto Protocol to that Convention.

Aiming to implement the previsions of Article 12 of the Kyoto Protocol and its underlying Decisions by the Conference of the Parties to UNFCCC serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) on the guidelines for its implementation, providing for the transfer from a Party not included in Annex 1 of UNFCCC to a Party included in Annex 1 of Certified Emission Reductions (CER) accruing from Clean Development Mechanism (CDM) project activities to contribute to compliance with part of its quantified emission limitation and reduction commitments under Article 3 of the Kyoto Protocol,

Underlining the importance of the domestic policies and measures to meet commitments under the Kyoto Protocol and the supplementary role of the activities under its Article 12.

Accepting any further Guidelines on Article 12 of the Kyoto Protocol to be developed by CoP/MoP, and also taking into account any future decisions by CoP/MoP relevant for the prompt and effective implementation of CDM,

Anticipating the entry into force of the Kyoto Protocol,

Considering that co-operation in the field of the CDM under Article 12 of the Kyoto Protocol will result in an efficient contribution to sustainable development and in the reduction of greenhouse gases emissions,

Desirous to express the political will to start and implement a long-standing co-operation on and to facilitate a prompt, efficient and effective implementation of the CDM,

Have agreed as follows:

Article 1

Objective

This memorandum shall apply to procedures that – in accordance with article 12 of the Kyoto Protocol - facilitate the development and implementation of greenhouse gas emission reduction project activities in the Republic of Moldova and the transfer to Denmark of the agreed part of the CER resulting from those project activities.

Article 2

Competent Authorities

Ministry of Ecology, Construction and Territorial Development of the Republic of Moldova and Ministry of Environment of Kingdom of Denmark, Danish Environmental Protection Agency are the competent authorities for agreements on implementation of the projects. For each CDM project there will be prepared project agreement, which will include all relevant issues to secure the implementation of the specific projects.

Article 3

Contribution of the Moldavian Party

The Moldavian Party will facilitate the development and implementation of projects by supporting the potential beneficiaries interested in carrying out CDM projects with information and formal approval of

projects as CDM projects, in accordance with article 12 of the Kyoto Protocol, which meet all national requirements for such projects.

The Project Agreement must contain binding affirmation of the Moldavian Party that it will transfer the resulting CERs of the Project Agreement, to Danish Party, in accordance with article 12 of the Kyoto Protocol and the guidelines adopted by COP/MOP.

The Moldavian Party will secure transfer of the agreed and prepaid amount of CERs, within the agreed period for each project as described in the project agreement as long as the CDM-projects keep generating CERs, which can be verified by an independent entity.

The Project Agreement will also confirm that the transfer will be free of any specific CDM charge beyond the agreed payment of CERs.

Moldavian Party will decide alone and will present to Danish Party the list of the projects selected to be financed. Priorities will be settled in consultation with both Parties.

Article 4

Contribution of the Danish Party

The Danish Party will contribute to the development and implementation of CER projects by the procurement of CERs originating from those projects or by acceptance and registration of CER procured by private parties from the Moldavian Party being the ultimate owners of such CER units. The Danish signatory shall approve the CDM projects in accordance with article 12 of the Kyoto Protocol by signing a project agreement.

The Danish Party will inform the Moldavian Party about the relevant power of attorney given to private firms.

The contribution from the Danish Party to a specific project in Moldova can only be used for the specific project.

Article 5

Payment Schemes

Payment schemes for CDM projects will be agreed on a case by case basis and formally reflected in the project agreements.

Article 6

Independent validation, verification and certification of projects

Validation, verification and certification of projects shall be carried out by independent entities accredited by the executive board under the UNFCCC. Both parties will contribute to the work of these entities.

Article 7

Entering into force

The present Memorandum will entry into force at the date of the last notification regarding implementation of the Parties of necessary intern procedures for its entry into force.

The Memorandum is settled for a period of 5 years and it is automatically prolonged for a period of 5 years, if none of the Parties notifies in writing the other one, with at least 6 month before the end of its validity, about the intention to denounce it.

Article 8

Amendments and earlier termination

In case of significant changes in relevant national policies of the Republic of Moldova or the Kingdom of Denmark which result in difficulties of generation and delivery of CERs by the project executors and/or investors, both parties will do their utmost to have the CERs agreed upon in the project agreement transferred in a practical manner.

Parties shall be entitled to notify in written form the other Party about proposed amendments or termination of the present Memorandum. The projects being executed within the framework of the present Memorandum shall be in force until the CER provided by the project agreements are transferred. The Memorandum shall be in force for those projects

Signed at ……..…., at ……. 200…. .in two originals each of them in Moldavian and English languages. In case of disagreement regarding the interpretation of present Memorandum, the English text shall prevail.

For	For
Government of the Republic of Moldova	Government of the Kingdom of Denmark

6.5. Memorandum of Understanding Georgia - Denmark

Memorandum of Understanding Between the Government of Georgia and the Government of the Kingdom of Denmark on cooperation for the implementation of the Kyoto Protocol to the UN Framework Convention on Climate Change

The Government of Denmark, in particular the Ministry of Environment, Danish Environmental Protection Agency being the competent Danish authority for the purpose of this Memorandum, hereinafter referred as the Danish Party and The Government of Georgia, in particular the Ministry of Environment Protection and Natural Resources being the competent Georgian authority for the purpose of this Memorandum, hereinafter referred as the Georgian Party

Taking into consideration that both Parties are parties to the United Nations Framework Convention on Climate Change, (UNFCCC), and have ratified the Kyoto Protocol to that Convention.

Aiming to implement the provisions of Article 12 of the Kyoto Protocol and its underlying Decisions by the Conference of the Parties to UNFCCC serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) on the guidelines for its implementation, providing for the transfer from a Party not included, in Annex 1 of UNFCCC to a Party included in Annex 1 of Certified Emission Reductions (CER) accruing from Clean Development Mechanism (CDM) project activities to contribute to compliance with part of its quantified limitation and reduction commitments under Article 3 of the Kyoto Protocol,

Underlining the importance of the domestic policies and measures to meet commitments under the Kyoto Protocol and the supplementary role of the activities under its Article 12,

Accepting any further Guidelines on Article 12 of the Kyoto Protocol to be developed by CoP/MoP, and also taking into account any future decisions by COP/MOP relevant for the prompt and effective implementation of CDM,

Anticipating the entry into force of the Kyoto Protocol,

Considering that co-operation in the field of the CDM under Article 12 of the Kyoto Protocol will result in an efficient contribution to sustainable development and in the reduction of greenhouse gases emissions,

Desirous to express the political will to start and implement a long-standing co-operation on and to facilitate a prompt, efficient implementation of the CDM.

Have agreed as follows:

Article 1

Objective

This memorandum shall apply to procedures that – in accordance with article 12 of the Kyoto Protocol – facilitate the development and implementation of greenhouse gas emission reduction project activities in Georgia and the transfer to Denmark of the agreed part of the CER resulting from those project activities.

Article 2

Competent Authorities

The Ministry of Environment Protection and Natural Resources of Georgia and the Ministry of Environment of the Kingdom of Denmark, Danish Environmental Protection Agency are the competent authorities for agreements on implementation of the projects. For each CDM project there will be prepared a project agreement, which will include all relevant issues to secure the implementation of the specific projects.

Article 3

Contribution of the Georgian Party

1. The Georgian Party will facilitate the development and implementation of projects by supporting the potential beneficiaries interested in carrying out CDM projects with information and formal approval of projects as CDM projects, in accordance with article 12 of the Kyoto Protocol, which meet all national requirements for such project.

2. The project Agreement must contain binding affirmation of the Georgian Party that it will transfer the resulting CERs of the project agreement, to the Danish Party, in accordance with article 12 of the Kyoto Protocol and the guidelines adopted by COP/MOP.

3. The Georgian Party will secure transfer of the agreed and prepaid amount of CERs, within the agreed period for each project as described in the project agreement as long as the CDM-projects keep generating CERs, which can be verified by an independent entity.

4. The project Agreement will also confirm that the transfer of CERs will be free of any specific CDM charge beyond the agreed payment of CERs.

5. The taxation of CDM project activities except transfer of CERs, are to be carried out in accordance with the acting Georgian legislation.

6. The Georgian Party will decide alone and will present to the Danish Party the list of the projects selected to be financed. Priorities will be settled in consultation with both Parties.

Article 4

Contribution of the Danish Party

1. The Danish Party will contribute to the development and implementation of CDM projects by the procurement of CERs originating from those projects or by acceptance and registration of CER procured by private parties from the Georgian Party being the ultimate owners of such CERs. The Danish signatory shall approve the CDM projects in accordance with article 12 of the Kyoto Protocol by signing a project agreement.

2. The Danish Party will inform the Georgian Party about the relevant power of attorney given to private firms.

3. The contribution from the Danish Party to a specific project in Georgia can only be used for the specific project.

Article 5

Payment Schemes

Payment schemes for a CDM project will be agreed on a case by case basis and formally reflected in the project agreements.

Article 6

Independent validation, verification and certification of projects

Validation, verification and certification of projects shall be carried out by independent entities accredited by the executive board under the UNFCCC. Both parties will contribute to the work of these entities.

Article 7

Entering into force

1. The present Memorandum will enter into force at the date of the last notification regarding implementation of the parties of necessary internal procedures for its entry into force.

2. The Memorandum is settled for a period of 5 years and it is automatically prolonged for a period of 5 years, if none of the Parties notifies in writing the other one, with at least 6 months before the end of its validity, about the intention to denounce it.

Article 8

Amendment and earlier termination

1. In case of significant changes in relevant national policies of Georgia or the Kingdom of Denmark which result in difficulties of generation and delivery of CERs by the project executors and/or investors, both parties will do their utmost to have the CERs agreed upon in the project agreement transferred in a practical manner.

2. Parties shall be entitled to notify in written form the other Party about proposed amendments or termination of the present Memorandum. The projects being executed within the framework of the present Memorandum shall be in force until the CER provided by the project agreements are transferred. The Memorandum shall be in force for those projects.

Signed at ....., at .....200..... in two originals each of them in Georgian and English Languages. In case of disagreement regarding the interpretation of present Memorandum, the English text shall prevail.

On behalf of the Government of Georgia:	On behalf of the Government of the Kingdom of Denmark:
TAMAR LEBANIDZE Minister of Environment Protection and Natural Resources of Georgia	CONNIE HEDEGAARD Minister of Environment of the Kingdom of Denmark
_____ Date	_____ Date

7. Bibliography

Biblio 1 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (Text with EEA relevance). Official Journal L 275 , 25/10/2003 P. 0032 - 0046

Biblio 2 COMMISSION REGULATION (EC) N° 2216/2004 of 21 December 2004 for a standardised and secured system of registries pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision No 280/2004/EC of the European Parliament and of the Council

Biblio 3 ISO 14040:1997, Environmental management - Life cycle assessment - Principles and framework

Biblio 4 ISO 14064-3:2006, Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions

Biblio 5 ISO 14065:-[9]), Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition

Biblio 6 United Nations Framework Convention on Climate Change. The Kyoto Protocol to the Convention on Climate Change, 1998

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