



**PROGRAM OF NATIONAL CDM/JI STRATEGY STUDIES
NSS PROGRAM**

**THE NATIONAL STRATEGY OF UKRAINE FOR JOINT
IMPLEMENTATION AND EMISSIONS TRADING**

EXECUTIVE SUMMARY

Kiev
June 2003

**MINISTRY OF ENVIRONMENT
AND NATURAL RESOURCES
OF UKRAINE**

This project has been supported by the Swiss Government, the Government of Ukraine, and the World Bank.

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The Ukraine Government is gratefully acknowledged for the support given, in particular:

Inter-Ministerial Commission on Climate Change

Ministry of Economy and European Integration

Ministry of the Environment and Natural Resources of Ukraine

Ministry of Fuel and Energy

Ministry of Industrial Policy

EXECUTIVE SUMMARY

Main Results

Ukraine is one of the countries which has to gain most from the Kyoto Protocol. By selling emission credits, very significant financial resources may be flowing into Ukraine. Furthermore, by implementing Joint Implementation Projects, Ukraine could attract foreign investment into various economic sectors of the country. However, so far the country has not set up the institutional infrastructure necessary to either sell emission credits via the International Emissions Trading framework or attract Joint Implementation investment – not to speak of the capacity necessary to maximise Ukraine's benefits from the Kyoto Protocol. Action is thus most urgently required, if Ukraine is not to be side-tracked by other countries, losing this unique opportunity.

Ukraine needs to put into place the institutional structure necessary for Joint Implementation projects to be implemented in Ukraine and for participating in International Emissions Trading. Ideally, the government would secure financing and support for first JI projects so that demonstration projects would be available in Ukraine. This will pave the way for further JI investments in the country.

The Ukraine National Strategy Study (NSS) not only gives an overview of recent climate policy developments in Ukraine and OECD countries, but also includes analysis of Ukraine's GHG mitigation potential and costs, GHG emission reduction market opportunities, information on the capacity building needs to participate in the Kyoto Protocol, GHG market options for Ukraine, project suggestions, and a plan of action until 2008. In the following the main results of the NSS Ukraine are summarized; details are given in the main report.

Within the NSS, two scenarios forecasting economic growth and associated GHG emissions have been produced. The study clearly shows that Ukraine will have excess GHG permits under any plausible scenario at least until 2020. In terms of tons of carbon, this means that Ukraine's aggregated energy related CO₂ emissions during the commitment period of the Kyoto Protocol will be between 2'037 and 2'265 MtCO₂. Ukraine would be allowed to emit 3'360 MtCO₂ during that period (based on 1990 level of energy-related CO₂ emissions) and has a total assigned amount of 4'300 MtCO₂ equivalent. This means that the country will have excess emission rights of more than 1'000 MtCO₂. These excess emission rights can be sold on the international market.

The costs of CO₂ mitigation are also estimated. The marginal abatement cost curve (MAC) is based on various data sources, including project costs of real projects. The MAC shows that Ukraine has great potential for GHG emission abatement. Considering the period 2002-2012, 1'500 Mt CO₂ can be reduced at costs equal or smaller than \$8/tCO₂, 1000 Mt CO₂ are in fact no-cost options. A significant portion of this potential (approximately 1/3 of the total potential) is directly related to energy savings.

However, it has to be realized that emission reductions achieved before 2008 have no market value, because Ukraine can only sell allowances from its Kyoto assigned amount of the

period 2008-12. Thus Ukraine's potential to produce (marketable) emission credits via emission reduction projects is in the magnitude of 750 Mt CO₂.

The study has estimated the price Ukraine could potentially fetch from these credits, given the current GHG market situation and also subject to certain market strategies. The main issues when formulating Ukraine's opportunities and strategies within the context of JI and IET are the size of the GHG market, the price GHG credits may fetch on this market, and the rules on the market.

For GHG price estimates, the study uses CERT, a model provided by the World Bank. Based on this model, the study suggests a price of 4-5 \$/tCO₂ as a likely scenario, with the full range of the expected price being 1-5.5 \$/tCO₂. Furthermore the study summarizes GHG prices observed in current market transactions. These market prices are in the range of 1-12 \$/tCO₂. However, the model also shows that prices will drop significantly in case Russia and Ukraine sell a large part of their excess AAUs on the market. This has to be kept in mind when calculating potential revenues for Ukraine from selling excess AAUs.

The NSS has set out necessary institutional structures within Ukraine, which are to be seen as a prerequisite for participating in the GHG market. The study describes that for JI two possible tracks have been established in the Marrakech Accords: A fast track (Track 1) and a slow track (Track 2). In the case a country wants to participate in the fast track (which is associated with lower transactions costs) a number of prerequisites need to be fulfilled: it needs to have an accepted national emissions inventory and allowance registry in place and report correctly to the UNFCCC.

Besides, the study summarizes Ukrainian legislation relevant to climate change issues. It is concluded that the legislative basis for regulating procedures concerning IET and JI (such as JI approval rules and laws regulating AAU and ERU ownership) are not yet in place in Ukraine.

The NSS shows also what strategy Ukraine is to follow in order to maximize its benefits from this newly emerging market. According to the study's estimates, the country will have surplus emission rights of about 1.5 billion tonnes of CO₂-equivalent in the first commitment period 2008-12 (including non-CO₂ GHG and forestry sinks). In addition the country offers potential for further emission reductions of approximately 750 MtCO₂ in the period 2008-12 which can be exploited profitably at the projected market price of \$8 / t CO₂. This potential is supported by both a more project orientated calculation and calculations which assume the introduction of additional energy efficiency policies on a national level.

The sale of these emission rights on the international GHG market could generate substantial revenues for Ukraine, which could help to renew the country's obsolete energy infrastructure. In addition, a further reduction of GHG emissions would create substantial co-benefits for the country in the form of reduced dependence on imported fuels, and reduced health costs associated with air pollution.

The study also presents a pipeline of potential JI projects. The details of the projects are presented in the Uniform Reporting Format. Cost per ton of CO₂ emission reduction are

calculated using internationally accepted methods; it should be stressed that cash flows as well as future emission reduction effects are discounted adequately – which is in sharp contrast to many other JI and AIJ project descriptions.

In selecting and preparing the JI project proposals, the study team has reviewed existing JI project proposals and identified new projects on the basis of development plans and other material. The selected pilot pipeline projects represent a wide variety of possible projects from the various sectors of the Ukrainian economy. The pipeline has been prepared in such a way that it can be used for AIJ pilot phase and for future JI under the Kyoto Protocol.

Aim and Target Audience of the Study

In response to the challenge of global warming, the Government of Switzerland, jointly with the World Bank, has supported a number of studies that analyze the options and opportunities associated with the implementation of greenhouse gas (GHG) mitigation projects in developing countries and countries with economies in transition.

The National Strategy Study (NSS) Ukraine addresses policy makers in Ukraine and beyond, Joint Implementation (JI) project developers within Ukraine, academics, the growing climate change community and - perhaps most importantly - representatives of the private sector who are considering to venture into the emerging market of greenhouse gas mitigation.

Policy makers will find in this document important suggestions on how to design institutions and rules that will help the development of a climate change market to the benefit of the people living in Ukraine, the environment, and also the international business development. *JI project developers* and other individuals and organizations will find an introduction to the international rules of the GHG market a wide range of information on Ukraine. *Academics* working on climate change issues may be interested in the primary data on GHG mitigation possibilities and the institutional set-up in Ukraine presented in the study. Finally, this document will also facilitate the decision making process of *private sector representatives from industrial countries* considering JI investments in Ukraine.

The analysis presented here not only gives an overview on the scope of mitigation options, but also includes project suggestions, a discussion on the relevant institutional arrangements in Ukraine and an overview on investment climate, barriers, and risks.

Structure of the Study

First an introduction to climate change is given and Ukraine's past and current climate change activities are summarised. Chapter 2 of the NSS then clearly shows that Ukraine under any plausible scenario will have excess GHG permit. Chapter 3 estimates the price Ukraine could potentially fetch from those credits, given the current GHG market situation. Chapter 4 sets out the necessary institutional structures within Ukraine, which are a prerequisite for participating in the international GHG market. Chapter 5 draws those different elements together and shows what strategy Ukraine is to follow in order to

maximize its benefits from this newly emerging market. In Chapter 6 potential Ukraine JI projects are identified and described in some detail and finally the Plan of Action developed in Chapter 7 shows which steps are to be taken by Ukraine within the next years in order to reap the benefits from GHG trading.

Introduction to Climate Change and the Kyoto Protocol

Climate change is a global problem that needs to be addressed by coordinated efforts of the World Community. In June 1992, 161 countries signed the United Nations Framework Convention on Climate Change (UNFCCC), of which Ukraine is an active participant, being listed in Annex I of the Convention. After ratifying the Convention in October 1996, Ukraine became an official Party to UNFCCC in August 1997. In 1997 a binding GHG emission commitment was agreed upon at the Kyoto Conference of the Parties to this Convention. The Protocol commits developed countries and countries in transition to a market economy to reduce their emission on average by 5.2% below 1990 levels during the commitment period from 2008 to 2012. Ukraine's commitment is not to exceed its 1990 emissions during that period.

Additionally, the Kyoto Protocol provides the foundation of an international emission credits market. Because greenhouse gas abatement costs differ among countries, through an international trade of emission rights, it is possible to take advantage of economic gains while pursuing the goal of improving the environment. This would allow countries and firms around the world to reduce emissions in the most cost effective manner. The Kyoto Protocol includes three so-called *Flexible Mechanisms*, instruments that allow governments in industrialized countries to achieve parts of their emission reduction commitments under the Kyoto Protocol through projects abroad rather than through action or policy changes at home. Furthermore the Protocol states the possibility that countries form "international emission bubbles". Below is a brief explanation of the above mentioned mechanisms:

- ***Joint Implementation (JI)***: JI is a project-based mechanism to be used among Annex I countries that consists of an investment in reducing GHG emissions. Besides traditional benefits from the project, the return on this investment is represented by emission credits. The emission reduction effect is calculated by comparing the achieved level of emissions with an emissions baseline and is measured in "Emission Reduction Units" (ERUs).
- ***Clean Development Mechanism (CDM)***: CDM is a mechanism meant to assist developing countries in achieving sustainable development in line with the objectives of the Convention, and to assist Annex I countries in complying with their quantified emission limitations and reduction commitments. CDM projects are very similar to JI projects, with the difference that investments are made in non-Annex I countries. The emissions reduction obtained with the implementation of CDM projects are called "Certified Emission Reductions" (CERs). Note: the CDM is less relevant to Ukraine.

- ***International Emission Trading (IET):*** While the Kyoto Protocol's Annex B lists the emission limits (called "Assigned Amounts") for all Annex I countries of the UNFCCC, to be achieved during the commitment period of 2008-2012, Article 17 of the same Protocol allows the possibility of emissions trading among these countries. Thus, an Annex I country can buy part of its emission reductions from another Annex I country (including Ukraine), although the text of the Kyoto Protocol cautiously provides that such trading shall be supplemental to domestic actions to reduce emissions. The unit traded under the IET is the Assigned Amount Unit (AAU).
- ***International Emission Bubbles:*** Article 4 provides the possibility for Annex I countries to form "bubbles", such as regions whose emissions reduction commitments are considered cumulatively. The European Union (EU) has formed a bubble. As a result, some countries within the EU bubble have agreed to reduce their emissions beyond their Kyoto goal, while others are allowed to emit more than they would have been allowed to emit under the Kyoto commitment.

Review of Development in Ukraine

The protracted recession that took place in Ukraine during the nineties resulted in the fact that emissions of carbon dioxide were reduced by more about 60% between the years 1990 and 2000. Furthermore, in Ukraine, the potential and the price of emissions reduction remain competitive and are likely to be so during a long period of time. This explains why Ukraine is very interested in the implementation of both JI and IET mechanisms. Especially, the implementation of JI would cause a considerable inflow of direct investments in key sectors of the economy and produce a number of additional benefits associated with the introduction of new energy-saving technologies, and the possibility for waste utilization in municipal services and agro industrial production. Furthermore, the implementation of JI projects would trigger environmental improvement and creation of new jobs.

During the past several years a number of climate change activities have been undertaken in Ukraine:

First National Communication and First National Inventory of Greenhouse Gas Emissions: In 1998, the Government of Ukraine, in order to meet its commitments under the Convention, prepared and submitted to the Secretariat of the UNFCCC its First National Communication and First National Inventory. To date, only one national greenhouse gas emission inventory has been forwarded to the Secretariat of the Convention. The inventory refers to the year 1990, which is taken as the base year for Ukraine. The inventory provides data on fuel combustion in all sectors of the economy (industry, agriculture, public services), as well as data on the structure of greenhouse gas emissions.

National Policy and Strategies: During the last years, the Ukrainian Government has developed several important documents on economic development strategy. Among them are:

- Program for the Restructuring of the Ukrainian Economy (1995)
- National Energy Program (1997)
- Comprehensive State Energy Conservation Program of Ukraine (1997)
- Program of State Support of the Development of Alternative and Renewable Sources of Energy and Small Hydro and Thermal Energy (1997)
- National Programs of Development of Sectors of the Economy (1993-1997)
- Short-term Programs of Development of the National Economy (annually)
- “Ukrainian Coal” (the Program of Development of Coal Industry in Ukraine as one of the priority sectors of the fuel-energy complex)

The main official document, which can be used for predictions of greenhouse gas emissions in Ukraine, is the Comprehensive State Energy Conservation Program of Ukraine of February 5, 1997. The Program was prepared with the participation of the Ukrainian Ministry of Economy, the State Committee for Energy Saving and the National Academy of Sciences. In 2000, the Program was revised with due account to changes and results reported in 1998–1999.

Furthermore a number of bilateral programs have been established:

- Various programmes financed by the United States of America.
- The Canadian-Ukraine Environmental Cooperation Program
- The Dutch JI Programme
- Cooperation on reduction of greenhouse gas emissions is in progress also with Finland, Sweden, Japan and other countries.

Cooperation with Multilateral Agencies and International Financial Institutions includes a program on the Removing of Barriers to Climate Change Mitigation in Ukraine through Increased Efficiency of Municipal Heating Systems (United Nations Development Program (UNDP) - 2002-2004), and a program on energy management at the municipal level (European Bank for Reconstruction and Development –EBRD- and Technical Assistance to the Commonwealth of Independent States TACIS- program).

Summary of past Activities in Ukraine and Value added of the NSS: Over a short period of existence of Ukraine as an independent state, many national-level and sectoral programs of development dealing with reduction of fossil fuel consumption, increase in energy and fuel efficiency, utilization of casing-head gases and wastes of production have been started. However, a number of issues have not been tackled so far and the NSS is hoped to make a new and additional contribution on those issues. Among them:

- Emission predictions based on macro-economic scenarios
- Analysis of financial instruments used in the international market for emission credits.
- Comprehensive strategic consideration on Ukraine’s options in the greenhouse gas market.

- Calculation of potential emission reduction of various project types including the calculation of costs per ton of CO₂ emission reduction.
- Comprehensive National Action Plan for participation in the Kyoto Mechanism. Such an Action Plan is one of the outputs of this study.

GHG Mitigation Potential and Costs

By 1999, the Ukrainian GDP had decreased to 40% of 1990 levels. GHG emissions in 1999 also were about 60% lower than in the year 1990. Since 2000, the economy shows positive growth. Within the NSS, two scenarios forecasting economic growth and associated GHG emissions have been produced. The first scenario (Scenario A) predicts that 1990 levels of GDP will be reached in the year 2009, while the second and less optimistic scenario (Scenario B) sees GDP still at about 60% of 1990 levels during the first commitment period of the Kyoto Protocol (2008-2012).

With respect to expected GHG emissions, the two scenarios differ significantly less. While in the fast economic growth scenario GHG emissions are predicted to reach about 68% of the 1990 level by 2010, the low-economic -growth scenario shows GHG emissions at 62% of the 1990 level in the year 2010. The reason for the small difference in terms of GHG estimates is that the pessimistic scenario is associated with low energy efficiency and high GHG intensity, while with fast economic growth, energy efficiency is improved significantly.

In terms of tons of carbon, this means that Ukraine's aggregated energy related CO₂ emissions during the commitment period of the Kyoto Protocol will be between 2'037 MtCO₂ (Scenario A) and 2'265 MtCO₂. Ukraine would be allowed to emit 3'360 MtCO₂ during that period (based on 1990 level of energy-related CO₂ emissions) and has a total assigned amount of 4'300 MtCO₂ equivalent (for a summary of these figures see Table Ex.S.1 below). This means that the country will have excess emission rights of more than 1'000 MtCO₂. These excess emission rights can be sold on the international market (see also Chapter 5). The graphs below show the GDP and CO₂ emission predictions for the base scenarios A1 and B1 (without specific energy saving instruments being in place).

Figure Ex.S.1

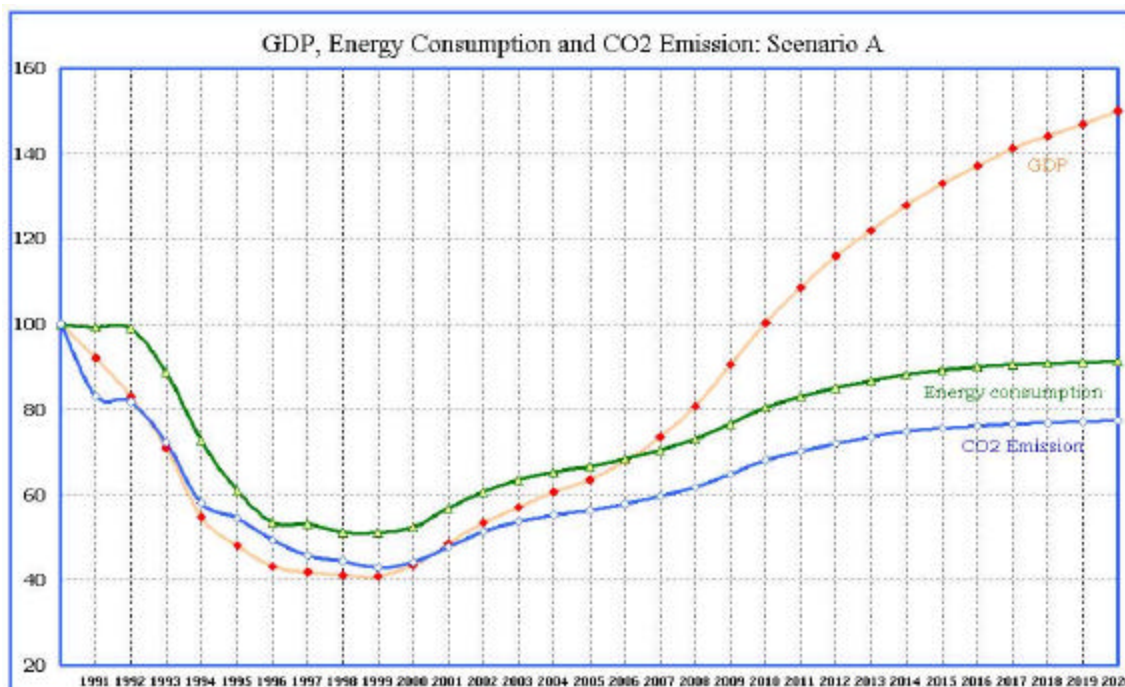
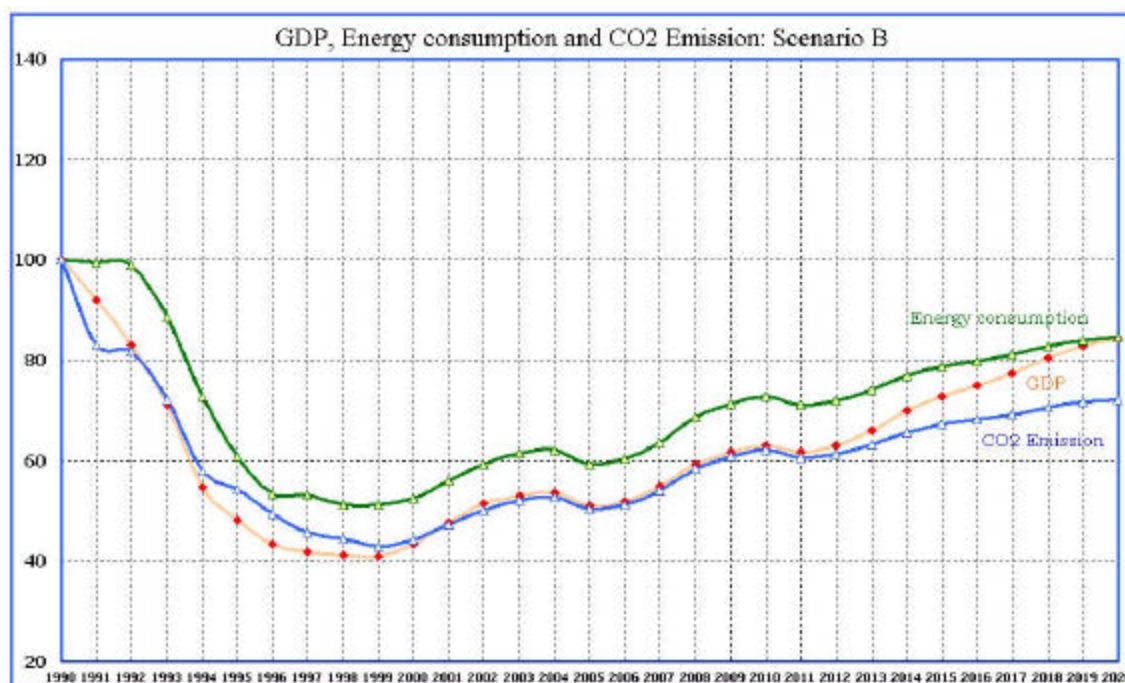


Figure Ex.S.2



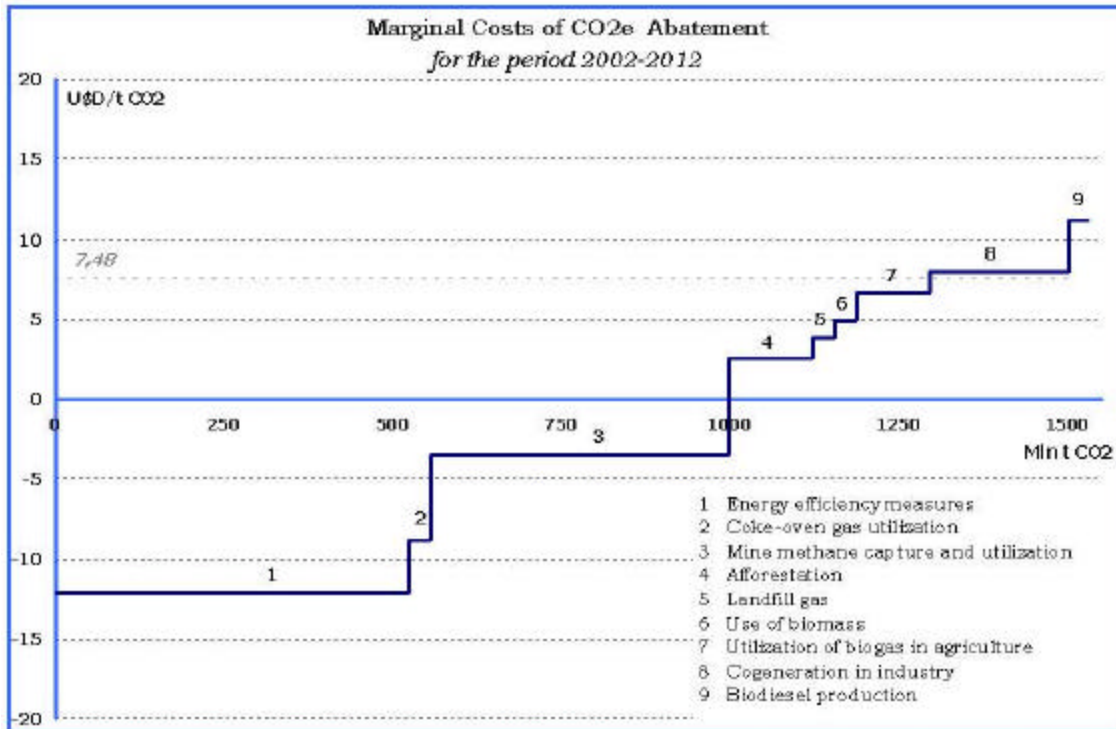
The marginal abatement cost curve (MAC) produced in the study (Figure Ex.S.3) is based on various data sources, including project costs calculated in Chapter 6.¹ It needs to be

¹ Note on the forestry projects: calculating the abatement costs, future GHG abatement has not been discounted,

emphasized, however, that the MAC attempts to calculate costs per ton of CO₂ emission reduction if projects are carried out on a national level and thus draws heavily on various national studies and also projects are grouped for the MAC calculation. Therefore, the costs identified in Chapter 6 are not necessarily the same as those shown in the MAC, and a comparison between Chapters 6 and 2 should be made with caution only.

Project developers interested in implementing projects are thus directed to Chapter 6 which summarizes work done on concrete projects in much greater detail. Chapter 2 in contrast, provides more of an overview of results from previous studies.

Figure Ex.S.3



The MAC shows that Ukraine has great potential for GHG emission abatement. Considering the period 2002-2012, 1'500 Mt CO₂ can be reduced at costs equal or smaller than 10\$/tCO₂. 1000 Mt CO₂ are in fact no-cost options (although one needs to be careful with such estimates, as some risks and other barriers may not have been accounted for in all of the underlying studies). A significant portion of this potential (approximately 1/3 of the total potential) is directly related to energy savings.

However, it has to be realized that emission reductions achieved before 2008 have no market value, because Ukraine can only sell allowances from its Kyoto assigned amount of the period 2008-12. Thus Ukraine's potential to produce (marketable) emission credits via emission reduction projects is in the magnitude of 750 Mt CO₂. Table Ex.S.1. summarizes Ukraine's projected Emissions and Reduction Potential.

which results in costs which are lower than they would be if GHG flows had been discounted.

Table Ex.S.1: Ukraine's projected GHG Emissions and Reduction Potential

	1990 (Mt CO ₂ e)	1999 (Mt CO ₂ e)	2008-12 average (Mt CO ₂ e /yr)	2008-12 cumulative (Mt CO ₂ e)
CO ₂ energy-related 1)	672	289	453	2'265
Other GHG emissions 2)	242	96	151	755
CO ₂ removals 3)	-52	-52	-52	-261
Total GHG emissions and removals	862	333	552	2'760
Kyoto Assigned Amount (rounded) 5)			860	4'300
Surplus AAU - all gases (rounded) 6)			300	1'500
Surplus AAU - only energy-related CO₂ (rounded) 7)			220	1'100
Additional Reduction Potential (<8 \$/t CO₂e) 4)			150	750

Data Sources

- 1) 1990: 2nd National Communication (1999) p.31; 1999 and 2008-12: Own calculations, according to Scenario A, Chapter 2
- 2) 1990: Second Nat. Comm., 1999 and 2008-12: Assumed proportional to energy-related CO₂, at about 25% of total GHG emissions
- 3) 1990: First National Communication (1998) p.6; 1999 and 2008-12: assumed to remain constant at 1990 level
- 4) According to Chapter 2, marginal abatement cost curve
- 5) Corresponding to 100% of 1990 GHG emissions
- 6) Calculated as Assigned Amount minus total GHG emissions. This value represents an approximation, because it is based on simplifying assumptions regarding GHG emissions other than CO₂, and regarding CO₂ removals by sinks
- 7) Calculated as energy-related CO₂ emissions in 1990 minus project emissions in 2008-12

GHG Emission Reduction Market Opportunities

The main issues when formulating Ukraine's opportunities and strategies within the context of JI and IET are the size of the GHG market, the price GHG credits may fetch on this market, and the rules on the market. Furthermore, information on existing products on this market is essential, and the Ukrainian government also needs to be informed on market players, most notably the potential GHG buyers and competing sellers.

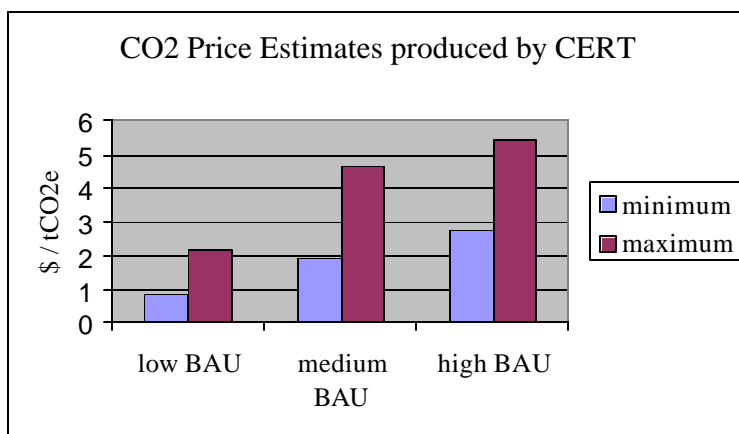
Since the Kyoto Protocol was formulated in 1997, there has been a vigorous discussion on the rules of the Flexibility Mechanisms. Changes in the potential rules governing the GHG market are frequent and it is difficult to keep up with the developments. Chapter 3 reviews these developments and highlights the most recent decisions taken in autumn 2001 in the Marrakech Accords.

In order to provide market participants with a better understanding of the GHG market, an analysis of the GHG emission reduction policies of the Organization of Economic Cooperation and Development (OECD) countries, the major potential GHG credit purchaser, is provided. The analysis focuses on the European Union as a whole, Germany, the United Kingdom, the Netherlands, Japan, the US, Canada, and Australia.

For GHG price estimates, the study uses results from the carbon market simulation model CERT provided by the World Bank. The CERT model is in fact a meta model, including empirical findings of a large number of studies and taking into account the most recent trends and developments within the GHG market such as US non-participation or partial participation in the market. Based on this model, a price of 4-5 \$/tCO₂ is taken to be a likely scenario, and the full range of the expected price is about 1-5.5 \$/tCO₂. Figure Ex.S. 4 shows

the main CERT model estimations of the CO₂ price under likely scenarios for the GHG market architecture and for different assumptions on the business as usual emissions (BAU).

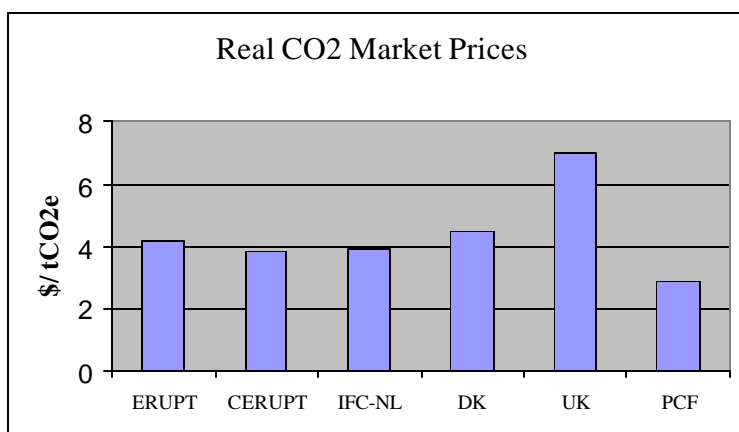
Figure Ex.S.4



Source: Grütter, J., Kappel, R., Staub, P. (12/2002), “The GHG Market on the Eve of Kyoto Ratification”, Report prepared on behalf of the NSS program of the World Bank, Table 8.

GHG prices observed in current market transactions are in the range of 1-12 \$/tCO₂, with the most important players today paying a price of 2-7 \$/tCO₂e (see figure Ex.S.5).

Figure Ex.S.5



Source: Grütter, J., Kappel, R., Staub, P. (12/2002), “The GHG Market on the Eve of Kyoto Ratification”, Report prepared on behalf of the NSS program of the World Bank, Figure 2.

However, the CERT model calculations also show that prices will drop significantly in case Russia and Ukraine sell a large part of their excess AAUs on the market. This has to be kept in mind when calculating potential revenues for Ukraine from selling excess AAUs.

The NSS also shows that within the GHG market, various financial products such as derivatives and investment funds are being established. The study describes the theoretical concepts behind those products and explains how those products can be used. It describes the risks associated with purchasing such products (product, country, project, and price risks), and discusses in which way JI associated risks can be dealt with. It is argued that Ukraine's government as well as private market participants need to be careful not to "oversell" in the sense of engaging in option or future contracts which will oblige them to deliver credits which they might not have. Finally, the NSS provides information on existing carbon funds.

Ukraine, however, currently faces significant problems in accessing carbon funding. In order to attract foreign investment into climate projects, Ukraine must address the following investment barriers:

- General macroeconomic climate in Ukraine and lack of capital due to poorly developed capital markets and weakness of the local banking sector
- Lack of local managerial experience
- Existence of natural or state monopolies with little incentives to participate in JI
- Little credit records in the private sector
- Insufficient size of most JI projects to attract the interest of major financial institutions
- Low and unstable energy prices, undermining the cost-effectiveness of most energy efficiency projects

Apart from these general investment barriers, little has been done in Ukraine to develop the appropriate institutional capacity to participate in international market-based flexibility mechanisms and to maximize revenues associated with JI and IET. Ukraine not only needs to fulfill the requirements of the UNFCCC (and important steps towards this goal have been undertaken), but what is most urgently required now is the institutional framework that would also include the build-up of adequate *Ji and IET-related* know-how in the public administration. Finally a coherent climate change policy needs to be formulated.

Domestic Institutional, Regulatory and Legal Prerequisites

There are clear international requirements for taking part in IET and JI. The study describes that for JI two possible tracks have been established in the Marrakech Accords: A fast track (Track 1) and a slow track (Track 2). If a country wants to participate in the fast track (which is associated with lower transactions costs), a number of prerequisites need to be fulfilled: it needs to have an accepted national emissions inventory and allowance registry in place and report correctly to the UNFCCC.

The institutional structure dealing with JI and IET still needs to be put in place. There are a number of existing institutions that should play a decisive role in this context, first and foremost the Ministry of the Environment and Natural Resources of Ukraine (MENR) and its Department of Hydrometeorology (UDH), although the latter currently is entrusted primarily

with observation and climate change vulnerability activities. Furthermore, the Inter-Ministerial Commission on Climate Change (IMCCC) has a major role to play in coordinating climate change activities within Ukraine and formulating Ukraine's climate change strategy.

Also the following ministries are seen to play some role in Ukraine's climate change policy:

- Ministry of Fuel and Energy (MFE)
- State Committee on Energy Conservation
- Ministry of the Economy of Ukraine (ME)
- State Committee on Statistics of Ukraine (Derzkomstat)
- Ministry of Finance of Ukraine (MF)
- Ministry of Foreign Affairs of Ukraine (MFA)
- State Committee on Forestry
- Ministry of Transport

Apart from the government sector, private companies are expected to take part in the GHG market, most notably consulting firms, banks, insurance firms and energy and environmental audit companies.

Secondly, the legislative basis for regulating procedures concerning IET and JI (such as JI approval rules and laws regulating AAU and ERU ownership) are not yet in place in Ukraine.

Despite the numerous existing institutions potentially dealing with climate change issues, it would be advisable for Ukraine to establish a central JI/IET office. Key functions of the office would be the following:

- Establishing the national legislative and regulatory framework for Joint Implementation and International Emission Trading, including arranging potential tax and import duty exemptions.
- Developing project approval criteria and procedures; developing and marketing national project pipeline.
- Providing information on the legal and procedural issues regarding project implementation, including terms and conditions of the transactions, environmental assessment requirements, and local consultation procedures, and any fees required.
- Verifying the conformity of economic, technical, social and environmental indicators of proposed JI projects with selection criteria and submitting them to the MENR for approval.
- Preparing bilateral Memoranda of Understanding or Letters of Intent between Ukrainian government and investor, as well as final Carbon Purchase Agreements.

- Providing other services to minimize administrative and transaction costs of the investor, for example in organizing local consultation process.
- Establishing and administering a web-site and providing public access to JI projects and activity data bases.
- Building domestic public awareness on JI through mass-media, workshops and other sources of information.
- Issuing ERUs certificates upon appropriate international verification process.
- Administer National Registry.

Particular assistance of the JI/IET office may be required after the project is validated as an eligible JI project, at which point investor and host enterprises, with the intermediary service of JI/IET office, sign a Carbon Purchase Agreement that defines the details of the implementation of the project.

The JI/IET office should be established as soon as possible to enable Ukraine to take part in JI Track 2. However, in the long-term (after eligibility for IET and Track 1 JI is obtained), the JI/IET office administrative structure will require a more complex and more effective structure consisting, at least, of three sections dealing with *JI projects, Tradable Allowances, and Information and Registration*.

Building on the capacities developed by the JI/IET office in administering Track 2 JI, it will likely have to assume additional functions, such as:

- Developing guidance on the national requirements for project information, such as additionality assessment, project baseline analysis, and monitoring plan.
- Developing national procedures for project validation, monitoring and verification, including possible establishment of an independent monitoring and verification system.
- Conduct market research on international emissions trading; providing market and macroeconomic analysis for correct estimation of IET potential and appropriate price indicators.
- To carry out further JI and IET supervisory activities in line with the international requirements, particularly as regards certification, verification and reporting to UNFCCC Secretariat.

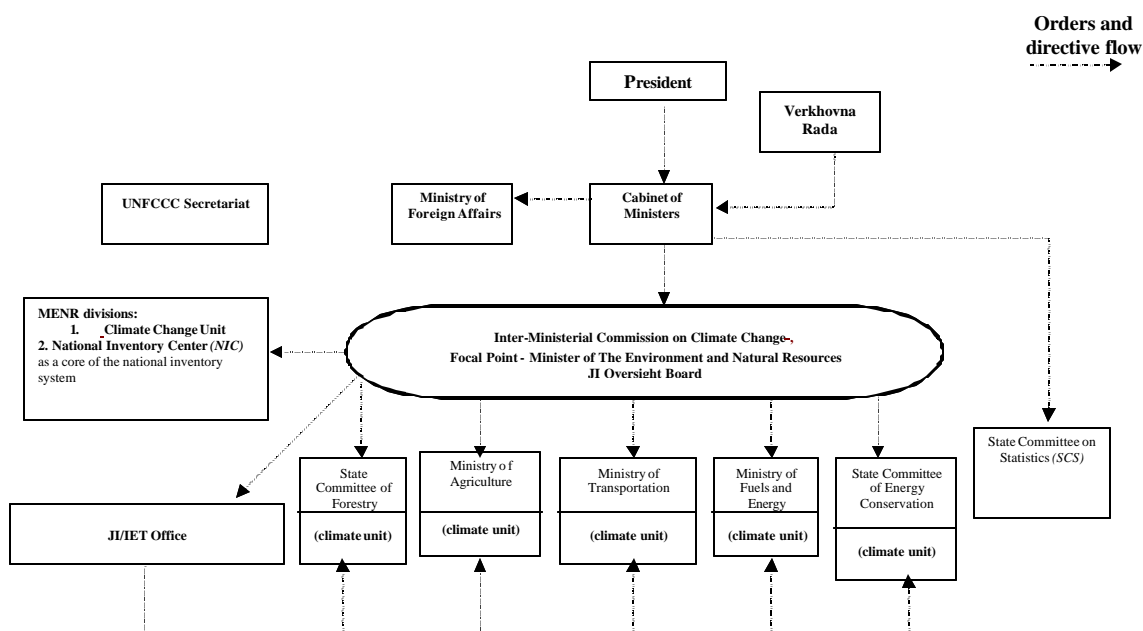
It is envisaged that the JI/IET office set-up and operation will be financed on the basis of:

- State budget sources
- Fees to be paid to the JI/IET office for consultative and intermediary services provided by this office
- Assistance from interested foreign, international and national organizations

Finally, there is an urgent need to develop a sustainable and permanent national GHG inventory system and a national GHG register, as these are requirements of the UNFCCC for countries to participate in Track 1 Joint Implementation and International Emissions Trading.

National GHG inventories were developed in Ukraine twice. The First National GHG Inventory for the 1990 base year was prepared under the U.S. Country Study Program. Annual inventories for the period of 1991-1998 were developed in 1999 and funded by the MENR. The results were submitted to the UNFCCC Secretariat in 2000. However, the Ukrainian national GHG inventory needs to be further developed to comply with the UNFCCC standards. Currently, the GHG inventory lacks data on the new gases: HFCs, PFCs, and SF₆, it uses IPCC default emission factors instead of local ones, and it is not reported in the Common Reporting Format (CRF). In order to be able to comply with the eligibility requirements for International Emissions Trading and Track 2 JI, Ukraine needs to improve its inventories to an international standard and establish a sustainable permanent system that would support national GHG inventory development and management on a regular basis.

Figure Ex.S.6 describes a possible administrative structure (to be taken as an example): the main administrative body, IMCCC, relevant ministries and authorities, national inventory system and JI/IET office form Ukraine's institutional infrastructure for JI/IET.

Figure Ex.S.6: Institutional Structure (an Example)

Options for Ukraine

Ukraine has the potential to become a major seller of GHG emission rights under the Kyoto Protocol. According to the study's estimates, the country will have surplus emission rights of about 1.5 billion tonnes of CO₂-equivalent in the first commitment period 2008-12 (including non-CO₂ GHG and forestry sinks, see Chapter 2). In addition the country offers potential for further emission reductions of approximately 750 MtCO₂ in the period 2008-12 which can be exploited profitably at the projected market price of \$8 / t CO₂. This potential is supported by both a more project orientated calculation (Chapter 2) and calculations which assume the introduction of additional energy efficiency policies on a national level (Chapter 5).

The sale of these emission rights on the international GHG market could generate substantial revenues for Ukraine, which could help to renew the country's obsolete energy infrastructure. In addition, a further reduction of GHG emissions would create substantial co-benefits for the country in the form of reduced dependence on imported fuels, and reduced health costs associated with air pollution.

In order to realize these revenues and benefits, we recommend that Ukraine should take the following strategy:

1. For the sale of surplus emission rights for the period 2008-12 (surplus AAU or "Hot Air"):
 - Start negotiations with potential buyers regarding sale of surplus AAU immediately.
 - Sell about 1/3 of the surplus AAU (only those related to energy CO₂, corresponding to 350 MtCO₂) at the projected average market price of \$8 /tCO₂.

This could generate revenues of about \$2.8 billion during the first commitment period 2008-12. Ideally, a part of these revenues can already be received before 2008, through up-front payments. But note: \$8 /tCO₂ is a somewhat optimistic price scenario, Chapter 3 suggests that prices might be lower.

- The revenues from these AAU sales should be spent on further emissions-reducing measures, i.e. on further de-carbonization of the national economy. Besides delivering large benefits for Ukraine in the form of renewed energy infrastructure and local environmental benefits, this recycling will be a prerequisite for attracting buyers, because it adds environmental credibility to the sale of surplus AAU.
- Reserve the remaining surplus AAUs for sale at a later stage, or for Ukraine's own use in the second commitment period, 2013-17. These reserve AAUs should not be sold until Ukraine's emission target for the period 2013-17 has been defined, and until long-term development of carbon prices has become more certain.

2. For the generation and sale of further emission reductions:

- Take all measures required to enable efficient sale of emission reductions under the Kyoto Protocols Article 6 JI mechanism. The demand for and supply of such emission reductions will be primarily driven by the companies involved in these projects. Ukraine Government should play an enabling role for JI, by creating clear national rules and an efficient approval process. This is further described in Chapter 4 of this report.
- Consider introduction of further domestic policies for stimulating GHG emission reductions in Ukraine. These include, in particular: Introduction of a Governmental program to (co-)finance the renewal of the energy infrastructure, and policies promoting a shift from existing taxes on income / labor to taxes on energy consumption and carbon emissions. With the help of these policies, Ukraine could generate further emissions reduction which the Government could sell on the international GHG market under Article 17 emissions trading.
- In the longer term, Ukraine may also consider introduction of a domestic GHG trading scheme involving large emitters such as, e.g., power generators, metals, mining and cement companies. Such a scheme will very likely be introduced in the European Union from 2005. Participation in this European Trading Scheme would allow Ukrainian companies to sell emission rights at substantially reduced transaction costs, compared to Article 6 JI.

The proposed generation and sale of emission rights could bring to the country an impressive financial inflow from abroad. Overall, we estimate the possible revenues for Ukraine at \$1.7 billion per year, or \$8.5 billion for the total period 2008-12, although it needs to be noted that the figure will be lower at lower carbon prices. It may be possible to obtain a part of these

revenues already before 2008, through forward purchase contracts with partial up-front payment by the buyers.

3. With respect to the choice of mechanism used by Ukraine (JI Track 1 or 2 or IET) the study makes the following recommendations:

- JI: Ukraine should allow JI investors to choose between Track-1 and Track-2 JI. For this reason, Ukraine should become eligible for both Tracks by taking the institutional measures described in Chapter 4. This will require little time and resources in the case of Track-2, and moderate resources for Track-1. As a result, Ukraine should try to make Track-2 JI available for international buyers as soon as possible, ideally from 2004, and Track-1 JI from approximately 2006.
- IET, Government level: With regard to the sale of surplus AAU, Ukraine should start preparations and negotiations immediately, in order to start actually selling AAUs approximately in 2006.
- IET, Company level: A domestic GHG trading scheme for large emitters is likely to become an attractive option for Ukraine in the longer term, if the corresponding European scheme materializes as expected. Ukraine should keep an eye on this option. Preparations could start as early as in 2006, with a view to actually starting the scheme after 2012. A domestic GHG trading would essentially replace project-based trading under JI.

Pilot Project Pipeline

The study has developed preliminary concepts for a number of potential JI projects. The details of the projects are presented in the Uniform Reporting Format. Cost per ton of CO₂ emission reduction are calculated using internationally accepted methods; it should be stressed that cash flows as well as future emission reduction effects are discounted adequately – which is in sharp contrast to many other JI and AIJ project descriptions.

In selecting and preparing the JI project proposals, the study team has reviewed existing JI project proposals and identified new project ideas on the basis of development plans and other material. The selected pilot pipeline projects (see Table Ex.S.2) represent a wide variety of possible projects from the various sectors of the Ukrainian economy. The pipeline has been prepared in such a way that it can be used for AIJ pilot phase and for future JI under the Kyoto Protocol.

Criteria for project selection were:

- Level of information quality;
- Willingness of project owners to cooperate;
- A project should be compatible with and supportive of national environment and development priorities and strategies;

- A project should bring real, measurable, and long-term environmental benefits related to the mitigation of climate change that would not have occurred in the absence of such AIJ/JI activities;
- Good prospective economic state of the company (roughly estimated);
- Total amount of investment should be not less than USD 500,000;
- Replicability potential;
- Use of proved conventional technology;
- Represent the relevant sectors of economy and categories of a project.

The following table provides an overview on the selected projects and gives some key data.

Note of Caution: As with many initial JI project descriptions and cost calculations, some of the projects are found to have negative costs. The team did its best to take into account appropriate risk adjusted discount rates. Yet, risks might have been overlooked, revenues might be overestimated and costs underestimated. Thus, any JI investor will have to take a more detailed look at costs and revenues of those projects.

Table Ex.S.2: JI Project Pipeline

#	Sector	Category	Title of the project	Investment, thousand USD	CO ₂ reduction over project life time, t		Cost of emission avoided ² , USD per t CO ₂ eq.		Incremen- tal costs of project ³ , thousand USD	IRR ⁴ , %	Comments, risks, sensitivity
					819g CO ₂ /kWh ⁵	350g CO ₂ /kWh ⁶	819g CO ₂ /kWh	350g CO ₂ /kWh			
1	Energy sector (coal)	Gas capture	Skochinsky mine methane capture and utilization	51,895	2,196,621		-6.92		-5,476	26.0/ 29.7/ 33.4	Key element: a ready market to accept the gas that is produced and willingness-ability of consumers to pay competitive for the gas with cash. The project has strong compliance with national economic development, socio-economic as well as with environment priorities and strategies. (e.g., safety in coal mining). Methane emissions in the baseline and project case are relatively uncertain.
2	Power sector	Energy efficiency	Installation of new steam turbines in existing boiler station at Tyre plant "Dniproshina" (12 MW)	5,610	990,659	360,323	-2.23	-6.13	-538	22.5/ 24.2/ 27.1	Good risk rating, well-tested technology, absent of necessity to sell electricity to a grid
3	Power sector	Energy efficiency	Kachanov associated gas capture and utilization (Poltava region)	3,000	589,680	252,000	4.7	11.1	681	13.8/ 16.2/ 19.3	Anticipated amount of associated gas for a long-term period may be a critical issue. Insufficient data basis
4	Power sector	Renewable energy	Installation of Additional Wind Power at Novoazovsk (Donetsk oblast) and Tarkhankut (Autonomous Republic of the Crimea) Wind Plants	14,000	621,523	265,608	38.6	90.3	4,158	7.0/ 7.8/ 8.8	The project meets the requirement of additionality due to the positive value of incremental costs of the project. There is a minor risk that preferential electricity tariff regimes will not exist for a long time, and governmental support for wind power will be lower

² Cost per t CO₂ reduction = (NPV of baseline - NPV of project) / discounted GHG effect project case net of GHG effect baseline

³ NPV of baseline minus NPV of project at 20% of discount rate

⁴ IRR present without ERU credits / with ERU credits \$5 per t CO₂ for 350 g CO₂ emissions per kWh / with ERU credits \$5 per t CO₂ for 819 g CO₂ emissions per kWh

⁵ Specific average national emission of 819.7 g CO₂ per kWh for thermal power plant in Ukraine for 1990 base year

⁶ Specific emission of 350 g CO₂ per kWh for the best available electricity production technology using natural gas

#	Sector	Category	Title of the project	Investment, thousand USD	CO ₂ reduction over project life time, t		Cost of emission avoided ² , USD per t CO ₂ eq.		Incremen- tal costs of project ³ , thousand USD	IRR ⁴ , %	Comments, risks, sensitivity
					819g CO ₂ /kWh ⁵	350g CO ₂ /kWh ⁶	819g CO ₂ /kWh	350g CO ₂ /kWh			
5	Power sector	Energy efficiency	Co-generation system on coke gas at Avdeevka coke plant (16 MW)	13,000	1,583,500	676,710	-9.4	-22.0	-4,894	30.7/ 32.7/ 35.3	The most sensitive element: the project will be a pilot for the usage of coke gas by gas turbine in the Ukraine
6	Industry	Energy efficiency	Heat recovery for ventilation of main production building (Rosava tyre plant)	3 401	344 441	341 848	5.9	5.9	491	15.7/ 18.8/ 18.8	The project meets the requirement of additionality due to the positive value of incremental costs of the project. Good risk rating, well -tested technology
7	Households	Fugitive gas capture	Implementation of 1.5 MW _e power plant operating on landfill gas at Lugansk landfill	2 250	1 337 280	1 224 720	3.8	4.2	1 243	3.3/ 20.0/ 21.3	The project meets the requirement of additionality due to the positive value of incremental costs of the project. Major risk: the volume of captured and utilized landfill gas will be lower than anticipated
8	Agriculture	Renewable energy	Implementation of 280 kW _e +560 kW _{th} CHP biogas plant in pig breeding farm	1 039	267 651	246 640	6.1	6.6	398	9.2/ 16.2/ 16.7	The project meets the requirement of additionality due to the positive value of the incremental costs of the project. Conservative estimate of CH ₄ emission reduction. Sharp drop of livestock due to the extension of sickness or bad harvest may impact the amount of manure
9	Industry	Industrial processes	Modernization of smelter to improve operating efficiency at the "Zaporizhziya Aluminium Enterprise"	200 000	9 984 817	6 980 229	6.7	9.5	16 162	17.8/ 18.8/ 19.2	The project proposed by the firm with very good reputation. This project has a variety of non-greenhouse benefits. Minor risk: deterioration of the world market of aluminium conjuncture
10	Households	Energy efficiency	Installation of new energy efficiency pumps on Dniprovskaya Waterworks	3 647	1 117 558	477 589	-5.3	-12.4	-1 447	30.2/ 33.5/ 37.9	Good risk rating, well-tested technology. A big social importance of the project
			Installation of new energy efficient pumps on Desnianska Waterworks	9 777	2 564 959	1 096 136	-3.6	-8.4	-2 234	25.9/ 28.8/ 32.6	

#	Sector	Category	Title of the project	Investment, thousand USD	CO ₂ reduction over project life time, t		Cost of emission avoided ² , USD per t CO ₂ eq.		Incremen- tal costs of project ³ , thousand USD	IRR ⁴ , %	Comments, risks, sensitivity
					819g CO ₂ /kWh ⁵	350g CO ₂ /kWh ⁶	819g CO ₂ /kWh	350g CO ₂ /kWh			
11	Households	Energy efficiency	Installation Gas Turbine Combined Cycle at Ivano-Frankivsk CHP	36 872	4 540 086	474 924	8.6	82.6	9 555	12.6/ 12.9/ 15.7	The project meets the requirement of additionality due to the positive value of incremental costs of the project. Good risk rating, well-tested technology.
12	Households	Energy efficiency	District heating system rehabilitation in Vinnitsa city	49 700	5 200 610		31.1		17 068	9.2/ 11.2/ 11.2	The project meets the requirement of additionality due to the positive value of incremental costs of the project. Good risk rating, well-tested technology. Insufficient data basis
13	Forestry	Afforestation	Afforestation in Kharkiv region	470	282 300		18.3		431	<0/ 6.7/ 9.2	The project proposed by the firm with very good reputation on environmental issues. The project has been approved by the Ukrainian State Committee of Forestry. ERU sales substantially increase financial viability (IRR) of project.
14	Households	Renewable Energy	Utilizing wood waste as an alternative fuel for heating in Ivano-Frankivsk region, replacing coal	3 179	411 305	427 017	14.10	13.6	1 411	7.2/ 11.5/ 11.3	High additionality due to insufficient project profitability without ERU revenues. About 20% of the indicated GHG savings correspond to methane emission reductions resulting from reduced coal mining. Estimate of GHG emission reduction is conservative because methane emissions from decaying wood are not accounted for. Risk: Reliability of wood waste supply to be studied in more detail

Plan of Action

Ukraine stands to gain substantial benefits in foreign investment, technology transfer and capacity building from participation in the Kyoto Protocol mechanisms. Therefore timely ratification of the Kyoto Protocol and creation of the necessary national capacity to participate in its mechanisms is the most important recommendation offered to the Government of Ukraine. Urging the Government to act, the study describes the steps to be taken by the Government of Ukraine to start building the necessary prerequisites for their implementation.

In particular it examines how the Marrakech Accords translate into specific needs with regard to establishment of national institutions, i.e. JI and IET focal point, the national inventory system, and the national registry. Since no national climate change institution would be able to operate without proper legal underpinnings, it is recommended that a legislative and policy-making process be launched that would promulgate the establishment and functioning of the national climate change institutions.

Building institutional capacity will entail certain budgetary implications, such as direct expenditures required for the establishment of Kyoto Protocol institutions in the country, as well as the resources required for establishing relevant policies and ensuring appropriate compliance with the international rules. While some steps would require significant investment of time and resources on the part of the government, such as updating the laws, preparing the *annual inventories* and establishing the *registry*, some are not so costly (e.g., allocating clear institutional responsibilities and developing administrative procedures). Moreover, the budgetary constraints will substantially differ for Track 1 and Track 2 eligibility.

The study further examines relevant capacity building needs, emphasizing existing knowledge gaps and lack of awareness of the climate change issues and the Kyoto Protocol mechanisms among the wider circle of government officials and parliamentarians. For the mechanisms to be implemented effectively, it is necessary to educate local governments and industry and support dialogue among various stakeholders. The capacity building needs of the government include developing an understanding of the international GHG market, its instruments and dynamics, including macroeconomic implications of a particular market behavior. For example currently there is limited ability to evaluate the impact of potential JI/IET strategy on the country's market potential in JI and emissions trading, perspective government and industry revenues, and the ripple effect on various sectors of the economy.

At the same it is important to build the local consultancy base in order to avoid the siphoning of parts of JI investment to foreign consulting companies and agencies. The Ukrainian private sector needs to be made broadly aware of the fact that they could develop JI projects, or gain accreditation as independent operational entities for JI internationally and domestically. More importantly, establishing Track 1 JI in Ukraine will bring the additional benefit of spawning a new set of service industries in the country, just as the global market for JI gave rise to international carbon consultancies. To maximize economic gains from the JI, it is important

to develop local expertise in these new areas of economic activities, as at present the number of internationally qualified local JI experts is very low.

When examining potential Ukrainian strategy for engaging in International Emissions Trading and Joint Implementation, Chapter 7 primarily looks into the issue of how to approach international market most effectively. It recommends to start with implementing pilot GHG reduction projects, either through Activities Implemented Jointly or through Track 2 JI, stressing that the implementation of first JI projects under Track 2 JI should coincide with the development of sound Track 1 institutions and the launching of the process to fulfill all Track 1 eligibility criteria, so that investors eventually are able to choose between Track 1 and Track 2. In order to encourage investor interest, Ukrainian government should provide all potential investors with clear and up-to-date information about their procedures, project eligibility criteria, decision-making authority, monitoring and reporting requirements. Transparency and consistency will be essential to ensure the political stability needed for effective JI investment.

In order to encourage buyer interest and improve marketability to Ukrainian surplus allowances, a revolving facility is recommended to streamline AAU revenues into real GHG reduction projects. At the same time transparent national registry for recording and tracking forward sales, as well as transparent GHG inventory are noted as critical prerequisites for determining the success of emissions trading for Ukraine. In the longer-term, the national climate policy would benefit from such financial mechanism, as it would help Ukraine to overcome existing financial barriers to restructuring its carbon-intensive economy.

It is our recommendation that Ukraine proceeds with establishing the capacity to fulfill Track 1 eligibility requirements as soon as possible. First, the sooner the eligibility information is submitted, the more the country will be able to benefit from the international review processes that will help Ukraine improve, in particular, its inventory systems. Secondly, it will cushion any potential delays in providing clarification, if such are requested to JI Supervisory Committee. Thirdly, any delay in setting up national systems and institutions means some delay in participating in the mechanisms, since they are the eligibility requirements to participate. Suggested timeframe for building the national infrastructure for participation in the Kyoto Protocol is presented below.

Various bilateral donors, international financial institutions, and development agencies were identified as possible sources of capacity building assistance in responding to Ukraine's institutional needs. Fees from processing JI projects as well as revenues from some of the AAU sales were noted as having potential to become a sustainable and substantial resource for funding Ukraine's capacity building needs, especially in preparation of the inventories and establishment and maintenance of the national registry.

Table Ex.S.3: Suggested Time Schedule for building the national infrastructure for participation in the Kyoto Protocol

	2003	2004	2005	2006	2007
Designation of a JI/IET focal point	■				
Development of national JI/ IT strategy		■			
Elaboration of project selection criteria and procedures		■			
<u>Track 2 available</u>			→		
National inventory system development		■	■		
National registry developed and tested			■		
Preparation of the annual inventories		■	■	■	■
<u>Track 1 available</u>					→
Assigned Amount established and recorded				■	■
Preparation for IET and negotiation with purchasers			■	■	■
<u>Eligibility determination</u>				■	■

An important action stipulating JI investments in Ukraine will be the implementation of first JI projects. Continuously improved JI-related capacity in the country will further enhance the attractiveness of Ukraine as a JI host country. Below a suggested time table for project implementation and capacity building is sketched.

Table Ex.S.4: Suggested Time Schedule for JI Demonstration Projects and Capacity Building

	2003	2004	2005	2006	2007
Presentation of potential JI projects to interested investors such as the World Bank's PCF	■				
Contract negotiation on first projects, project approval by Ukraine's government		■			
Implementation of first JI projects			■	■	
Implementation of further JI projects				■	■
Capacity building on project design, base line determination, financial project assessment	■	■	■		
Capacity building on projet monitoring as well as verification and certification (under JI track 1). Contract negotiation training for IET			■	■	■

