THE WORLD BANK

National Strategy Study

for the Application of the

Clean Development Mechanism in Uruguay

Institutional Aspects

and

Portfolio of CDM Projects

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Climate Change Unit

National Environment Directorate

Ministry of Housing, Territorial Regulation and Environment

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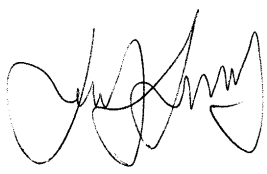

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Part 1

Institutional Aspects for the Application of the Clean Development Mechanism in Uruguay

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1 Introduction

The Kyoto Protocol (KP) to the UN Framework Convention on Climate Change (UNFCCC) was agreed upon in December 1997. The Protocol establishes quantified emissions limitation and reduction commitments for developed countries listed in Annex B of the Protocol (Annex B Parties). The Protocol covers six greenhouse gases (GHG). The most important are carbon dioxide (CO2) and methane (CH4). In addition to quantified emissions limitation and reduction commitment, the Kyoto Protocol contains provisions, which would permit acquisition and transfer of GHG emissions quantities, either in the form of credits generated by specific climate protection projects or of emission allowances (so called Kyoto mechanisms).

Through Article 6 of the Protocol, Parties listed in Annex I of the UNFCCC (Annex I Parties) can transfer to, or acquire from, any other Annex I Party emissions reduction units resulting from projects aimed at reducing emissions by sources or enhancing removal by sinks of GHG in any sector of the economy. This mechanism is often referred to as joint implementation (JI) of commitments by the Parties to the UNFCCC. Through the clean development mechanism (CDM), established in Article 12 KP, Annex I Parties can acquire certified emission reductions accruing from project activities that assist non-Annex I Parties (i.e. developing and newly industrialized countries) in achieving sustainable development. Annex I Parties may use emission reduction units obtained through JI and certified emission reductions obtained through the CDM to comply with their emission limitation and/or reduction commitments in the KP. These two mechanisms (CDM and JI) are distinct from emissions trading provided for in Article 17, which calls for the Conference of the Parties to the UNFCCC to define principles, modalities, rules and guidelines for emissions trading between Annex B Parties (i.e., the transfer and acquisition of amounts assigned to Parties listed in Annex B of the Protocol, often referred to as “allowance trading”). In addition to these Kyoto mechanisms, Art. 4 provides additional flexibility for Annex I Parties who agree to fulfill their quantified emissions limitation and reduction commitments jointly (also referred to as “bubble”. This mechanism is expected to be used by the European Union).

It is believed that the Kyoto mechanisms could become an interesting instrument for developing and newly industrialized countries as well as Annex I countries in central and eastern Europe and the former Soviet Union, which may possess large potentials for generating GHG emission reductions. The instruments, particularly those that create emission reductions through investment projects, might not only lead to a modernization of the existing capital stock for energy production and consumption but may also generate a financial surplus for the hosting country in the form of additional financial flows.

2 National Background

Uruguay is Part of the UNFCCC since November 16, 1994 (Law Nº 16.517) and of the KP since February 5, 2001(Law Nº 17.279) and is not included in Annex I of the Convention.

The Ministry of Housing, Territorial Regulation and Environment (MVOTMA) of Uruguay was created on June 8, 1990 (Law No. 16.112). Its ministerial responsibilities include the formulation, execution, supervision and evaluation of the national environmental plans and the instrumentation of the national environmental policy. Through article 19 of Law No. 17.283 (Environment General Protection), the MVOTMA was defined as the national competent authority in climate change matters and commended of the establishment of mitigation measures and GHG emissions regulation.

The performance of mentioned responsibilities is being taken care of through the National Environment Directorate (DINAMA) which was created on October 1, 1990 (Law No. 16.134) and through the Climate Change Unit (UCC), depending on the DINAMA. This unit was created by MVOTMA's on December 29, 1994 (Resolution No. 505/94) and its functions are: to organize, conduct and execute the activities that emerge from the application of the UNFCCC and the KP

During year 2001, by MVOTMA's Resolution No. 341/2001 dated July 9, 2001, the UCC's duties were extended to also include the performance of the executive functions of the national authority for the application of the CDM.

The UCC coordinates its climate change activities through the Technical Advisory Commission for the Environment Protection (COTAMA). This is a plural body where the different ministries, the parliament, the municipality authorities, the productive, academic and labor sectors, and the non-governmental organizations are represented.

Recently, the Government has created a national coordination ambit, integrated by representatives of the following ministries: Housing, Territorial Regulation and Environment; Foreign Affairs; Economy and Finance; Industries, Energy and Mining; and Livestock, Agriculture and Fisheries. This inter-ministerial ambit is in charge of establishing, in a coordinated manner, the policies, strategies and procedures for the application of the CDM and is assisted by an Advisory Committee integrated by technicians of the mentioned ministries and representatives of the productive sectors and non-governmental organizations.

Within the non-Annex I Parties of the Convention, Uruguay was the third to submit its Initial National Communication. It was also the first non-Annex I Party country in receiving financial assistance from the GEF (UNFCCC financial mechanism) for the elaboration of a Second National Communication and the first to execute a mitigation demonstration project, with the financial assistance of mentioned fund. This has developed an interesting project execution capacity with external assistance. In this regard, the following aspects are pointed out:

a) Through the MVOTMA's Enabling Activity for the Preparation of Uruguay's Second National Communication to the UNFCCC which is under execution with the GEF financial assistance, two programs are being developed as part of Uruguay national action plan: a GHG Mitigation General Measures and Climate Change Adaptation program (PMEGEMA) and a Voluntary Abatement of Net

GHG Emissions program. This complements with another result already achieved: the Third National Inventory of Greenhouse Gas (GHG) Emissions and Removals, published in April 2001.

b) In order to develop the PMEGEMA, the CCU has established and coordinated nine Sectoral Working Groups (Energy, Transport, Agriculture, Waste Management, Fisheries, Biodiversity, Human Health, Coastal and Water Resources). In these groups there were represented all the stakeholders of the national activity (public and private institutions, NGOs).

c) The GHG emissions mitigation activities compose the instruments through which the certified emission reductions foreseen by the CDM will be accomplished. In this respect, the MVOTMA is executing a Landfill Methane Energetic (electric) Recovery Demonstration Project at Las Rosas (Department of Maldonado), with GEF/World Bank assistance. Through the methane emissions mitigation project, emissions of 18,970 tons of CH4, i.e. equivalent to 129.200 tons of CO2 will be reduced. It is foreseen that this demonstration project, on account of its characteristics, will be taken as a model to be replicated at regional and national levels.

d) A study on the energy sector in Uruguay was carried out and a comprehensive report on “Identification Study on Mitigation Measures of GHG Emissions in the Energy Sector” was published in November 1999. This study included sectoral and emission scenarios projected until the year 2013. This study constitutes a first and approximate guideline for the development of a mitigation policy in the Energy sector.

e) The UCC has carried out during the first semester of year 2002 a Preliminary Study on the Application of the CDM in Uruguay, with the financial assistance of the International Development Research Centre (IDRC). The Study quantified in a preliminary way the potential for GHG emission reductions of a group of projects ideas in Uruguay and assessed the related cost of GHG reductions.

During the COP 8 at New Delhi, the MVOTMA and the Netherlands Ministry of Housing, Spatial Planning and the Environment have entered into a Memorandum of Understanding on co-operation in the field of the Clean Development Mechanism (CDM) under article 12 of the Kyoto Protocol to facilitate the development and implementation of greenhouse gas emission reduction project activities in Uruguay and the transfer to the Netherlands of the agreed part of the certified emission reductions resulting from those project activities

3 Objectives of the project

The objective of the present Study is to improve the capacities for the CDM in Uruguay, through the elaboration of the following concrete products: i) a proposed methodological guideline for the identification and presentation of CDM projects; ii) a proposal for a national CDM action plan; iii) an approach for diffusion and public awareness for CDM and iv) a capacity building program to facilitate the transfer of environmentally sound technologies.

4 Outputs of the Study

4.1 Proposed Methodological Guidelines for CDM Projects

One of the responsibilities of the Designated National Authority is to promote and facilitate the CDM projects. In order to comply with mentioned responsibilities, a methodological guideline for the identification of CDM projects and following presentation of them before the DNA for approval it is proposed. This proposed guideline is included in the enclosed Appendix I.

The introduction of the guideline contains some basic concepts related to climate change, the UNFCCC, the Kyoto Protocol and the CDM so as to establish a common language.

Then, the first part of the guideline refers to the process of identification of the project idea, including an established format requiring some basic information of the project. This information enables the proponent of the project to evaluate if the idea complies with the requirements of any CDM project.

Thereafter, the second part of the guideline refers to the presentation of a CDM project before the DNA for its national approval. This part is complemented with several appendixes containing:

- List of sectors and categories for CDM projects
- List of Greenhouse Gases targeted
- Proposed sustainable development criteria for CDM project national approval
- Project Designed Document approved by the CDM Executive Board
- Small Scale Project Designed Document approved by the CDM Executive Board
- Suggested Elements for the Elaboration of a Proposal Containing the Instructions for the National Approval of CDM Projects
- Format and guideline for the application of promotional declaration of a project

4.2 Proposal for a National CDM Action Plan

In order to carry on with the activities that Uruguay is performing for the implementation of the CDM in the country, a proposal for a National Action Plan has been formulated which consists of the components described below.

The total estimated cost for the proposed Action Plan is US$ 200,000. This figure doesn't include the Capacity Building Program to Facilitate Transfer, Promotion and Dissemination of Environmentally Sound Technologies and the Training, Difussion and Public Awareness Enabling CDM Projects Program, included in points 4.3 and 4.4 respectively. Due to the fact that the basis for establishing such programs are presented, funding and resources would be required to design them and then estimate their cost.

It is very important to notice that the present proposal it is the first version of the Action Plan, therefore it will be reviewed and modified.

4.2.1 Promotion of the CDM

Objective

Facilitate, promote and foster the development of CDM project activities by improving, strengthening and coordination of the existing capacity.

Justification

Given the fact that the CDM process it is a very young mechanism and that the rules for its application are being defined, it is necessary to carry out diffusion and public awareness activities among the national stakeholders with the purpose that they understand the benefits of the CDM and be prepared to participate in the carbon market in a competitive way.

Estimated Cost: US$ 68,000

Activities

4.2.1.1 Public Awareness and Diffusion on CDM Field and Stakeholder CDM Project Development Capacity Building

The limited knowledge and understanding of the opportunities that CDM represent to Uruguay and the limited capacity among the national stakeholders to formulate and develop CDM projects are important barriers to the CDM. Thus, it is proposed to increase CDM awareness through several seminars in different regions of the country and to train in project formulation sectors with CDM potential.

The seminars will include the following topics: the climate change issue, the international negotiations within the framework of the UNFCCC and the Kyoto Protocol, carbon markets, CDM opportunities and benefits in Uruguay, CDM project cycle and management. For this purposes, it will be necessary to elaborate, reproduce and distribute different supporting materials (brochures, technical briefs).

Capacity building activities for project development will consist of hands-on training sessions focused on a step-by-step real case CDM project development in each sector with CDM potential.

All the supporting materials and the reports with the outcomes of the different seminars and training sessions will be available at the UCC's web site.

In this way, the stakeholders will increase their understanding of CDM and its opportunities. Moreover the sectors with CDM potential will be able to take their projects through the CDM project cycle.

4.2.1.2 Design of Selected CDM Projects

In order to facilitate the submission of CDM projects to the CDM Executive Board it would be useful to develop a pre-feasibility review of selected potential CDM project ideas.

First it would be necessary to select for example three project ideas representing each of the main sectors. Then the projects should be design and finally a detailed pre-feasibility assessment will be conducted.

The results of this process will be collected in a document and posted at the UCC's web site.

4.2.1.3 Deepen Links with International Organisms with Regional Representation in Uruguay Working in CDM Matters

In the framework of this activity it is foreseen to deepen the links already established with regional representation offices located in our country of international organisms that are actively working in CDM matters. This will enable to co-ordinate efforts and take advantage of the possible existing synergies between the institutions as well as to reach the regional knowledge market related with CDM. In this regard the following organisms, both located in the city of Montevideo and representing the Latin America and the Caribbean region, are mentioned as examples: ARPEL Executive Secretary (Regional Association of Oil and Natural Gas) and the CIER Executive Secretary (Regional Commission of Energy Integration).

4.2.2 Consolidation of the National Institutional Capacity Building for the Approval and Development of CDM Projects.

Objective

To create, initiate and maintain in operation the necessary and appropriate institutional and regulatory framework for the approval and development of CDM projects in Uruguay.

Justification

For a CDM project to be validated by the Designated Operational Entity[1] and be further registered before the CDM Executive Board[2] the Designated National

[1] Designated Operational Entity: Independent entity appointed by the CDM Executive Board.

[2] CDM Executive Board: Organ that supervises the CDM and reports directly to the CMNUCC Conference of the Parties

Authority (DNA)[3] approval of the host country is required. This approval is subject to the accomplishment of the following basic requirements of a CDM project: i) its contribution to the sustainable development of the country and ii) voluntary participation. In Uruguay the DNA is the Ministry of Housing, Territorial Regulation and Environment and the Climate Change Unit performs the corresponding executive functions. This means that for a CDM project to be developed in Uruguay, the project must count with the ministerial resolution granted by the MVOTMA establishing the compliance of the two aforementioned requisites.

For this it is necessary to define and put into operation the institutions, criteria and procedures that assure the approval of CDM projects in a fluent, efficient and transparent way. The fact of having institutions with clearly assigned functions as well as procedures specifically established will contribute to increase the competitiveness of the Uruguayan projects.

Estimated Cost: US$ 48,000

Activities

The activities included in this component of the National Action Plan proposed are summarized below:

4.2.2.1 Creation of a National Board for Climate Change Joint Projects (JNCC)

As mentioned before, the national approval of a CDM project is linked to the evaluation of its contribution to the sustainable development, an evidently multidisciplinary issue. For this reason it is convenient that the functions to be followed by the national competent authority be carried out in coordination with other public and private entities in this matter. At the same time, it is convenient that the institutions involved in this process proceed in a fluent and efficient way. Consequently, it is considered appropriate to formalize the national existing coordination ambit in the matter of Climate Change through a Decree creating the National Board for Climate Change Joint Projects (JNCC). This Board shall be integrated by the Ministries of Environment; Foreign Affairs; Economy and Finance; Energy, Industry and Mining; and Livestock, Agriculture and Fisheries and will be assisted by an Advisory Committee integrated by technical representatives from the mentioned ministries, as well as representatives from the productive sectors and NGOs.

4.2.2.2 Elaboration and Adoption of Guidelines and Procedures for CDM Project Submission and National Approval

The national approval of a CDM project is a process that should fulfil a series of stages and provide some basic information, which in turn shall be the basis for the CDM cycle to continue until final certification of emission reductions.

First, and in accordance with provisions of 4.1 supra, a proposal of methodological guidelines has been prepared for the identification and presentation of CDM projects. This proposal is attached as Appendix 1.

[3] DNA: Ministry of Housing, Territorial Regulation and Environment

Based on these proposed guidelines for project idea identification, informal consultations at personal and institutional level will be made, with entities and technicians linked to the areas that, according to the identified reduction potential, are feasible for CDM projects, in order to improve the guidelines for project identification and for it to be used in the elaboration of project ideas at the various levels.

After the incorporation of the contributions obtained from consultations and after the guidelines approval by the JNCC, they would be publicized at national level and those entities already contacted will be invited to a national workshop aimed at compiling and discussing projects ideas that would conform a portfolio for supporting international, regional and even local negotiations in search of investors for CDM projects.

Second, and also in accordance with provisions of 4.1 supra, a methodological guideline has been prepared for CDM project submission to the Designated National Authority for national approval and further validation by a Designated Operational Entity and register with CDM Executive Board. The national approval requires the project contribution to the sustainable development of the country. The format and information requirements included in this guideline are based on the instructions defined by the Designated National Authority or documents or formats approved by the CDM Executive Board. Information provided would enable the evaluation of the project contribution to sustainable development, as required to obtain the approval by the Designated National Authority, or otherwise show benefits arising from the project application that would facilitate its implementation from other points of view.

This guideline should have the necessary information for CDM project approval by national authorities, particularly those required by the Advisory Technical Committee in charge of assessing each project prior its presentation to the JNCC for approval. Thus, a guideline draft will be sent to all the Ministries that participate in the JNCC for it to be assessed by each ministry. Moreover, they will be able to present their initiatives in reference to the minimum basic information each of them would required in order to grant national approval.

After this round of ministerial consultations, a workshop will be organized with all members of the CTA (technical representatives of the ministries participating in the JNCC and representatives of the productive sector and NGOs) to evaluate the scope of the various elements of the Guideline proposed and the modifications suggested by each Ministry involved, so as to finally obtain a consensus document, able to facilitate project elaboration and nationa approval, by providing clear and detailed information on national requirements for CDM projects to obtain the national approval .

Finally, a final version of this guideline will be prepared and make public through the official publishing mechanisms of the Ministry including the UCC's web site, and a team will be conformed to train the members of the CTA in order to put together those criteria and procedures arising from the guideline for CDM project approval.

4.2.2.3 Establishment of Sustainable Development Criteria for the Approval of Projects under the CDM

While each host country is completely free to establish the way in which it will determine whether CDM projects contribute or not to promote sustainable

development, it is relevant to develop basic criteria of sustainable development to systematize and facilitate the process. This would also contribute to the transparency of the procedure, an aspect of great importance for the functioning of the mechanism, and to generate high quality projects, which would result in a lesser risk to both the one proposing the project and the investor.

In view of the above, a proposal of sustainable development criteria for the approval of projects under the Clean Development Mechanism was elaborated. This proposal it is included in the Annex 4 of the Methodological Guidelines for Identification and Submission of CDM Projects, presented in the Appendix 1. It will be subject to a process of consultation in a first instance, through interviews involving representatives of governmental institutions, the private sector, the academic sector and NGO's, in order to adjust the list of criteria and indicators, and thus improve the proposal.

Later on, the proposal will be presented in a National Workshop with all the stakeholders. In this ambit, the assignation of weigh coefficients to categories, criteria and sub-criteria will be carried out by small working groups.

4.2.2.4 Elaboration of the Instructions for Calculation of Sustainable Development Indicators established in d) and further evaluation of their applicability

As specified in the previous paragraphs, the National Workshop will provide a list of sustainable development basic criteria and indicators together with their weighing, in order to apply them to each project requesting host country approval. However, the sustainable development indicators to be used for each of the criteria and subcriteria should be as clear and transparent as possible to avoid dissimilar interpretations that may alter the final results of their calculation or appreciation (in the case of qualitative indicators), otherwise, they may render differences amongst projects that do not result from the projects themselves but from different interpretations or calculations of those indicators -a fact that would impair evaluation fairness and hinder the use of the indicators.

Taking this into consideration, three work groups -with members representing the ministries that will compose the CTA- will be created to develop each of the three categories used in the sustainable development criteria, i.e. 1) environmental, 2) social and 3) economic.

Each group will be in charge of providing a strict definition of indicators use to measure each criterion and / or subcriterion composing these categories, by applying the proposed criteria to at least three CDM projects that have already been performed or are highly advanced. From this practical experience, conclusions will be drawn up and decisions will be made on the steps to be taken to obtain the quantification for each indicator used. Then a workshop will be held with the participation of the three groups, to analyse the interrelations between the various aspects dealt by each of the groups in the three categories.

Finally, a base document will be elaborated that will be submitted for approval to the JNCC, and will be used by the CTA for measuring the results of sustainable development criteria, based on an objective and common set of indicators that will apply to all projects to be considered.

4.2.2.5 Capacity Building for National Verification of CDM Project Baselines

Although the validation of the baseline study for a CDM project is to be made by the Designated Operational Entity, taking into consideration the significance of such study, its verification by the Technical Advisory Committee is considered appropriate. This will help national stakeholders to feel certain that such study is adequate.

With this purpose the organisation of training practical workshops addressed to the CTA members is proposed. The selection of three project ideas or else three developing projects pertaining to different sectors is suggested for the development of these workshops. At the same time the determination of the baseline of a specific sector with CDM potential could be worked on.

Complementing the above, the CTA may request the opinion of the national agencies competent in the subjects in question.

4.2.2.6 Creation of a CDM Registry

The formulation and implementation of CDM projects in the country will promptly start, provided that current efforts made by the authorities and the actions oriented to face immediate future, which are mostly described in this Action Plan, are relatively successful in producing a portfolio of project ideas and enhancing and improving information on the subject -a fact that may also result in new projects. Thus, an increasing participation of CDM projects in the country is expected as a result of these activities and the inherent potential of some sectors where activities of this kind of project would be developed.

For this reason, developing a monitoring system of the various stages of each project cycle within the country -beyond the approval by the National Authority- is important. Furthermore, it is also necessary to have available information on relevant aspects such as, number and type of projects performed or under execution, general and particular outcomes of the measuring of sustainable development criteria and indicators, reductions of GHG emissions, their certification, deadlines, accomplishment of objectives and explanation for deviations, etc.

These data will increase the efficiency of the authorities in approving projects and fostering this type of projects, while providing information to markets, sectors, and investors, thus contributing to make CDM investment in Uruguay more attractive

For this purpose a registry for CDM projects will be created under the sphere of the DNA, which will register: name of project -exclusive for each activity-, location of project activities (department, region or city), participants (local party, sponsors, Annex I parties, etc.), project activity, date of start and duration, CERs issued per year (both corresponding to CDM and the rest) and their subsequent verification -including those differences found respect to the original project-, first destination of CERs in carbon markets, monitoring of steps for national approval, outcomes per category, sustainable development criteria, subcritera and general level, and specification of the stage of project and corresponding duration.

Summary reports of the information in the registry will be regularly made, and the corresponding electronic versions will be published in the UCC web page.

4.2.2.7 Capacity building in legal fields: contracts, CERs property rights

The sale of certified emission reductions (CERs) represent an income of the project that in some cases may be crucial for project profitability, while in others may make an additional contribution to economic-financial indicators. Within this context, the legal and regulatory framework ruling CERs issue and trading in CDM project contracts should be analysed. For that purpose the legal conceptualisation of the CERs in our country has to be studied and understood in order to determine who owns the corresponding titles (CERs), and the fiscal system to be applied. Also the role to be played by the State in a system of transferable certifications like this must be defined.

As a first approximation to legal and fiscal aspects, a preliminary report about CERs issue and trading has already been made, including legal interpretation, probable fiscal system and mechanisms to deal with interpretations in considering the application of taxes to CERs trading. International antecedents have been surveyed as well as local experiences that, at a first instance, may be considered similar. Also technicians working on related areas were interviewed. Finally, a legal environmental advisor prepared a report on the legal interpretation alternatives based on international experiences and Uruguayan Law. These reports are attached as Appendix II.

The above process showed both the difficulties existing for interpreting these events and the degree of uncertainty entailed. In view of these conclusions, is proposed to further study legal and tax aspects related to the contracts, property rights, trading and taxes applicable to the CERs.

For this, a new legal report has been planned to provide an in-depth analysis of the issues encountered in the first approach, particularly the legal conceptualisation of these instruments and its application in contracts.

After knowing these report results, an analysis on the tax system to apply to CERs issue and trading will be made by specialists on these subjects. Special care will be taken in considering present and future progress made on this area at the CDM level.

Then the General Fiscal Directorate (DGI) will be consulted on the tax system applicable to these cases. Both preliminary reports will be provided to the DGI, as this is a new issue in the country even for this Directorate.

Taking this into consideration and to make progress on this aspect, the Ministry of Economy and Finances will be asked to send a representative of the DGI to the Technical Advisory Committee of the JNCC.

The interpretations obtained with these preliminary reports will serve as basis for a workshop discussion to be held with the technicians working on these issues, aiming at defining a proposal to eventually modify national legislation in order to foster CERs issue and trading by reducing or eliminating the tax burden affecting them, with a view to promote CDM projects in Uruguay.

The proposals obtained will be analysed and then submitted to the JNCC, which will be in charge of outlining a proposal of changes to be introduced in the national legal framework.

A manual on CDM project contracts legal and fiscal aspects will be elaborated, including those concerning to CERs issue and trading, which will be submitted to the JNCC for its dissemination through the UCC web site. This Manual will be kept updated with corresponding national and international modifications.

Additionally, in order to offer training in CDM project legal and fiscal aspects, two seminars will be organized during the current year and the next one on this manual and the changes introduced both at local and international level, intended for those participating in project activities and technicians related to these issues.

4.2.2.8 Defining the Basis to Create a Carbon Accounting System

The basis should be defined to establish a system to account carbon emissions into and removals from the atmosphere. This system aims at the following objectives: i) provide a general framework of transparency and credibility to carbon sequestration projects in activities of land use and land use change, thus generating a competitive advantage for the country and ii) facilitate control of leaks in carbon sequestration projects, thus minimizing one of the grounds for greater concern related to these projects.

The key elements that are suggested for evaluation are available to an acceptable extent; they are: i) areas with different cover and use of land, as resulting from satellite images, surveys and affidavits, ii) land maps and iii) weather maps.

These elements should be completed with field data and the idea is that this information will feed a Geographic Information System (GIS).

For the stock and stock change calculations national data may be used if there are not IPCC[4] data tables available. However, the use of default values reduces the quality of these systems so it becomes necessary to analyse forms to overcome these restrictions.

The database that describes land units in terms of vegetation and management composes the basis for accounting and reporting. However, a system like this has many additional applications besides those linked to climate change, which are useful for public policies.

The system would render quantitative information on emissions and removals by type of land use defined, showing atmosphering impacts and trends in emissions and removals.

The system would in principle, cover forests and soils as these are the two main land carbon sinks of the country.

4.2.3 Support to marketing of project portfolio

Objective

Train stakeholders to identify, formulate and capitalize CDM projects, as well as to carry out an international promotion of the project portfolio developed by the country.

[4] Intergubernamental Pannel for Climate Change

Justification

In order to promote the elaboration of CDM projects in Uruguay, an important critical mass should be generated, to face the challenges of this kind of activities. This will allow to develop national capacity able to formulate, execute and even finance, to a certain extent, an important number of CDM projects, of such a quality level that would permit a fluent performance of the various stages of a CDM project cycle, and attain positive results for the national economy as well as for the environmental and social objectives of the projects.

In this sense, it is necessary to identify some key areas to train local stakeholders, aiming at identifying and capitalizing CDM projects. Such areas would be: information for the identification, formulation and design of the project; study of international carbon markets; risk mitigation schemes; financing sources and alternatives.

If a significant advance in these areas is reached, local stakeholders will be able to generate -based on their training- high-quality ideas and projects, which can be promoted internationally and which will attract foreign partners, i.e. public or private entities from Annex I countries.

Estimated Cost: US$ 40,000

Activities

The activities proposed to reach the established objective are the following.

4.2.3.1 Study of International Carbon Markets

Information on carbon markets will constitute a basic tool for the promotion of CDM projects elaborated in the country in the near future, since in many cases, the viability of the project, or otherwise, its profitability rate, will rest on such information, depending on the contribution of CERs trading in the international market through investors from the countries in Annex I.

Given the importance of this information, a first approximation was carried out, and information on carbon markets was surveyed, conducting an analysis of their current situation and the future of GHG international markets, based on the analysis of the literature on the results of the projections of different economic models which have been used so far in different studies in this field.

This initial information obtained, consisted of the dimensioning and characterization of the current markets and estimates of demand future levels based on the information provided by models and studies.

On this basis, and together with studies carried out in our country over the emission reduction potential of the country, it is possible to outline strategies to penetrate these markets in the future.

As a result, it is hereby proposed to design and build up a system to enable Uruguay to keep updated international information on carbon markets. For this purpose, the starting point should be to make a survey of the main web pages informing about the performance of this kind of studies, and their periodical follow-up in order to make a systematic evaluation of the same.

Also, progress will be made by following previous work done to determine future demand, by surveying the different economic models of GHG markets projections available in the market; and for this purpose a technician will be trained in their regular use in order to produce future demand alternatives based on these models and compare them with the opportunities generated by the country's potential and the CDM projects on course. These analyses should be publicized through the UCC web, and once a year, a workshop will be carried out with stakeholders to discuss the evolution of carbon markets, their future, and our participation in the same, with a view to contribute in decision making.

4.2.3.2 Mitigation of Project Risk.

Together with the above, CDM projects risk mitigation schemes should be strengthened by training stakeholders in risk evaluation, both in reference to the country risk and corresponding sector's risks as well as risks of the project itself.

For this, three pilot project ideas will be selected corresponding to different sectors, with different problems and future projections in agreement with the expected demand according to the carbon international market analyses.

Based on this, these pilot projects will be designed and formulated to obtain the necessary information about the risks that might be found, in order to mitigate them by improving their formulation. In this way, valuable information will be available, which will have to be taken into account in the future contracts for CDM projects.

As a synthesis of this work, a document will be drawn up. Such document will provide detailed information of the potential risks identified in the formulation these type projects, corresponding mitigation forms and the impacts of identified risks on each project results in cost and benefit terms.

Also a guideline including potential and possible risks of CDM projects will be made, with special emphasis on the differences found amongst the sectors analysed in this opportunity.

These documents will be publicized through the UCC web site, being the materials at the disposal of those interested.

4.2.3.3 Financing sources and alternatives

One of the important areas mentioned above is the one referring to the financing of the CDM projects, which becomes a key element in countries such as ours, where capital markets are hardly developed and project financing usually depends on foreign financing, which adds risks and uncertainty to this kind of activities.

Therefore, first, the above mentioned formulation of pilot projects will be used to identify the financing needs of the projects for each of the considered sectors, based on their cash flows and the inherent characteristics to the financing process designed thereby.

Such financing needs should be considered at the various stages of the project cycle in each of the analysed sectors.

Besides, inquiries to the main consultancy companies of the country, specialized in project design and formulation (general, not CDM) will be made. Such inquires will be made for each sector considered, so as to complement the analysis of the pilot projects and to be able to identify the main financial needs and their characteristics for the formulation and implementation of projects in the country, by expanding the range and incorporating information from specialists, even though not specifically in CDM projects.

The results of these activities will hopefully provide an overall view on this subject, which will have to be completed with a research on the existing or potential financing sources, to which a CDM project could accede both locally and internationally.

As the analysis would be make by sector, first, a research will be conducted of the most traditional financing sources in the country corresponding to each of the involved sectors, taking into account the current credit lines from the local and international markets, and those possible to be obtained based on certain considerations about the future of the country and of the involved sector itself.

Then, possibilities of other financing sources, different from the traditional ones, will be studied, which may be acceded to in the international markets or even developed in the limited local markets, such as compensation funds, securities, capital shares, etc..

All the financing possibilities which have been or are being developed under carbon markets should also be assessed, as well as the credits to which there is access to through these markets, or the funds created in order to promote and develop GHG emission reductions at global level. In this case, the characteristics of these funds and their current and even future availabilities according to each of the analysed sectors, should be taken into account in the research.

Finally, according to previous research, new financing alternative sources, other than the traditional ones, will be proposed, so as to be able to develop strategies, to be carried out in the international markets, to obtain new and more profitable ways of funding that may complete or complement the traditional ones, for CDM project development in the country.

Among these proposals, the possibility should be evaluated of developing a national investment fund, able to participate in the capital markets taking advantage of current advances in this area both at the local and international level.

These studies should be incorporated in a document, which will be disseminated aiming at stakeholders capacity building. For this purpose, it will be first published in the UCC web site, and then a seminar will be carried out with the participation of sectorial project developers, with a view to be a contribution to future strategies in these fields.

Finally, permanent updating of the surveyed and researched sources should be encouraged, as well as the follow-up of new alternatives for CDM project financing.

4.2.3.4 International Promotion of Project Portfolio

A relatively studied project portfolio that includes the minimum necessary information is an important tool to attract interested parties both locally and

internationally concerning the opportunities arising under the CDM. This project portfolio should therefore be promoted, in order to enhance Uruguay's participation in the international carbon markets through its projects.

The strategy for that purposes focuses on three complementary lines aimed at making the project portfolio internationally known, and consequently increasing Uruguay's possibilities of participating in the carbon markets

Firstly, aiming at a general scope, the UCC web page will be used, as defined in previous components of the proposed action plans, including Project Idea Notes (PINs) and other type of complementary information to that of such documents. In a similar way, the information published in the web on the CDM in Uruguay, its authorities, strategies, actions, potential of emission reduction, guidelines for the identification of ideas and formulation of projects, sustainable development criteria for national approval, etc. also represents a contribution.

Secondly, permanent contacts will be established with brokers and associations of same, IETA (International Emission Trading Association) for example, acting in the carbon markets, to inform them of particular aspects of CDM projects in Uruguay, providing information about the prepared portfolio, other project ideas, the country's potential in terms of GHG emission reduction and those actions taking place in the country to improve Uruguay's participation in the CDM.

Thirdly, aiming at a specific scope, the UCC through the MVOTMA will act in coordination with the Ministry of Foreign Affairs to disseminate this project portfolio and the rest of corresponding information about CDM in Uruguay, in those Annex I countries of Kyoto Protocol where Uruguay has a representation and in fora where it participates. For this purpose, the UCC will prepare all necessary materials and will arrange mettings with the staff of the mentioned Ministry to inform them about CDM and the project portfolio. Further, explicit information of the scope of the project portfolio and actions of Uruguayan authorities in this respect will be given to all embassies of Annex I countries in Uruguay.

4.2.4 Revision and Updating of CDM Potential and of Applicable Procedures for National Approval of Projects According to New National and International Frameworks

Objective

Maintain updated information on national potential of GHG emission reduction, according to changes in the national and international reality, taking into account new CDM rules, and considering new sectors or markets accepted under the CDM for the formulation of projects in the country.

In addition, the procedures applicable to the national approval of CDM projects will be revised and updated, since such changes may alter the functioning or even the scope of documents, criteria, requirements, etc., inherent to such responsibility under national authorities.

Justification

Regulations of Kyoto Protocol, particularly of the CDM, through new decisions and rules to be defined by the COP and the Executive Board, may imply a restriction or an expansion of possibilities for channelling of resources towards

different types of project, and this in turn may substantially change the national potential for GHG emission reduction.

In addition, these regulations and the dynamics of national and international economies will produce changes in markets and in the opportunities to enter these markets in the various countries, thus also changing the corresponding potential for GHG emission mitigation.

The above will in turn alter the characteristics of carbon markets, both respect to trading volumes and reduction prices, affecting sector and project maps of the projects to be implemented in the different countries and therefore their potential to address these markets.

Project implementation will then depend on project eventual potential and its design and formulation, which increase the relevance of the national approval, and of national instructions and guidelines established by national authorities to promote these projects.

It is therefore important to have a national strategy to permanently update both the national potential of emission reduction and the national procedures for project approval and promotion.

Estimated cost: US$ 44,000

Activities

Activities proposed to accomplish the objectives established are as follows:

4.2.4.1 Compliance with CDM rules

As mentioned previously, the CDM rules have undergone a process of adaptation due to the changing circumstances of the world and to the natural learning process of those participating in the different areas included under the CDM.

Thus, it is important to be permanently acquainted with these regulations and changes, as well as with the causes they respond to, to be able to assess the probable evolution of the mechanism and hence, the national potential of emission reduction of the country, the sectors included, its scope, projects to be formulated, etc.

In this sense the creation of a registry is proposed that will include the rules, their origin, causes and probable consequences on the emission reduction potential, and project approval and promotion in the country. A report of CDM rules will be published periodically, including recent evolution and possible impacts.

It will also include, if it corresponds, an analysis of new sectors or activities covered by the CDM under the new rules.

4.2.4.2 Knowledge of environmental regulations

Similar to above comments about changes in CDM rules, countries adapt their environmental regulations according to progress in scientific knowledge, the experience of the regulators and those participating in these spheres, modifications in political, social and economic strategies both of government and other stakeholders, etc.

In such complex and changeable framework as described, environmental regulations are created and modified, generating in turn changes in the behaviour of good and service markets that then interact with the regulations that originated those changes and lead to the generation of new environmental relations. This process, together with the scientific-technological development, is giving rise to the referred permanent change of laws, decrees, regulations, etc.

In view of this, all existing environmental regulations in the country should be studied, analysing them under CDM requirements, and a system would be designed for their updating, in coordination with the various departments within the Ministry of Environment.

In-depth analysis will be carried out periodically of the environmental regulations of the country and their interrelations with international ones, projecting current and future development within this framework.

4.2.4.3 Study of National and International Markets of CDM Sectors or Activities

The changes underwent by the CDM, for instance regarding land use, will probably continue in the future, including under the mechanism new activities.

Further, also changes in the markets of those sectors and activities already within the CDM take place, which generate new views and opportunities for the assignment of resources in a country like Uruguay, to undertake certain types of project, within a framework of potential for emission reduction altered by the influence of new sectors and the changes in the existing ones.

Thus, the study of national and international markets of CDM sectors or activities becomes more relevant for the future of the CDM in the country.

This study is too large a task to be carried out by the current CDM structures in the country, besides the fact that results may not prove highly efficient in view of the technical specifications required.

In this action plan, a survey is proposed of public and private services existing in the country that keep informed of the national and international framework, with an emphasis on sectoral analysis, aimed to a subsequent selection of those considered most suitable according to sector and activities included under the CDM.

Through these services, information will be obtained of similar analyses performed in the world market, compatible with information provided by those. A selection will be made of those considered most suitable to the objective of informing on CDM sectors.

Once selected, the necessary connections will be established for their periodical updating, with a specific analysis of those sectors and activities considered under the CDM.

Such analyses will be made in accordance with those developed in studies of carbon markets included in the corresponding point 4.2.3.1. supra.

Finally, in the event of incorporation of new sectors, a similar process will be carried out, selecting information sources of the national and international markets of such sectors.

The information obtained will be recorded and arranged by sector, making available on the UCC web site a periodical summary by selected sector, including an assessment of impacts concerning the future of the CDM in the country.

4.2.4.4 Information to Stakeholders about the Potential for GHG Emission Reduction

In 2002, a Study was published supporting the application of the Clean Development Mechanism of Kyoto Protocol in Uruguay, with the assistance of the International Development Research Centre. This study is the main antecedent in the country in matter of potential for GHG emission reduction under the CDM.

The theoretical national potential for emission reduction in the study is the result of applying previously identified GHG emission mitigation options.

Therefore there is an approximation to the country's potential, as well as a preliminary list of project ideas, which may later develop and be transformed into projects to be included under the CDM.

Therefore, this study is a tool that enables the evaluation of Uruguay's options and opportunities in the potential international market of GHG emission reductions through the CDM, and of its contribution to the development of a strategy for the country's participation in the carbon markets.

The evaluation is performed by the authorities and by those interested in the project ideas therein included and others to be identified not considered in this study, yet indirectly promoted by the study by providing information on CDM projects.

On account of the changes mentioned previously regarding the markets of sectors and activities where CDM projects can be developed, national and international frameworks, strategies, regulations, etc, it must be concluded that the potential calculated in such study is practically permanently changing.

It is proposed that the study be updated to render a better approximation to the country's emission mitigation potential, in the light of increased experience and the changes having occurred and to occur in the markets of those sectors and activities considered under the CDM, the carbon markets and the very CDM.

This will provide stakeholders and authorities with essential information for identification of project ideas and for the development of design, formulation or implementation of CDM projects.

4.2.4.5 Updating of CDM Project Approval Procedures

As mentioned before, a proposal of sustainable development criteria for the national approval of CDM projects has been made and is now under consideration by the various national authorities that participate in the CDM.

The previously mentioned changes in the external and internal frameworks, in the sectors, activities, rules and regulations, at the local and international levels, will affect with the passage of time and the evolution of societies both the definition of criteria and the ways of quantification, and even changes within the CDM.

To that effect, it is proposed that the sustainable development criteria used be periodically studied and compared with the changes occurring in the various

fields affecting them, based on the activities previously developed. In the light of this study, changes will be proposed as deemed necessary to adapt these criteria to a changing reality.

A set of instructions for approval and a guideline for project presentation have also been proposed. This way, the information to interested parties is fairly complete in these aspects and enables promotion of CDM projects while facilitating their process of approval.

The national authorities evaluate the information contained in the project documentation, taking into account sustainable development criteria defined to this end, applicable legal and administrative norms as well as any other information and considerations arising during such process. A report is then submitted to JNCC relative to the project adaptation to national and international norms and procedures regulating CDM project activities, its contribution to the country's sustainable development and pertinence of its approval.

A periodical evaluation of the approval procedures is proposed, regardless of the sustainable development criteria, together with CDM rules and national regulations, also considered in the previous activities, in order to update the instructions and the procedures and elements for national approval, adapting them to the changes within the context of CDM.

4.3 Training, Difussion and Public Awareness Enabling CDM Projects

4.3.1 Introduction

Several public and private entities of the Energy, Transport, Forestry, Agricultural, Industrial an Wastes sectors, may take advantage of the additional income arising from the execution of CDM projects or from the new opportunity for investment initiatives previously discarded for not being feasible and that may become viable if developed under the clean development mechanism.

To obtain the maximum possible profit from the CDM it becomes necessary to build adequate capacity and information in order to enable potential national participants to become interested and to understand, explore and take advantage of the opportunities and benefits implied by this kind of projects.

4.3.2 Background

From the start of the Institutional Strengthening Projects on Climate Change, the Ministry of Housing, Territorial Regulation and Environment (MVOTMA), though its operative and executing agency, the Climate Change Unit (UCC) has developed the following training, diffusion and public awareness activities:

a. Elaboration, publishing and distribution of bulletins targeted for different sectors of public.
   - “Cambio Climático – Calentamiento Global” (Climate Change and Gobal Warming) (High-schools and technical schools, teachers and general public)
   - “Cambio Climático” (Climate Change) (school children, teachers and general public).
   - “Para comprender el Cambio Climático: Guía Elemental de la Convención Marco de las Naciones Unidas y el Protocolo de Kioto” (Understanding Climate Change: Elementary Guidelines of the United Nations Framework Convention on Climate Change and the Kyoto Protocol) (high-school and technical schools and teachers)
   - “Mecanismo para el Desarrollo Limpio, Protocolo de Kioto” (Kyoto Protocol Clean Development Mechanism) (General Public)

b. Elaboration and massive distribution of stickers on atmosphere protection

c. Elaboration and making of posters (four colours) with information on Uruguay and its activities relative to Climate Change.

d. Distribution of bulletins -coordinated and in collaboration with Education Authorities- amongst teachers and students of schools, high schools and technical schools of Uruguay

e. Creation of the web page of the Climate Change Programme of Uruguay including information on Projects executed by UCC and access to publications published by such Unit.

f. Participation of UCC technicians in interviews, lectures and press conferences.

g. Lectures and conferences in various events organized in cooperation with other national institutions or non-governmental organisations.

It should be noted that complementary to above list, the UCC has elaborated and published the following publications:

a. “Inventario nacional de gases de efecto invernadero: 1990”(National Inventory of Greenhouse Gases: 1990), 127 p (March 1997)

b. “Comunicación Nacional Inicial del Uruguay”, (National Initial Comunication of Uruguay*), 80 p. (October 1997)

c. “Inventario nacional de gases de efecto invernadero:1994 – Estudio comparativo de emisiones netas de gases de efecto invernadero: 1994-1990”, (National Inventory of Greenhouse Gases: 1994 - Comparative Study of Net Greenhouse Gas Emissions: 1994-1990) 364 p (November 1998)

d. “Estudio para la Identificación de Medidas de Mitigación de Emisiones de GEI en el Sector Energía (Study for Identification of GHG Emission Mitigation Measures in the Energy Sector), 250 p. (November 1999)

e. “Inventario nacional de gases de efecto invernadero:1998 – Estudio comparativo de emisiones netas de gases de efecto invernadero: 1998-1994-1990”,.(National Inventory of Greenhouse Gases: 19998 - Comparative Study of Net Greenhouse Gas Emissions: 1998-1994-1990), 251 págs. (May 2001)

f. “Estudio de apoyo a la aplicación del Mecanismo de Desarrollo Limpio del Protocolo de Kioto en Uruguay “(Study for Kyoto Protocol Clean Development Mechanism Implementation in Uruguay), 164 p. (May 2002).

Within the referred framework, the UCC has also developed several training activities to widen knowledge and information of stakeholders of climate change activities. Amongst these stakeholders we should mention: managers, planners, operators, technicians, both in the public and private sectors of national activities in the various fields of such subject. The following events are amongst them:

a. Workshop Preparing the Implementation of Greenhouse Gases National Inventory and GHG Emissions Mitigation in the Energy Sector (1996)

b. Workshop on Mitigation of GHG emissions in the Agriculture. (1996).

c. Workshop on national and global benefits and determination of project incremental costs (1997)

d. Workshop on GHG mitigation in lime production (1998)

e. Workshop on renewable energy sources and environment

f. International thematic workshop on GHG mitigation in South American region. (2000)

g. Workshop for presentation of projects assisted by the Global Environmental Facility and the United Nation Programme for Development: outputs and perspectives (2001)

h. Workshop on “GEF actions to Promote Synergies in the implementation of Environmental Conventions on Biodiversity, Climate Change and Desertification” (2002).

i. Meeting for launching Climate Change Mitigation and Adaptation Measures. (2002)

j. National Consultation Workshop on the results obtained by the mentioned workgroup. (2002)

The UCC also made some training and public awareness activities relative to the CDM.

a. A cycle of two informative meetings on the Clean Development Mechanism (1998)

b. Workshop on Kyoto Protocol negotiation mechanisms.

c. Meeting as enlarged session of the Technical Advisory Commission for Environment Protection on KP negotiation mechanisms

d. Workshop on CDM application and perspectives (2001)

Likewise during the period 1996-2000, the Uruguayan Network of environmental NGOs and the UCC develped joint public diffusion events on climate change issues, which were attended by more than 3.400 people from various cities of the country, including the Capital City, Montevideo.

There are no other known antecedents in reference to education, training or diffusion and public awareness activities on Climate Change, the United Nations Framework Convention on Climate Change and Kyoto Protocol.

The above mentioned training and diffusion activities were not part of a structured integral programme with explicit and concrete objectives, however, they have provided a significant contribution to the diffusion and public knowledge of several aspects of the Climate Change and the CDM and to an increased awareness on such issues in some specific sectors of society. They have also highlighted the important and increasing roles played by the MVOTMA, as National Authority for Climate Change issues, and the UCC as operational and executing agency in such matters.

The UCC has also revealed its technical and execution potential through the performance of the above mentioned activities, as, with limited resources, it has been able to organize and perform these training and diffusion activities of national level. Therefore, it has accumulated valuable experience, which would be taken into account at the moment of setting a training, diffusion and public awareness programme on CDM issues.

4.3.3 Identification of Instruments

Several organized actions with specific orientation and clearly defined objectives, which for the purpose of this document will be called “instruments”, have been identified as favourable for a training, diffusion and public awareness programme aimed at the broadest application of the Kyoto Protocol clean development mechanism (CDM) and to make the most of the opportunities implied

by project activities under such mechanism. There follows a brief description of those that could be applicable in Uruguay.

4.3.3.1 Training

Training activities aim at concrete target audiences and constitute an instrument intended to teach certain technical experience of immediate practical application. They consist of courses and other activities, generally short or very short in time, with objectives that are not included in formal courses and whose aim is to transmit concrete and applicable knowledge to a specific public.

There follows a description of some of such activities, regardless of any others that may be identified:

a. Technical and Specialized Training

Short courses (from a few weeks to a few months), and some intensive courses (from one to a few days) intended for a specific target public and that are supported by material specially designed for the course characteristics. Their objective is to transfer experience or knowledge on concrete subjects, such as: GHG emission mitigation measures and policies, cooling and heating technologies and air-conditioning, use of models and interpretation of results for calculating emission reductions, etc.

b. Short -time meetings on specialized subjects

These include workshops, seminars and conferences (20 to 100 people) and briefings. These are tailored activities, thought for a previously defined audience and purpose. This instrument would be oriented to analyze, know and disseminate various concrete issues, such as, CC policies, CDM application strategies, mitigation technologies in Energy and Industrial Processes, impacts of land use change and silviculture activities, CDM project activities, standards and methodology for baseline calculation in a CDM project, forms of CDM project presentation, etc.

4.3.3.2 Specialized Support Elements

It includes the elaboration, reproduction and availability of specialized documents and support materials for training. These are key elements to ensure the success of such activities. For this purpose, in every case, all enabling and supporting elements will have to be made available, for example: leaflets, guidelines, manuals, teaching modules, software, etc.

4.3.3.3 Diffusion and public awareness

This item includes:

a. all the activities aiming at raising interest and awareness on certain aspects of climate change that may generate changes in both attitude and behaviour and are intended for the general public;

b. activities that although intended for specific audiences, their purpose is to raise awareness;

c. activities of generation of informative materials, including studies, reviews, and research, for wide dissemination; and

d. communication strategies and presentations for the general public, such as conferences, seminars, workshops, etc.

Diffusion and public awareness activities can be developed by the Government, intergovernmental organizations, non governmental organizations, the private sector or jointly by two or more than those stakeholders and through various modalities, such as:

a. Meetings, including workshops, seminars, conferences and other fora.

   These aim at wide scope objectives, the general public or wide sectors of the public. The issues to be disseminated are rather general, for example: Climate Change and Environment, the Kyoto Protocol, flexibility mechanisms of KP, situation of CDM negotiations, etc.

b. Events, exhibitions, campaigns, including the declaration of a Climate Change Day.

   These include exhibitions, computer demos, awareness campaigns, organization of competitions and massive campaigns, etc. Also a generalized promotion of technologies, such as efficient domestic use of energy.

c. Production and diffusion of general information through informative material (leaflets, press releases and radio and television programmes), publication of press articles and others in bulletins and journals, operation and maintenance of WEB sites for the dissemination of information, products, climate change organization activities and issues, mainly on CDM.

d. Dissemination of information, including translations of results of studies and investigations for the general public.

4.3.3.4 Participation of the Public in Climate Change Issues

This is an instrument intended for involving government authorities, policy makers, and specific groups or sectors in order to facilitate knowledge and understanding of CDM benefits and opportunities, convenience and need to identify and prepare projects, promotion of attitudes favouring the integration of CDM projects and the adoption of measures benefiting GHG emission mitigation and sustainable development. These include:

a. Maintenance of a fluid and permanent dialogue with stakeholders including, decision makers, public authorities, representative production sectors and non-governmental organizations.

b. Establishment of advisory or consulting groups.

c. Motivation of potential stakeholders (private companies, NGOs, etc) to develop project identification and promotion activities.

4.3.3.5 Identification and Strengthening of Links with other Conventions and Protocols

The identification of links between the activities of training, diffusion and public awareness and those corresponding to climate change programmes (general measures for mitigation and adaptation, voluntary abatement of emissions and

transfer of environmentally sound technologies) and others carried out under other conventions and protocols, allow evaluation of opportunities and strengthening the advantage meant by the resulting synergies. This instrument must be used to optimize the potential effect of articulating all actions of same nature in similar areas.

4.3.3.6 Regional and International Cooperation and Coordination

This instrument contributes to strengthen the collective action of Governments, intergovernmental organizations, NGOs and the public and private sectors in the implementation of the Convention and the Kyoto Protocol, and, in particular, the application of the CDM, improving management efficiency to favour sustainable development.

It requires to determine potential cooperation areas and exchange possibilities, both at the regional and international level in reference to: a) training and public awareness materials, b) staff for expert training or temporary assignments, c) other mechanisms to share experiences and good practice on CDM projects.

This should be complemented with adequate management and the development of arrangements or agreements to facilitate such exchange in expert staff, information, training and awareness material.

4.3.4 Institutional Strengthening for Facilitation, Promotion and Stimulation of CDM Project Activities.

4.3.4.1 Introduction

In order to facilitate, promote and stimulate the development of CDM project activities, improvement and strengthening of existing capacities is proposed, through the execution of a Institutional strengthening programme entailing: a) the development of a panning process for structuring a training, diffusion and public awareness programme (CDSP by its Spanish acronym) and b) the identification and evaluation of measures for the creation of a technical, administrative, legal, economic and financial framework to foster CDM project application.

Basic elements of this programme are exposed below.

4.3.4.2 Aim

The development of strengthening activities will lead to the achievement of the following short-term goals:

a. Identification and elaboration of concrete proposals for training and diffusion.

b. Search of contributions of interested entities and public participation in the formulation and implementation of a training, diffusion and public awareness programme on climate change and KP clean development mechanism

c. Formulation and management of a CDSP programme to be developed by MVOTMA within a framework of broad national participation.

d. Identification and evaluation of measures for establishing an environment favourable to CDM projects.

4.3.4.3 Objective

The objective is to strengthen the institutional capacity of MVOTMA for:

a. the formulation of a training, diffusion and public awareness programme to promote the existing knowledge and facilitate and guide a process of understanding and awareness of:

   i. Opportunities and benefits of CDM project activities

   ii. Elaboration and management of CDM projects

   iii. Cycle of CDM projects

   iv. National and international norms and procedures for the development of such activities

   v. Climate change issue and sustainable development

   vi. The negotiation process taking place under the United Nations Framework Convention on Climate Change and its Kyoto Protocol (KP), concerning CDM Project activities (art 12 of KP)

b. The creation of a favourable environment for the development of CDM projects.

4.3.4.4 Activities

4.3.4.4.1 Elaboration of the schedule of CDSP activities under the CDM

Initially, a set of non-exclusive activities, actions and instances has been identified for an appropriate development of an integral structuring and elaboration process of a CDSP Programme:

a. Elaboration of a directory of persons, institutions and organizations potentially interested or involved in CDM project activities

b. Identification and evaluation of key elements for developing a CDSP programme:

   i. Potential stakeholders and their capacity for prospective participation in the programme.

   ii. Mechanisms, means, opportunities and limitations for adequate diffusion of relevant information relative to the CDM and climate change

   iii. Various targeted public (enterpreneurs, policy makers, NGO's, etc.)

   iv. Types of relevant information and priorities for different stakeholders

   v. Need of specialized support material for the programme (publications, leaflets, video, etc.)

   vi. Mechanisms, means, opportunities and limitations for distribution of specialized support material of the programme

c. Evaluation of the information obtained and elaboration of summary document including results and conclusions

d. Workshop of document analysis and identification of:

i. Most suitable mechanisms and instruments for each targeted public

ii. Barriers, opportunities and facilities for development of the programme

iii. Forms of co-participation in a CDSP programme

iv. Needs and resources for programme structuring and execution

e. Evaluation of the availability of support material of the programme in Spanish and definition of new material reproduction, translation and elaboration needs

f. Identification of the need to improve UCC web page in support of CDSP activities for the CDM and design and elaboration of modifications and extensions of such web page

g. Assessment of the public participation potential in the various stages of the elaboration and management process of CDM projects

h. Evaluation of public access to information relative to the CDM

i. Identification and evaluation of new information sources and types, their availability and the facilitation of access to such information or barriers to same

j. Evaluation of the possibility and the opportunity to create national network in support to CDSP activities for the DCM

k. Workshops to identify and analyse the strategy and instruments to promote and facilitate:

i. Knowledge and awareness of benefits and opportunities of CDM projects and of their contribution to national sustainable development

ii. The development of identification and elaboration activities of CDM projects

l. Evaluation of needs of improvement of cooperation and coordination levels, both regionally and internationally, in reference to CDSP through:

i. Identification and evaluation of:

- potential cooperation areas

- forms and possibilities for exchanging:

– educational and public awareness material

– expert training staff or temporary assignments

– other mechanisms of sharing experiences and good practice

ii. Promotion and development of agreements facilitating interchange of CDSP experts, information and material

m. Creation of an (interdisciplinary) Advisory Group to advise in matters of evaluation, development and structuring of:

i. Training, diffusion and public awareness activities

ii. Public participation in matters of CDM, climate change and sustainable development

iii. Identification and links with other conventions and protocols

iv. Regional and international cooperation and coordination

v. Identification of necessary technical, logistic, normative and administrative resources enabling programme development

vi. Development of a communication strategy

n. Formulation of a training, diffusion and public awareness national programme relative to climate change, impacts, the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol, with an emphasis on the CDM taking into account the following general characteristics:

i. Main elements:

- CDM training and
- public diffusion and awareness on CDM and related issues

ii. Thematic areas

The following thematic areas have been initially identified, as must be addressed when planning training and public awareness activities:

- Climate Change (CC) in general
- CC within the environment framework
- CC within the sustainable development framework
- Third Report of the Inter-governmental Panel of CC
- United Nations Framework Convention on Climate Change
- Kyoto Protocol
- KP Clean development mechanism
- Mitigation technologies for Energy, Industrial Processes and Wastes sectors
- Mitigation technologies for Agriculture, Forestry and Land Use Change
- Evaluation of impacts of and adaptation to CC
- Instruments, techniques and methodology: baseline calculation, project development, use of models, calculation of emission reduction, etc

- National and international norms for the elaboration, presentation and management of CDM projects

iii. Executing agency: MVOTMA, through the CCU

iv. Main elements for technical and financial assistance approach:

- Expert participation
- Design and elaboration of specialized support material
- Technical and specialized training activities
- Workshops, conferences, seminars and meetings
- Occasional events, exhibitions and public dissemination campaigns
- Production and diffusion of informative material
- Public participation in climate change issues
- Work of advisory and support groups
- Regional and international expert interchange and visits
- Surveys and evaluation
- Elaboration, reproduction and distribution of publications, translations and reproduction of support material for training, awareness and diffusion activities

4.3.4.4.2 Creation of a favourable environment for the CDM

Complementing all training and diffusion actions undertaken, and in order to take advantage of the opportunities and potential benefits arising from CDM projects, it is indispensable that other measures be adopted by the Government, leading to favourable conditions for their development.

The CDSP programme should be backed with complementary efforts of institutional strengthening for the performance or studies and evaluations leading to the identification of policies and measures that facilitate the development of CDM projects. Among these the following are noted:

a. Identification of technical, legal and administrative obstacles (barriers) to CDM projects and of measures to eliminate them

b. Identification of complementary procedures and norms to facilitate national management of CDM projects

c. Improvement of data quality and availability on GHG emissions and absorptions by sector and activity

d. Identification and evaluation of economic-financial incentives for CDM project activities

4.4 Capacity Building Program to Facilitate Transfer, Promotion and Dissemination of Environmentally Sound Technologies

4.4.1 Introduction

In order to reduce emissions or increase absorption of greenhouse gases (GHG), it is necessary to apply technologies5 and technical or specialized knowledge, needed for mitigation and a rapid, widespread technology transfer6.

Technology transfer (TT) is done by means of a series of actions conducted by different stakeholders, such as: developers, owners, suppliers, buyers, receipients and users of technology, financial entities and donors, government, international institutions, non-governmental organizations (NGOs) and groups.

Although part of the technology is transferred directly between state agencies or between vertically-integrated companies, the flows of technologies increasingly depend on the coordination of multiple organizations, such as: information services supplier networks, business consultants and financial companies.

The stakeholders adopt various forms or ways of performing the TT. A few of them are: government assistance programs, direct procurement, franchising, direct foreign investment, joint ventures, cooperative research agreements, co-production education and training agreements and direct state investments.

Even though TT processes are usually complex, they involve several stages, such as: identification of needs, choice of technologies, assessment and adjustment of technology to local conditions, evaluation of the transfer conditions, agreement on the terms of the transference, its implementation and replication.

Obstacles to the TT may emerge at any of the stages. These may be: lack of information, insufficient human capacity, financial limitations (lack of capital, high transaction costs, etc.) commercial or political restrictions, lack of knowledge or understanding of local conditions, businessl limitations (risk aversion, etc.), institutional limitations (insufficient legal protection, inadequate environmental codes and standards, etc.). The tasks involving identification, analysis and ranking of the obstacles must the conducted on a national scale and form part of a group of actions and measures that should be adopted by the Government in order to facilitate TT.

Clean Development Mechanism (CDM)

This is an important international instrument to facilitate the association and cooperation of public, private and non-governmental entities with the purpose of

[5] "Technology": piece of equipment, technique, practical knowledge or experience needed to perform a specific activity.

[6] "Technology Transfer": broad set of exchange processes taking place between different stakeholders (government, private entities, financial institutions, governmental and non-governmental organizations and educational and research institutions) that cover the contribution of know-how, experience and equipment and lead to the dissemination of technologies for mitigation and adaptation to climate change.

developing projects that contribute to mitigate GHG and promote sustainable development at national level, including the application of environmentally sound technologies (EST) [7].

A proper identification of technological needs and the establishment of national environmental and sustainable growth goals are the basic elements that lead to the right planning and development of practical guidelines to promote those projects that meet the said technological needs, while at the same time contributing to the achievement of the preceding goals.

The CDM is an instrument capable of generating experience, technology transfer and of building human and institutional capacity. It contributes to strenghten institutional and labor relations, understanding between partners, the private sector, NGOs and governmental agencies on various levels and generates a sphere of technological cooperation.

National Outlook Concerning EST Transfer and Facilitation.

Overall, there is little knowledge of the initiatives under implementation for the purpose of knowing, developing, researching, reporting, introducing or applying ESTs. There are also few initiatives of public or private entities to perform, on a national scale, assessments of needs, selection, promotion and dissemination of ESTs. Neither are there any known specific incentive to facilitate TT.

There is a general idea of the activity sectors with higher potential for GHG emission reductions: electric power generation, automotive transportation, landfill management and livestock raising. Those with higher absorption potential are: forestry activities, direct sowing and preservation-oriented soil management.

The existence of general or sector priorities concerning EST transfer is yet unknown.

Access to technological information networks and centers is not very frequent.

There are no public sector measures to address the elimination of technical, administrative or legal obstacles to EST, or the creation of specific and transparent procedures to manage investment projects involving the use of EST; neither are there any tax, economic or financial incentives for EST, or contributions or assistance for the development and assessment of EST transfer projects.

Moreover, those activities aimed at promoting and developing technologies that could include EST are of very small scale.

There is a demostrative pilot project under way that includes the use of EST.

There are no specific measures aimed at modifying or expanding the environmental regulatory framework with the purpose of facilitating EST transfer.

[7] "Environmentally Sound Technologies (EST)": Technologies that protect the environment, are less polluting, use the whole of the resources on a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they are substitutes, and which are comparable with nationally determined social and economic, cultural and environmental priorities. In this document, the expression "environmentally sound" implies technologies aimed at mitigation and adaptation. The term includes both "soft" and "hard" technologies.

In order to facilitate and promote EST transfer, we shall now proceed to present the structure of an initial Capacity Building Program.

4.4.2 Program Objectives

To develop actions that facilitate the transfer of environmentally sound technologies in Uruguay, by means of:

a) conducting an assessment of EST needs,

b) the application of activities involving training and public awareness, and setting the grounds for the creation of enabling environments.

4.4.3 Result 1: Technological Needs Assessment (TNA)

Conducting a TNA is the first step towards identifying EST suitable for replication, adaptation and dissemination and also towards obtaining an understanding of the barriers to TT and the set of measures needed to overcome them.

The development of a comprehensive evaluation of technological needs shall contribute to:

a. Identifying the sectors of activity and EST that better mitigate GHG emissions.

b. Promoting the identification and execution of projects based on pre-set priorities.

c. Focusing the EST transfer effort within the proper framework of needs and technological priorities.

d. Ensuring the consideration of the full number of available opportunities.

e. Promoting and obtaining the commitment of the stakeholders to achieve concrete and proper EST goals.

f. Handling pieces of information and data concerning EST with a clear understanding of their relative significance and importance.

g. Generating an initial action plan.

4.4.3.1 Activities

4.4.3.1.1 Institutional Arrangements and Commitment of the Stakeholders

There is a large number of institutions, agencies, firms and individuals who are interested in EST. Commitment of the stakeholders is paramount to achieving a successful evaluation of the needs for EST transfer. This commitment ensures that there will be no deficiencies when considering the full range of actions, or any lack of representation or omission by any of the sectors, regarding options or opportunities, or any difficulties to conduct the TNA or to implement the resulting recommendations, or insufficient interaction throughout the TNA development process and lack of understanding of the proposed implementation objectives.

The key roles played by large sectors of stakeholders in this process are: a) that of the public sector as the supplier of direct or indirect funding support, provider of public services (education, research, outreach) and setting forth standards and

regulations (ruling prices, environmental issues, etc.) and b) that of the private sector participating in the flow of capital and technologies as well as of specialized knowledge.

In order to favor the success of the process, the private sector should be contacted from the onset, thus making it more likely for the resulting plans and programs to be realistic and actually executable.

The commitment of the stakeholders is crucial for the outlining of public policies, credit instruments, public service funding, assessment of energy alternatives and environmental regulations on the use of technologies, practices and the definition of goals and objectives.

In order to conduct the institutional arrangements, the following action must be taken:

a. Identify stakeholders and consulting with key agencies

b. Convene a meeting to explore objectives and scope of the TNA.

c. Establish the core team and identify the entity in charge of conducting the assessment.

d. Define a process for continuous involvement of the public and private stakeholders.

The identification of the stakeholders who should be involved in the TNA process, regardless of other relevant or convenient parties, should be based on the need to count on the representation and commitment to participate of the representatives of:

a. Relevant Government sectors:

    i. Energy, environment and development policy;

    ii. Regulation of economically significant sectors: energy, agricultural and livestock, forestry, etc.;

    iii. Promotion and development of industrial and international trade activities;

    iv. Finance

b. Essential services sector (public and private): energy, water utilities, etc.

c. Companies or entities with high energy consumption or greenhouse gas (GHG) emissions or with a significant potential for GHG absorption;

d. Companies, industries and financial institutions connected with the manufacturing, import and sale of EST;

e. Commercial, agriculture and livestock or forestry farmers/producers that demand EST;

f. NGOs;

g. Institutions that provide technical and scientific support to the Government and the industrial sector (educational, research and consulting institutions, etc.)

h. Trade unions and associations;

i. Consumer groups;

j. International organizations and donor countries.

The organization of the activities should be scheduled in two levels with a core team and a plenary of participants. The core team would deal with the most substantial aspects of the assessment: resources, technology costs, reporting and others, while the plenary would fulfill the purpose of providing consulting, workshops, interactions with public opinion, information and other tasks of a more general scope.

4.4.3.1.2 Assessment Process

The following activities have been identified in order to move on with the process of assessing the relevant sectors and EST transfer priorities:

Preliminary Review of Options and Resources

a. Evaluation of studies, research, plans, programs and projects in connection with climate change, their impact and response measures, when conducted on a national scale.

b. Gathering of existing date concerning technologies and activity sectors that emit or absorb GHG,

c. Identification of data gaps and means to overcome this shortcoming,

d. Determination of the activity sectors with significant GHG emission or absorption levels,

e. Identification of the main GHG emission and absorption sectors,

f. Identification of the key alternatives regarding technologies and mitigation policies for each sector,

g. Preparing a preliminary assessment report that includes the following:

   i. Characteristics of the different activity sectors and technologies being used, GHG emissions and absorptions and financial conditions.

   ii. Potential for change of fuels and energy efficiency instruments by sector;

   iii. Country low carbon energy resources,

   iv. Sutability of low carbon technologies to national conditions.

Among GHG emitting or absorbing sectors, we find the following:

a. Electricity production, transmission and use

b. Other energy supply sectors, natural gas, LPG, etc.

c. Public and private transportation, fuel, vehicles and transport infrastructure.

d. Forestry

e. Agriculture

f. Energy-intensive industries

g. Climate technology industries or potential manufacturers or climate response technologies.

h. Waste management and recycling.

i. Infrastructure and buildings

j. Water management.

Identifying Assessment Criteria.

Identifying sectors, technologies and action priorities that require a view of the contribution that the new technologies would make to achieve social, environmental and sustainable development goals.

It would be necessary to determine those criteria by means of which EST transfers may be valued as to their contribution to national objectives.

A set of criteria should be set forth for evaluation purposes, bearing in mind a set of instruments such as: cost-effectiveness ratio, potential market, contribution to sustainable development, contribution to emission mitigation, social acceptance and adaptation to the conditions of the country, barriers and forecast of policies devised to favor the introduction of EST (regulations, pricing policies, incentives, etc.).

Below we provide the key elements involved in the process of identifying criteria:

a. Definition of the scope and objectives of the assessment criteria, based on the following considerations:

    i. Contribution to sustainable development and national political goals.

    ii. Contribution to GHG emission mitigation.

    iii. Potential market and cost.

    iv. Sustainable development opportunities.

b. Identification of the processes to be applied in order to adopt and weigh the criteria:

    i. Experts judgment.

    ii. Independent experts assessment.

    iii. Consideration of Government priorities.

    iv. Stakeholders consultation

c. Analysis and scope of an agreement on the relative weight of each criterion.

Identifying Priority Sectors and Selection of Technologies

The purpose is to start by selecting three or four activity sectors on the basis of the ranking of assessed technologies.

The selection of tecnologies should be conducted paying attention to the following elements:

a. Identification of criteria for assessment and achievement of a consensus on the set of criteria to be applied.

b. Determination of the relative weight of the criteria to be used.

c. Definition of participants in the selection process (stakeholders, experts, role of government, etc.)

d. Identification of activity sectors and technologies to be assessed.

e. Identification of how current and potential policy alternatives impact the use of EST.

f. Determination of priority sectors and selected EST.

Identification of Barriers and Measures

Within this activity, we should consider and assess the barriers that hinder or limit EST transfers, among which we may mention a few that stem from:

a. Social and cultural elements

b. Market structure (trusts, dominating interests, etc.)

c. Split incentives

d. Capital access difficulties

e. Information system deficiencies

f. Externalization of environmental and social cost.

Measures and policies aimed at overcoming these barriers will also be identified and assessed.

4.4.3.1.3 Preparing an Action Plan

Finally, an action plan will be prepared, made up of the following items:

a. TNA objectives within the context of national development priorities

b. Identification of priority sectors

c. Identification of the main technology options, including adaptation to endogenous options.

d. Sector priorities and key EST for an initial action

e. Capacity-building measures

f. Barrier busting measures

g. Direct Government intervention

h. Identification of measures to ensure funding of the plan.

i. Identification of participants and commitments.

j. Identification of goals and objectives.

k. Development of planning based on priority activity sectors, key technologies, projects, opportunities or a combination of these.

4.4.4 Result 2: Program of Activities covering Training, Public Awareness and the Creation of Enabling Environments

Technology transfer often demands resorting to a wide range of technical, commercial and regulatory fields of expertise. In order to facilitate transfer, it is necessary to build capacities in human resources, organization, information and assessment capabilities. Proper capacity is needed to address evaluation, selection, import, development and adaptation of technologies.

Capacity-building activities are required in all the stages of the technology transfer process and should be developed in close connection with the stakeholders, such as public and private entities, local government authorities, trade and commercial associations, NGOs and consumer and user associations.

Technologies generally flow via private information networks and evaluation services, or via management consultants, financial companies, legal counsel, accountants and technical experts. There are many private information networks that operate through consulting services and the Internet.

Technological information is essential to evaluate and select technologies, establish their priorities, create partnerships, become acquainted with different donor programs, analyze barriers and means of busting them and devise actions and other related activities.

Training and public awareness activities significantly contribute to promoting EST transfer.

In order to develop EST transfer methodologies and an innovative culture, there is need for a good integrated system that groups the actions involved in capacity building, information access and creation of enabling environments.

In line with this, we propose an initial capacity building program with the main purpose of generating the conditions that facilitate and stimulate the development, adaptation and dissemination of EST, and also:

a. Generate improvements in human and institutional capacity as to organization, information and experience expertise needed for EST.

b. Provide a capacity in line with fulfilling EST transfer objectives, information access, training and project preparation.

c. Gather and evaluate specific technical, commercial, financial and legal information.

d. Assess technologies, promote sample projects and prototypes and outreach services by setting up connections between manufacturers, farmers and end users.

e. Identify and develop innovative financial mechanisms, such as public and private sector partnerships, specialized credit, CDM, etc.

f. Identify and develop solutions to overcome technical, financial, legal, political issues and other types of obstacles hindering EST transfer.

4.4.4.1 Activities

With the purpose of fulfilling the proposed goals, we have devised a series of activities covering training, public awareness, and the creation of enabling environments.

4.4.4.1.1 Training

a. Provide training for technicians and experts by means of a schedule of visits and internship programs in foreign companies and industries that deal in the cutting-edge application of high-priority-rated EST.

b. Provide training to businessmen and experts of both public and private companies in the commercial aspects of priority EST, for the purpose of speeding up negotiations and market processes needed for their transfer.

c. Brief decision-makers, of the political and business spheres, on the features of the regulatory systems of those countries well ahead in the use of EST that facilitate the incorporation, development and adaptation of these technologies.

d. Perform training activities (courses, workshops, technical meetings, etc.) to transfer experience in the field of organization, management, development, execution and dissemination of pilot and sample projects involving transfer, development or adaptation of EST.

e. Conduct specific and sector training activities to disseminate practical knowledge needed to assess, import, develop, adopt, adapt, maintain and disseminate EST.

f. Perform those activities involving training and dissemination by sector or technology, regarding standards and procedures used at national and international level to regulate the management of CDM projects and regarding mechanisms proposed for preparing, selecting and defining standards for key elements in their formulation (reference base, monitoring plan, etc.)

g. Prepare specialized support material for specific and sector training activities.

4.4.4.1.2 Public Awareness

a. Organize activities to foster public awareness among specific target audiences on the economic, social and environmental advantages of EST (fostering economic development, employment and enabling environments), based on specific examples provided by other countries, projects and technologies.

b. Organize advertising campaigns sponsored by public and private stakeholders, NGOs, and business and commercial agencies, for the purpose of creating awareness on the advantages posed by the use of selected EST versus traditional less environment-friendly alternatives.

c. Disseminate the existing knowhow on different EST, processes and specialized knowledge for the purpose of increasing power efficiencies or making productive processes less energy-intensive.

d. Develop programs by sector and technology regarding information, expertise exchanges, scholarships and research collaboration to aid the transfer, application, adaptation , development, dissemination and promotion of EST.

e. Enhance the existing knowhow and disseminate the advantages and opportunities emerging from the complementary application of renewable sources of energy.

g. Organize advertising and public awareness campaigns addressed to consumers on the topic of product standards, codes and certification, backed by brochures, hotline services and other mass media.

f. Prepare specialized support material for the advertising and public awareness activities, for different sectors and particular cases.

4.4.4.1.3 Creation of an Enabling Environment

a. Promote awareness among businessmen, financial institutions (public and private, national and international) on the need to assess EST on an equal basis with less environment-friendly technologies.

b. Measures to strengthen ties between business and professional associations and EST-generated products consumer and end-user organizations.

c. Study the possibilities and opportunities for developing a widespread green-labeling program for products generated by means of the use of EST.

d. Conduct a feasibility study to set up, run, manage and finance a national center of technological information, with network operating capabilities and connected with other regional and international technological information and technology transfer centers, that keep updated databases containing:

    i. Support information to perform evaluations and updates of technological needs.

    ii. Technological options, benefits (technical, economic and environmental), barriers and limitations.

    iii. National key players and stakeholders in the EST transfer business.

iv. National and international stakeholders: priorities and plans of every sector in connection with EST transfer, background of activities, needs and outlook.

v. Technical, economic and environmental data on different technological alternatives, in order to assess technologies and commercial contacts.

vi. Procedures and funding, availability and access to financing, funding contract terms, investment incentives, export credit, information on banks and insurance companies.

vii. Community of donors, ways of financing, partnership and cooperation methods, relevant activities and market information.

viii. Applicable legal regulations

ix. Intellectual property rights.

x. Research and development activities.

e. Improve reporting, circulation, accessibility and quality of the technical, financial, ecological and regulatory information concerning EST and its opportunities for transfer, adaptation and development.

f. Identify measures that provide better opportunities for development of collateral companies for EST transfers, such as consulting firms to provide technological, accounting, energy, legal investment and product valuation, trading, information access and exchange (Internet, etc.) services.

h. Establish a data and qualitative information gathering service to develop indicators that facilitate the evaluation of processes of introduction, use, dissemination, assimilation and adaptation of EST.

i. Contribute to identify and develop TT objectives and their integration to the formulation and development of national policies, namely those covering environmental and research and development issues.

5 Conclusions and Recommendations

The main objective of the present document is to improve capacity building in Uruguay for the development of the CDM. The accomplishment of this is based on the elaboration and diffusion of a CDM project guideline, a national plan of action, diffusion and public awareness in reference to the Mechanism and the elaboration of a programme for technology transfer.

Thus, we seek to promote and facilitate CDM development in our country, since the existence of a guideline favours the process of national approval of CDM projects, and at the same time eliminates information barriers to the formulation and implementation of this type of projects, promoting them in an indirect way.

The most relevant aspect of the key documents generated by the present project is the short term within which they were obtained at a time when Uruguay is in need of them in order to be ready to receive CDM projects for national approval.

A methodological guideline proposal was prepared which consists of two clearly differentiated parts. The first part refers to the procedures for the identification of projects, which is useful as a basis for further projects. The second part of the guideline corresponds to the introduction of projects, according to international parameters. That is to say Suggested Elements for the Elaboration of a Proposal Containing the Instructions for the National Approval of CDM Projects; 2) the CDM definitions as far as the projects' basic characteristics and 3) the sustainable development criteria to evaluate the contribution of the projects to this objective of the society, as established in the CDM.

As a mode of conclusion, it could be asserted that this guideline proposal constitutes a substantial progress as regards to the recent past. It enables the stakeholders to have a previous knowledge of the procedures to which they must attain themselves in order to go ahead with the national approval of the CDM projects. Besides, this approval, which also includes a certain evaluation of the project by the authorities intervening in the process, will be carried out on the basis of predefined procedures that demonstrate the transparency of the process and therefore constitute an important element of promotion for the CDM projects.

The relevance of this instrument makes that the most important recommendation in this ambit be to carry out a process of adjustment and improvement of the components of this guideline proposal, to improve the efficiency of its use and increase the participation of the majority of the stakeholders in its elaboration, in order to obtain consensual procedures and instruments that facilitate CDM development in Uruguay, with the support of the majority of the participants in its diverse areas.

This has been contemplated by a set of activities that are included in this Action Plan, intended for consolidating the institutional capacity to approve and promote projects through the following: i) elaboration and adoption of the guideline; ii) establishment of sustainable development criterion for the national approval of CDM projects; iii) elaboration of instructions for the calculation of sustainable development indicators in order to allow the measurement of the contribution of each project; and iv) updating of all these documents and procedures according to changes verified in the CDM, markets, societies and national and international regulations.

Within this framework, the CDM national action plan advances other areas to enable CDM promotion, institutional capacity consolidation, CDM project portfolio development, and support to national and international marketing to carry out CDM projects which translate into facts the ideas included in the portfolio prepared.

Respect to the promotion of the CDM, in particular, actions should be focused on the dissemination of the mechanism and raising public awareness. For this purpose seminars, workshops, articles in the web, etc, should be of great importance, as well as building stakeholders capacity in project promotion and implementation

To advance in this last direction, the formulation and performance of pre-feasibility studies on select project ideas representing each of the main sectors plays a relevant role. These studies will also allow the identification of various types of possible risks that CDM projects should face, and this in turn will be used to define corresponding mitigation measures. This aspect makes this activity one of the most important in the action plan in reference to project portfolio marketing.

These actions should be carried out in a consolidated institutional framework in order to lead to a successful promotion of the CDM in the country. For this purpose such framework should be created, and maintained. It includes the National Board for Climate Change Joint Projects, guidelines and procedures for project elaboration and submission, definition of sustainable development criteria, as previously commented, together with the creation of CDM project registry and monitoring of project cycles, emission reductions and certifications. It also includes the establishment of the basis for a system of carbon accounting.

These activities will also require to build up capacity in all stakeholders, both private and public, in reference to legal aspects, particularly respect to the contracts to be made with sponsors and investors within the project framework, the property rights of the certified emission reductions, etc.

Project promotion at the local and international levels would require several actions. For this purpose carbon markets should be surveyed and monitored as well as those sectors and activities included under the CDM, both at the national and international level. Actions should be taken to keep an updated register of CD; rules, national regulations and national and international environmental norms.

Financing needs for this type of project require that this action plan include several activities in order to maintain all stakeholders informed about national and international credit lines and of the characteristics of the financial instruments used in carbon markets.

The information about changes in regulations and markets related to the CDM will enable the updating of the study of national potential for GHG emission reduction in order to provide stakeholders with valuable information to decide the ways to follow for project identification, formulation and implementation.

The total estimated cost for the proposed Action Plan is US$ 200,000. This figure doesn't include the Capacity Building Program to Facilitate Transfer, Promotion and Dissemination of Environmentally Sound Technologies and the Training, Diffusion and Public Awareness Enabling CDM Projects Program, included in points 4.3 and 4.4 respectively. Due to the fact that the basis for establishing such programs are presented, funding and resources would be required to design them and then estimate their cost. Moreover, it is very important to notice that the present

proposal is only a first version of the Action Plan, therefore it will be reviewed and modified.

We have concluded that to optimize CDM opportunities is necessary to build up an appropriate level of capacity and information that allow potential national participants to become interested, understand, know, explore and finally take advantage of the opportunities and benefits of this sort of developments. Several public and private entities could be favoured with the additional incomes arising from the execution of CDM projects or from the possibility that some investment initiatives formerly discarded or not developed for having been considered financially unviable, become viable through this mechanism. In order to facilitate, promote and foster the development of CDM project activities, the existing capacities should be improved and strengthened through the development of an institutional strengthening programme that would contemplate: a) the development of a planning process to structure a capacity building, diffusion and public awareness programme on CDM projects, and b) the identification and evaluation of measures for the creation of a technical, administrative, legal, economic and financial framework that favour and foster CDM project development.

The application of technologies and technical or specialized knowledge, and technology transfer are all key elements for GHG emission mitigation.

The CDM is an important instrument, which -in a subsidiary form- allows the generation of experience, technology transfer (TT) and the strengthening of human and institutional capacity.

To conduct an assessment of the technological needs is the first step towards: a) the identification of environmentally sound technologies (EST) that allow replication, adaptation and dissemination and b) the understanding of the barriers hindering TT and of measures to overcome them. These capacity building, diffusion and public awareness activities also contribute significantly to foster technology transfer.

The EST transfer and the development of an innovation culture require an integrated system that join the actions tending to capacity building and providing access to information, and the creation of a favourable environment.

Therefore an initial programme for institutional strengthening is proposed that will be focused on: a) the performance of an evaluation of EST needs, b) the application of training and public dissemination activities and c) the establishment of the basis for the creation of a favourable environment for CDM projects

From the documents composing this study it clearly stems the need of an instance of permanent participation and interaction of all stakeholders during the whole process of CDM project development. This should include public and private actors, the civil society and the academia. Hence, and as a general contribution to the conclusions and recommendations of this study, the convenience of considering the possibility of developing a co-participatory management experience at the national level is suggested. The idea is not exclusively referred to CDM projects but also to other areas related to Climate Change mitigation covering among others, aspects related with diffusion, capacity building, technology transfer and creation of a favourable environment for the development of such activities.

Considering the global condition of the Climate Change, such management institutional proposal would also include the development of the key function of articulating with interested international agencies.

The implementation of this idea would be highly feasible in Uruguay due to the high degree of maturity existing in the mentioned institutions and the current fluent relationships among them, which may even offer the possibility of positioning our country as reference in the region. This latter point may be reinforced by the existence in the country of regional offices of both international cooperation agencies and climate change-related specialized sectors, such as in the energy field.

Appendix I

Proposed Methodological Guidelines for Identification and Submission of Projects Under the Clean Development Mechanism of the Kyoto Protocol in Uruguay

Table of Contents

1 INTRODUCTION

1.1 Climate Change.

The Sun's radiation heat is basically absorbed by the Earth, which, in turn, has the capacity to transfer it to the atmosphere. The Atmosphere contains concentrations of various gases -the so called Greenhouse Gases (GHG)- that absorb and retain heat in a selective way, resulting in the warming of the earth's surface known as the Natural Greenhouse Effect.

The global industrialization process, the use of new technologies and the growth of the world population have resulted in the constant increase in concentrations of greenhouse gases, while new gases have recently also been incorporated in the atmosphere and others are indirectly contributing to the greenhouse effect. The main GHGs are: carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), ozone (O3) and water vapour, and some man-produced compounds (HCF, PCF, SF6 and CFC).

This process has led to an increase in the capacity of the atmosphere to absorb the earth's radiation and, consequently, has generated a trend to a re-establishment of an energy balance , which would be solved through warming the earth's surface. This may be apparent in: increase of mean sea level, changes in atmospheric circulation and rainfall patterns, and displacement of agricultural areas.

1.2 International Response

The international community has started to take steps to face these problems, which are part of the Climate Change issue. In Rio de Janeiro (June 1992), one hundred and fifty-five countries signed the United Nations Framework Convention on Climate Change (UNFCCC), in the United Nations Conference on Environment and Development known as "The Earth Summit". The ultimate goal of the Convention is to achieve stabilization of concentration of Greenhouse Gases in the atmosphere to an extent such that prevents dangerous anthropogenic interference in the climate system, and consequently the Parties commit themselves to reducing their net GHG emissions, make National Inventories of Emissions and Absorptions of these gases and prepare plans for climate change mitigation and adaptation measures

Afterwards, the international community gathered in Japan (December 1997) stepped ahead in pursuit of a limitation of GHG emissions. the Kyoto Protocol (KP) was adopted, with a view to strengthening the commitments of Annex I Parties of the UNFCCC, i.e. the industrialized countries. The above mentioned Protocol establishes: i) specific goals for the limitation of GHG emissions for AI Parties, which in average represent a reduction of 5% respect to 1990 levels, to be attained during the period 2008-2012, ii) the gases on which such reductions shall apply (CO2, N2O, CH4, SF6 and HFC), iii) registration systems to prove the fulfilment of the above mentioned goals, and iv) mechanisms to help AI countries to achieve these goals.

1.3 National Background

Uruguay is a Party of the UNFCCC since November 16, 1994, pursuant to Law No. 16.517 and of the KP since February 5, 2001, pursuant to provisions of Law No. 17.279 and is not included in UNFCCC Annex I.

The Ministry of Housing, Territorial regulation and Environment (MVOTMA by its Spanish acronym) was created on June 8 1990 by Law No. 16.112, the following being included among its competences: formulation, execution and evaluation of national environmental plans and implementation of national environmental policies. Under Art. 19 of Law No. 17.283, dated November 28, 2000 (General Law of Environment Protection), the MVOTMA is designated as the competent national authority in Climate Change issues.

The above mentioned competences are executed through the National Environment Directorate (DINAMA by its Spanish acronym), created on October 1, 1990 by Law No. 16.134, and by the Climate Change Unit (UCC by its Spanish acronym) which acts under the sphere of the DINAMA. The UCC was created by MVOTMA Resolution No. 505/94 of December 29, 1994. Its functions are to organize, manage and execute all activities stemming from application of the UNFCCC and KP.

The UCC competences were expanded by MVOTMA Resolution No. 341/2001 of July 2001 by including the executive functions of the designated national authority for the application of a Clean Development Mechanism (CDM).

1.4 Clean Development Mechanism

1.4.1 What is the Clean Development Mechanism?

The clean development mechanism was created by article 12 of Kyoto Protocol. This mechanism enables Annex I Parties to develop projects that generate emission reductions in territories of Non-Annex I Parties, aiming at two purposes: a) help Non-Annex I Parties to achieve sustainable development and contribute to the ultimate goal of the Convention; and b) help Annex I Parties to fulfil their quantified commitments of emission limitation and reduction (mitigation) through the submission of certificates stating the Certified Emission Reductions (CERs) resulting from such activities.

1.4.2 What requirements should CDM projects comply with?

Rules and procedures/proceedings for CDM projects are currently being defined in international negotiations taking place within the framework of the Convention. However, there are certain general criteria already approved for these activities, stating that project participants -either public or private entities- should belong to a KP Party country and that involvement in CDM activities should be voluntary.

CDM projects must: a) achieve a real reduction in GHG emissions in comparison with the scenario without the project and b) contribute to the sustainable development of the project's host country.

1.4.3 What is the role of the Uruguayan Government?

The host country, that is, the one receiving the investment, has the responsibility of granting national approval to CDM projects. National approval is based on the project's contribution to the sustainable development of the country, according

to the previous characterization adopted by the country to this respect, and on voluntary participation.

1.4.4 What are the benefits offered by the CDM?

- Exploitation of renewable energy sources
- Less dependence on fossil fuels
- Increase of foreign investment in priority sectors of the economy
- Access to financing for investment projects
- Access to upgraded clean technologies
- Improvement of infrastructure
- Generation of employment
- Contribution to global and national environment improvement
- Increase of business opportunities
- New opportunities of association with foreign companies

1.4.5 What type of projects is acceptable for the CDM?

Those relative to: use of renewable energies (hydraulic, wind, solar, biomass, etc.), substitution of fossil fuels in energy generation, improvement of energy efficiency (generation, transmission and distribution), improvement of energy demand efficiency (use of more efficient equipment, elements and systems), substitution of fossil fuels and increased efficiency of industrial processes, increased energy efficiency and fuel substitution in buildings, emission reduction in transport, methane recovery and forestry.

1.5 CDM Project Cycle

A CDM project, according to international negotiations, shall follow a cycle to obtain the Certified Emission Reductions, comprising the following stages:

Project Identification and Design

This stage is at the charge of the project proponent. During this stage a determination is made on whether the proposed project idea complies with the basic criteria required for CDM projects. Basically, there are two critical elements to be fulfilled by a CDM project: a) achievement of a real reduction in greenhouse gas emissions as compared to the scenario without project and b) contribution to host country's sustainable development.

Having identified the project idea, the proponent shall submit a Project Document following the international format approved by the CDM Executive Board, the organism in charge of CDM supervision and that reports directly to the Conference of the Parties of the UNFCCC (COP). The format of project design document (CDM-PDD) can be seen on UNFCCC web page: *http://unfcc.int/cdm/documents.html*. If the project is contemplated in the definition of small scale CDM projects[1], established by COP7 decisions, a simplified design document (SSC-PDD) is available at: *http://unfccc.int/cdm/ssc.htm*.

[1] In Decision -/CP.7 (Article 12), paragraph 6, small scale projects are defined as:
i)Renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts (or an appropiate equivalent); ii) Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 gigawatt/hours per year; iii) Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

Approval by the Designated National Authority (DNA)

The DNA shall approve the project, once assessed the voluntary participation of the parties and their contribution to the sustainable development of the host country.

In Uruguay, project approval is at the charge of the Ministry of Housing, Territorial Regulation and Environment (DNA), through the procedure established in the provisional Instructions for national approval of CDM projects (art. 12 of KP) included in the Annex.

Validation by the Designated Operational Entity

Validation of a CDM project is at the charge of a Designated Operational Entity (DOE), that is an independent entity designated by the CDM Executive Board and selected by the project participants. This stage consists of an evaluation of the project and its associated documents (CDM-PDD, baseline study, monitoring and verification protocol, and public consultation report) and includes making available to public knowledge the Project Document for receiving comments referent to validation requirements.

Registration with the CDM Executive Board

Registration is requested by the DOE to the CDM Executive Board. This stage implies formal acceptance of a validated project.

Monitoring

After project registration, project participants are responsible for monitoring and registering GHG emission reductions.

Verification and certification

Verification is performed by a DOE and consists of an independent review of the monitored emission reductions. The certification is a written statement given by the DOE of the verified reductions within the project framework.

Issue of CERs

The Executive Board issues the CERs in accordance with the certification delivered by the DOE.

1.6 Certified Emission Reductions (CERs)

CERs or GHG certified emission reductions belong to the owner or owners of the project, after performing the activities defined in the project.

Then, they are transferred to the private or public entities of Annex I countries, for these to use for compliance with their GHG emission limitation or reduction commitments under the CDM.

These entities are, mostly, the foreign project investors. This modality -known as bilateral CDM project- gathers the participation of a local party and a foreign party, that is an Annex I country.

The activity required by the project and the mechanics of the CDM project cycle, will generally entail a previous contract stating the purchase obligation of the foreign

investor or investors and the sale obligation of the project owner, therefore ensuring these operations and minimizing initial risk.

The CERs can be commercialised between private entities, both within and outside the country, unless there is any mechanism expressly forbidding it. In such cases, pursuant to the definitions reached so far under the Kyoto Protocol and subsequent COP resolutions, such rights may only be sold abroad, out of the host country (Uruguay) and towards the Annex I country, which should use them to comply at least partially with its GHG emission reduction commitments.

2 PRESENTATION OF THE GUIDELINES

The UCC has made this proposal of methodological guidelines based on international decisions and documents in the framework of the UNFCCC to facilitate the identification and subsequent submission of projects, producing homogeneous information and therefore facilitating enhanced transparency and efficiency in CDM project evaluation. Thus, they should be adjusted and approved by the national competent authority.

These guidelines have been formulated to be used at the various levels of those interested in CDM projects aiming at GHG emission reduction and the country's sustainable development. Therefore, it is intended for enterprises, entities, organizations, authorities, etc. that participate in the process of activities of projects of this kind.

The first part of these guidelines refers to the process of **identification of project ideas** for which a minimum information form has been elaborated. This information provides project participants with an initial orientation on the project and the possibility of fulfilling the basic objectives of a CDM project.

This part of the guidelines is to be considered only as an orientation and should not necessarily be followed by the proponent before submitting the definitive project. A preliminary form is attached to be used by interested parties, but consultations may be made to the UCC, both in reference to this form and on the procedure for the identification of project ideas.

Following is a description of the second part of these methodological guidelines that covers **project submission to the Designated National Authority** for approval and subsequent validation by a designated operational entity and registration with the CDM Executive Board. National approval conveys that the project contributes to the sustainable development of the country, but the country does not undertake any other responsibility for the project results , which are private of the CDM Executive Board, that is in charge of final acceptance of the project.

The information requirements and format required in these guidelines are indispensable for continuing the process, since they are based on the instructions given by the Designated National Authority or on those documents or information forms approved by the CDM Executive Board, as described in this document.

This should in turn be complemented with the information requirements enabling an assessment of the project's contribution to sustainable development, as necessary for its approval by the Designated National Authority, or otherwise showing other project benefits that may facilitate its implementation.

3 GUIDELINE FOR IDENTIFICATION OF CDM PROJECT IDEAS.

As mentioned before, the identification stage aims at determining if a proposal meets the basic criteria required for a CDM project. That is to say, it consists in verifying if a real GHG emission reduction will be obtained respect to the scenario without the project and if it contributes to the sustainable development of the country.

For this purpose, this guideline for CDM project idea identification has been prepared, aiming to help those interested entities (companies, NGOs and other organizations, authorities, etc.) to formulate and implement CDM projects in the country with a view to reducing GHG emissions within the framework of CDM.

This guideline is based on a format that contains the basic information required by interested parties to make a primary evaluation on the opportunity of performing such idea and transforming it into a CDM project that may fit the requirements of this type of project, according to the national requirements and those of the CDM. Therefore interested parties may assess if their idea contributes to a real additional reduction of GHG emissions in comparison with the scenario without such project, and also if it meets the country's criteria for contribution to sustainable development, which leading to the project's approval by national authorities.

The format also requires a minimum level of financial information, permitting a primary evaluation by the interested party of whether the project meets international practice and requirements in this field, and particularly the procedures currently applied for CDM projects. Thus, it is advisable -though not indispensable- that the information relative to the project idea meets the requirements of the financial indicators included therein, which in turns will facilitate subsequent design of the project, since these data shall be required for project submission to the authorities.

In addition, clarifications may be made with technicians of the Climate Change Unit (UCC) over the different elements of the identification of these project ideas with a view to their further concretion as a CDM project

The identification of a project idea may be made through the elaboration of a previously commented format and its evaluation by the interested party leading to the preparation of the definitive project. Likewise, interested parties may disregard these guidelines and directly step into the Project Design document (CDM-PDD). These guidelines are meant as a contribution of the UCC to the elaboration of project ideas that may facilitate greater efficiency and clarity in their subsequent formulation as a CDM project, but do not constitute a requirement.

The Format for identification of CDM Project Ideas is in Annex 1 and consists of five chapters: 1) Project General Information, 2) Project Description, 3) Estimated GHG emission reductions generated by the project, 4) Contribution to sustainable development and 5) Basic economic-financial information of project idea.

Chapter 1) specifies the name of the project, the type of activity, location, owner, participant or responsible person, the formulator or proponent, if corresponds, project category, based on the sectors identified in Annex 2, project life, bearing in mind that the CDM project validity period nowadays is 10 years or 3 renewable periods of 7 years, and lastly the project objective, where efforts should be made to define the project goals to allow assessment of its scope.

Chapter 2) includes a brief description of the project, where its main objectives, activities and technical details should be outlined, together with corresponding

technological changes and advances. Also, brief mention should be made of the main environmental, social, legal and economic aspects of the project idea.

Chapter 3) consists of a brief description of the baseline or reference scenario, as defined by the project formulator for the instance of the project idea. GHG emission sources considered by the idea should be outlined, including a quantitative preliminary estimation of such emissions. The gases included under CDM projects and their atmospheric warming potential can be found in Annex 3 herein.

A similar description of the scenario (or scenarios if applicable) of emission reduction under the project idea should also be included, in order to estimate the GHG emission reductions resulting from the project activities as the difference between the baseline and the project scenario.

Chapter 4) consists of a detailed description of expected project results and the ways they would contribute to the country's sustainable development. Annex 4 includes the sustainable development criteria required for national approval of CDM projects, according to present advances in the field by the UCC, providing orientation about fields in which the project shall have outputs that should meet this requirement.

It is advisable to take into account every criterion on sustainable development, and provide a first approach to its fulfilment, thus facilitating project design in these fields and its approval by the competent authority.

Finally, in chapter 5) some of the principal financial-economic indicators are to be included in order to provide at least a primary evaluation of the project results in terms of costs of the emission reduction, turnover, amount of initial investment and project profitability.

For this purpose, these guidelines include some summary tables that show the evolution of flows during the project life on the following aspects:

Investments
Operation and maintenance expenses
Project incomes
CERs incomes
Evolution of GHG emission reduction in tons CO2e.

Based on these flows, the following data should be calculated and included:

Cost or benefit of GHG emission reduction in US$/ ton CO2e
Current Net Value (using a 10% annual discount rate)
Internal Return Rate

If lack of availability of information should make it impossible to complete these data, it is convenient to include an estimation of the cost of emission reduction and a comparison with the CERs price, which can be estimated today at around US$2.5/ton CO2e after deduction of transaction costs.

4 GUIDELINE FOR SUBMISSION OF CDM PROJECT

After this stage of identification of project ideas, if the interested party evaluates that the idea identified under the present format may be carried out as a CDM project, or otherwise, without having gone through the project idea identification format, wants to formulate a CDM project, he should elaborate a set of documents in order to fulfil national and international requirements inherent in CDM project formulation and their subsequent implementation. These documents should be submitted to the competent national authorities in the various aspects of the project, so as to obtain approval of the project by the host country, in this case Uruguay, as stated herein above.

First, the interested party should provide the necessary information to meet the conditions of the Clean Development Mechanism Project Design Document. (CDM-PDD)

The 01 Version of this Document contains the international format approved by the CDM Executive Board, detailing the information to be provided. This Version has entered into force on August 29, 2002. Subsequent versions should be dated and numbered to make explicit any possible revisions made by said Board of this Document by the Executive Board. Such version can be found in Annex 5 and can also be consulted on the web at: *http://unfccc.int/cdm/documents.html*. If the project is contemplated in the definition of small-scale projects, the simplified design document may be used (SSC-PDD), included in Annex 6.

Although a Spanish version of the CDM-PDD is available, this should be submitted to the CDM Executive Board in English since it is the work language adopted by this entity.

The main body of such Document, shall describe the project, define the baseline methodology, and provide definitions of project duration and activities, or accreditation period for emission reduction, plan and methodology of project monitoring, including calculations of GHG emissions, environmental effects, and the observations of stakeholders on the scope and affectations of the project.

The Project Design Document form also requests additional information on the participants in the project activity, public funding, if any, new methodology for the baseline whenever those already approved and standardized by the CDM are not used, and key data used to define the baseline.

It is clear that the Project Design Document requires the same type of information than the format for identification of project ideas, but with greater detail and / or depth. In this sense, it is advisable to first complete the format for the identification of project ideas in order to have a previous experience leading to more efficient and suitable formulation of the CDM Project Design Document.

It is also advised in these Guidelines to include as much information as possible on economic-financial aspects, following the usual methodologies applied at national and international level for project formulation and evaluation, in order to provide sound information meeting the requirements stated herein, or in the event of any clarifications and/or extensions of the information requested in this document.

Other data and documents must accompany the information provided by the Project Document, to comply with the requirements set in the following document:

Suggested Elements for the Elaboration of a Proposal Containing the Instructions for the National Approval of CDM Projects. This document is attached as Annex 7.

This document has been made to meet CDM requirements for project approval by the host country, where compliance with the country's criteria for sustainable development of Projects submitted under CDM is evaluated.

The criteria for sustainable development to be used for CDM project approval can be found in Annex 4. These proposed criteria refer to environmental, social and economic aspects of the project. In every one of these categories the criteria selected represent the objectives the various policies in these fields should comply with in order to contribute with the sustainable development of the country, completing a menu of sixteen criteria with their respective evaluation scales. This information should be attached to the project approval application foreseen in the Suggested Elements for the Elaboration of a Proposal Containing the Instructions for the National Approval of CDM Projects.

Such documents should be submitted to the Climate Change Unit and should bear an application for project approval made by the proponent, together with the Project Document, elaborated pursuant to the format approved by the CDM Executive Board, a affidavit of the proponent over the contribution of the project to the country's sustainable development according to the criteria contained in Annex 4, with the information of the indicators used to measure such contribution, a more detailed description of the observations made by stakeholders of the project (included in the Project Design Document), with those corresponding to a public audience or consultation and the comments of the proponent on the results, together with a recording of such public consultation, and a document with the legal and administrative reference frameworks of the project.

When it corresponds, the proponent shall submit to the UCC the Environmental Impact Assessment as well as the corresponding Previous Environmental Authorization granted by the MVOTMA

The UCC shall verify the correspondence of the information delivered, that is to say if it complies with the instructions and the additional information required, which may require correction of any lack or fault of such information pursuant to the instructions and these guidelines. Then, the UCC shall proceed to register the project and shall send it to the Technical Advisory Committee of the National Board for Climate Change Joint Projects (JNCC by its acronym in Spanish), if there is one, or to an inter-ministerial organism of similar composition, notifying of such step to the aforementioned Board.

With this information, the Technical Advisory Committee composed of representatives of the Ministries involved in the projects submitted, shall evaluate whether the project contributes to sustainable development, according to the compliance with the criteria approved by the country on the subject and presented in Annex 4, and also if it meets national norms in the areas of the project.

For this purpose, the Technical Advisory Committee may request additional information or accept as sufficient the sworn statement and other documents delivered. The authorities of the country may, is so they wish, carry out an exhaustive evaluation of the project and submit their approval of such evaluation.

After the evaluation, the JNCC shall either recommend or not approval of the project by the competent National Authority, and shall elaborate a ministerial resolution on the voluntary participation of the national participant and the project's contribution to

the country's sustainable development, and shall send the project to the CDM Executive Board, without any other responsibility for the final decision on the project than that concerning its pertinence or lack of it under the criteria of sustainable development of the country.

5 BENEFITS OF THE INVESTMENT PROMOTION SYSTEM

Aside of this process, the proponent may be interested in obtaining the benefits granted by the country to projects elaborated under the framework of the investment promotion system, in order to improve the expected performance of the project, which may in turn influence its compliance with some of the criteria of sustainable development. In these cases, approval prior to its presentation to the CDM Executive Board is to await the granting of benefits corresponding to the promotion system.

This system declares such Projects as Qualified for Promotion, within the framework of Law No. 16.906 of January 1998 and in addition, through article No. 13 of the General Law of Environment Protection, it links those projects and investments made to improve the environment with the system of investment promotion. For explanatory purposes this control form for applications to the Promotion Declaration of industrial and agroindustrial projects is attached in Annex 8, whose requirements do not differ greatly from the Provisional Instructions, except in those aspects referring to specific details that should be contained in the Project Document and the public audience.

In this case the project document shall fulfil the minimum requirements of the Guidelines for Presentation of Industrial and Agroindustrial Projects, attached as Annex 9.

The Application form and other documents required, among which is the Project Document pursuant to these Guidelines, are submitted to the Application Commission (COMAP by its acronym in Spanish) of Law No. 16906, in the Financial Economic Advisory Department of the Ministry of Economy and Finance (MEF).

This project is then evaluated (either privately or publicly at the proponent's choice) within a term no greater than 60 days. When evaluation of an agroindustrial or industrial project is made publicly, this is generally done by the Administration of Industrial Promotion Actions, an organism of the National Directorate of Industry of the Ministry of Industry, Energy and Mining (MIEM).

After a favourable evaluation of the project, the fiscal benefits to be approved are stated (depending on each project). The COMAP approves them and sends its decision to the MIEM whose subsequent approval should be finally endorsed by the MEF.

Finally the project goes to the Council of Ministries where it is declared a Promoted Project and granted the corresponding benefits. This stage lasts approximately one month.

The benefits granted today correspond to tax exemption and the like (exemption from IVA, Contribution to Social Security, COFIS, and Specific Internal Tax -IMESI, importation or purchase in the local market of products not competing with national production. Also it may include the exemption from Patrimony tax for a term of up to 3 years in Montevideo and 5 years in the rest of the country to the fixed assets incorporated to the patrimony of the company owner of the project. It also receives a credit for IVA paid in the local market for materials of civil works, up to a 15% of the

total cost of such works, deducted from professional fees and social security contributions.

The laws in force, in turn, permit exemption from IRIC of net income generated by the project in a period of up to 10 years as from the start of the project. Currently, this exemption is not applied in all its breadth/extent.

In addition, also self-channelling of the amount of IRIC tax can be obtained, that is to say that this amount may be included in the owner's contribution to the project, at least during two fiscal years.

This declaration of Promoted Project and its benefits enable final approval by the country of projects where the fulfilment of sustainable development criteria depends on the benefits granted under this system.

Annex 1: Form for Identification of CDM Project Ideas

1. General Data

Name of Project:

Type of activity:

Location:

Project Responsible or executor(s):

Project formulator or proponent:

Participant(s) (specify role of each participant):

Sector and source category, according to Annex 2:

Project Starting and Completion dates:

Project Objective (it is advisable to give details on Project objective(s) in order to clarify project characteristics and scope):

2. Project Description

Insert here a brief description of the project, including, to the extent possible, major qualitative details in reference to the following items:

Scope
Activities
Technology applied
Impacts
- Social
- Environmental
- Legal
- Economic

3. Baseline Description

Brief description of features and assumptions.

Greenhouse Gases (GHG) considered, according to Annex 3:

Source of emission of each GHG:

4. Description of GHG emission reduction Scenario.

Brief description of features and assumptions.

Information on the following items:

- Greenhouse Gases (GHG) considered, according to Annex 3:
- Source of emission of each GHG:
- Certified Emission reduction (CERs) of GHG

	Years						
Concept	1	2	3	4	5	6	7
Tons of CO2e							

More items can be used
Minimum period: 7 years

Total emission reductions updated at an annual rate of 10% in CO2e tons*

5. Outputs contributing to sustainable development.

Specify clearly all qualitative an quantitative (if possible) outputs of the project that contribute to the country's sustainable development, according to those criteria defined by the country's competent authorities and specified in Annex 4 of this document.

6. Main economic-financial data

Funds Flow

	Years						
Concept	1	2	3	4	5	6	7
Investments							
OYM costs							
Total Costs							
Income							
CERs Income							
Total income							
Net funds flow							

Complete this chart for the difference between the Reductions Scenario and the Baseline, if possible.
More items can be used
Indicative value of CERs is between US$ 2,5/ton CO_2e, net from commercialization costs.
Minimum period: 7 years

Results:

Current Net Value of the Project (in US$ of starting year):

Calculate updating of net project funds at a discount rate of 10% annually.

Cost or benefit of emission reduction in US$/ton CO2e

Calculate ratio between project NPV and the updated total of emission reductions.

Funding Sources

Briefly indicate possible sources for project funding (self-funding, banks, international agencies etc.)

Annex 2: CDM Project Sectors and Categories

Sector	Category
Energy supply	Renewable energy
	Fuel substitution
	Retrofitting of existing generation plants
	New, more efficient generation plants
	Co-generation
	Reduction of transmission and distribution losses.
	Others
Energy demand	Installation of efficient equipment and systems
	Increased efficiency of existing equipment and systems
	Others
Transport	Fuel substitution
	Increased equipment efficiency
	Efficient systems and means of transportation
	Others
Waste	Recovery and utilization of gases from landfills
	Recovery and utilization of waste water treatment plants
	Others
Forestry	Forestation
	Afforestation
Agriculture	Reduction of cattle enteric fermentation
	Others

Annex 3: Greenhouse Gases

Type of gas		Global Warming Potential (GWP) 100 years
Carbon dioxide	CO_2	1
Methane	CH_4	23
Nitrous oxide	N_2O	296
Hydrofluorocarbons	HFC	< 12.000
Perfluorocarbons	PFC	>5700 y <11900
Sulphur Hexafluoride	SF_6	22.200

Note: The list above corresponds with Annex A of Kyoto Protocol.

Annex 4: Proposal of Sustainable Development Criteria for the Approval of Projects under the Clean Development Mechanism

Version 8

Table of Contents

1. Introduction

The Clean Development Mechanism (CDM) was established by article 12 of Kyoto Protocol (KP). It aims to help those Parties not included in Annex I of the United Nations Framework Convention on Climate Change to achieve sustainable development and contribute to the ultimate objective of the Convention, as well as to help those Parties included in Annex I to comply with their quantified commitments of greenhouse effect gas emission limitation and reduction as established in the KP.

As established in the Marrakech Agreement, the operational entity appointed by the CDM Executive Board shall receive from those participating in the project a written confirmation by the National Authority of the host country, stating that the project contributes to the country's sustainable development.

As each host country is completely free to establish the way in which it will determine whether CDM projects contribute to promote sustainable development, it is relevant to develop basic criteria of sustainable development to systematize and facilitate the process. This would also contribute to the transparency of the procedure, an aspect of great importance for the functioning of the mechanism, and to generate high quality projects, which would result in a lesser risk to both the one proposing the project and the investor.

In view of the above, the following is a proposal of sustainable development criteria for the approval of projects under the Clean Development Mechanism. These projects are related to the use of renewable energy sources (hydraulic, wind, solar, biomass, etc.), as substitute of fossil fuel in energy generation, improvement of energy efficiency (generation, transmission and distribution), improvement of energy demand efficiency (use of more efficient equipment, elements and systems), substitute of fossil fuel and improvement of industrial process efficiency, improvement in energy efficiency and substitute of fossil fuel in buildings, reduction of emissions in the transport sector, methane recovery (solid waste, liquid effluents), and forestry.

This proposal was informally consulted with representatives of the various local sectors related to the MDL, and improved by adding the contributions of such sectors. In order to finish this process, weighting coefficients must be assigned to all criteria and indicators in order to establish their relative importance.

The proposed criteria have been classified into four main categories according to the extent they contribute to country's objectives and policies for project development, environmental in this case. In view of this, categories correspond to the following criteria: a) environmental, b) social, c) economic and d) political.[1]

The criteria selected for each of these categories represent the objectives to be complied with by different policies in such fields in order to contribute to the country's sustainable development.

Some of these criteria have been subdivided in sub-criteria of less hierarchy, in view of their relative importance and/or complexity, in order to have a better approach to the problem of compliance with the contribution of each objective to sustainable development. In this way, such categories, criteria and sub-criteria make up a decision tree, with criteria of different hierarchy.

Finally, the criterion or sub-criterion of least hierarchy within the category has an indicator or measurement of results to be accomplished, which may be either quantitative or qualitative.

Quantitative and qualitative indicator levels to be used are sub-divided in a five-value scale in accordance with the characterization of each indicator used. These levels are assigned to a common scale for all indicators, ranging from +1 (maximum) to –1 (minimum), with a middle value at zero and two intermediate values (-0.5 and 0.5).

This leads to the homogeneity of the results achieved for the selected indicators. Besides, the existence of negative and positive values provides a good representation of the effects of these projects, as some contribute negatively and others positively according to each criterion. This is a simple way to visualize the results of the project for the criterion in question, contributing to its use for the evaluation and subsequent approval of projects.

[1] For more information on this methodology see, Heuberger, R (December 2002), "CDM Projects under Kyoto Protocol of the UNFCCC: A Methodology for Sustainable Development Assessment and an Application in South Africa". Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

As a result of the informal consultations carried out, a criterion was selected which is considered restrictive, beyond the previously discussed mechanics and the further evaluation of the remaining criteria contained herein. This restrictive criterion is related to projects with significant health and environmental risks and others risks. Moreover, each separate category must acquire a value higher or equal to zero in order to be approved.

This scale is then transformed into a utility function of the project to sustainable development. By definition, the utility function has positive values; therefore the scale is simply transformed through the following formula:

$U_i(p) = S_i(p)/2 + 0,5$

where: U_i (p) the project utility in reference to a criterion or sub-criterion

S_i (p) the project qualification in reference to a criterion or sub-criterion

This way, the results achieved are always positive and the greatest contribution to sustainable development is given by the highest positive valued attained, being 0.5 a middle value, which is, in principle, the lowest acceptable value to determine that the project complies adequately with this criterion. This is then extended to the rest of the criteria, these results accumulating by following the methodology explained below.

In order to aggregate the results of the different criteria used for each project, a weigh coefficient is assigned to each category, criterion and sub-criterion, according to the relative importance of each of them, according to the following formulas.

$U_j(p) = \text{Suma}\ (U_i(p)*C_i)$

where: U_j (p) the project utility in reference to criterion j

U_i (p) the project utility in reference to subcriterion i

C_i the weighing of subcriterion i in criterio j,

$\text{Addition}\ (C_i) = 1$

$U_m(p) = \text{Addition}\ (U_j(p)*C_j)$

where: U_m (p) the project utility in reference to category m

U_j (p) the project utility in reference to criterion j

C_j the weighing of criterion j in category m

$\text{Addition}\ (C_j) = 1$

According to the previously expressed restriction in relation to the obtention of a positive value for each one of the four categories, U_m must be higher than 0,5.

$U(p) = \text{Addition}\ (U_m(p)*C_{mn})$

where: U (p) total project utility

U_m (p) total project utilityu in reference to category m

C_{mn} weighing of category m normalized acacording to the following equation:

$C_{mn} = C_m * nm / (C_m * nm + C_n * nn + C_o * no + C_p * np)$

where: C_m weighing of category m

nm number of criteria in category m

m, n, o, p : each one of the four categories

Addition (C_{mn}) = 1

2. Criteria, Sub-criteria, Indicators and Scales

Following are the categories, criteria and subcriteria to be applied for evaluation of the contribution of each CDM project to the country's sustainable development, in accordance with the characterization mentioned above.

The starting point is an inicial restrictive criterion:

- Significan risk

Then, the four main categories used are:

- Environmental criteria
- Social criteria
- Economic criteria
- Political or institutional criteria

The following criteria are considered within the **environmental** category:

- Use of renewable energies
- Energy efficiency
- Air quality
- Water resources
- Land use
- Protection of biodiversity
- Risk of environmental emergencies

The Water resources criterion has been broken down into the following three sub-criteria:

- Quality protection
- Modifications in the quantity of resource
- Improvement of water use efficiency

Likewise, the land use criterion is broken down into the following two sub-criteria, according to the relative importance of LULUCF projects in the country:

- Soil quality protection
- Erosion prevention and soil degradation

The following criteria are considered within the **social** category:

- Net generation of employment
- Equitable distribution of income
- Capacity building
- Technologic self-sufficiency
- Impacts on local population

The criterion "impacts on local population" was divided in the following two subcriteria:

- Impacts on local population livelihood
- Impacts on local population habits

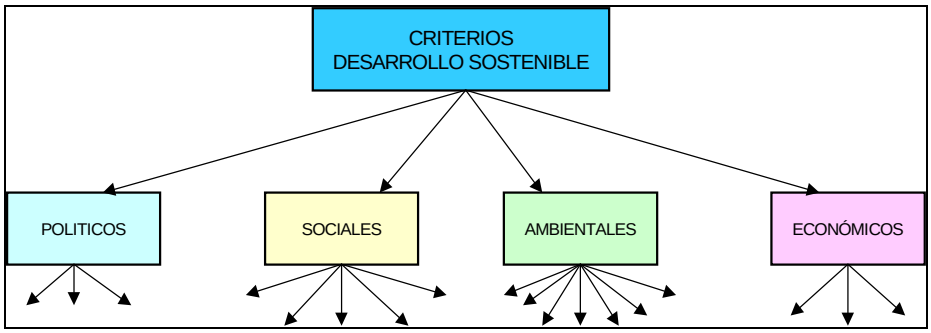
The economic criteria include:

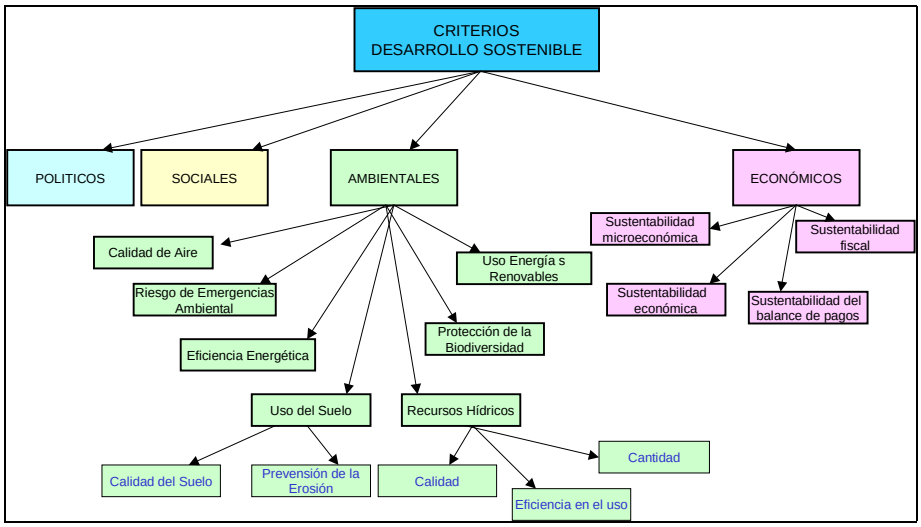
- Microeconomic sustainability
- Economic sustainability
- Pay balance sustainability
- Fiscal sustainability

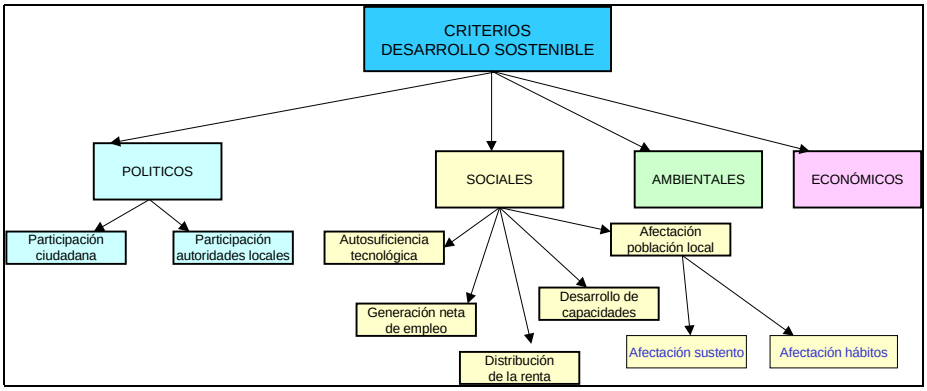
Finally, the **political** category contains the following criteria:

- Citizen participation
- Participation of local authorities

There follow three tree-type diagrams showing the hierarchy of criteria and sub-criteria, in relation to the categories used in this proposal.







2.1 Restrictive Criterion

Project that contain significant potential risks or that cause significant damage to the environment or to human health (e.g. nuclear energy projects) will not be assessed within the framework of the MDL, as such projects are deemed as not contributing to the sustainable development of the country, no matter other possible benefits.

2.2 Environmental Criteria

Indicate the environmental impacts associated with the project compared with the reference scenario

- These criteria asses project impacts on the environment, such as:Use of renewable energy sources
- Energy efficiency

- Air Quality
- Use of soil
- Protection of biodiversity

In view of the above, the following environmental criteria are proposed.

2.2.1 Use of Renewable Energies.

Measures the impact of the use of renewable energies in comparison with the base scenario.

The indicator selected establishes the change in the resource used for energy generation, the maximum value corresponding to the complete substitution of fossile oil.

Values are calculated through the following **formula**:

$R=(ER_P/(ER_P+EF_P) - ER_B/(ER_B+EF_B))*100$

Where

R= Result in %

ER_P= energy derived from renewable sources in the project

EF_P= energy derived from fossil fuels in the project

ER_B= energy derived from renewable sources in the base scenario

EF_B= energy derived from fossil fuels in the base scenario

This formula and the adopted definitions result in the following **scale**:

Scale	R in %
-1	-100%
-0.5	-50%
0	0
0.5	50%
1	100%

2.2.2 Energy efficiency

It indicates the impact of the project on energy consumption.

This criterion aims to assess the contribution of the project to energy use rationalization.

Values are obtain according to the following formula:

$R = E_B - E_P$

Where:

R = Result

E_B = energy efficiency in the reference scenario of the project

E_P = energy efficiency of the project

Scale	R
-1	-5%
-0.5	-5%
0	0
0.5	5%
1	10%

2.2.3 Air Quality.

Indicates the project impacts on the air quality in the local environment.

This criterion is aimed to measure the project's contribution to the maintenance or improvement of air quality. For such purpose, the following five quantitative parameters are proposed, in accordance with the air quality proposal of the working group GESTA aire: particulate material (PM10), sulphur dioxide (SO_2), carbon monoxid (CO), nitrogen oxides (NO_x) and reduced sulphur (TRS).

Scale	Unit
-1	Project actions increase significantly parameter levels
-0.5	Project actions increase slightly parameter levels
0	No parameter change respect to base scenario
0.5	Project actions decrease slightly parameter levels
1	Project actions decrease significantly parameter levels

2.2.4 Water resources

Indicates project impact on water resources, both for surface and deep waters, aiming at maintaining or increasing the use and efficiency of water resources of the country .

The indicators proposed for this case reflect the intention of protecting the quality of available water , optimising water use efficiency and meeting the demands for quantities imposed by coexisting uses.

The indicators used are basically qualitative, in view of the different scales that might be involved in the various projects, though quantitative information may sometimes be used as guideline for qualification. In all cases, the qualification will contemplate the basin that may be immediately impacted by the project.

Three subcriteria are taken into account: quality, quantity and efficiency of water resources.

2.2.4.1 Protection of water resource quality

Scale	Unit
-1	Significant detriment in quality of water available for other uses.
-0.5	Slight detriment in quality of water available for other uses.
0	No negative impact on water resource quality if compared with base scenario.
0.5	Slight improvement in quality of water available for other uses.
1	Significant improvement in quality of water available for other uses.

2.2.4.2 Modification of water resource quantity

Scale	Unit
-1	Project actions cause modifications, which prevent other uses or projects
-0.5	Project actions cause modifications, which very probably would restrict other uses or projects
0	No negative impact on water resource quantity if compared with base scenario.
0.5	Project actions cause modifications which improve the conditions for other uses or projects
1	Project actions cause modifications which significantly foster other uses

2.2.4.3 Use efficiency improvement

Scale	Unit
-1	Significant reduction of use efficiency if compared with base scenario
-0.5	Slight detriment of use efficiency in relation to base scenario
0	No modification of use efficiency if compared with base scenario
0.5	Improved practice in aspects of use efficiency
1	Better use of available technology in aspects of use efficiency

2.2.5 Soil use.

Indicates the rational use of soil and allows to decrease soil erosion and degradation levels.

This criterion is very important in our country at present and even in future conditions, due to the relevance of water resources for agricultural production and consequently for the current and future economy of Uruguay. .

Project impacts on the land resource may derive from different sources, therefore the criterion has been divided in order to provide an improved measuring of the criterion impact and to obtain a clearer panorama of the project influence on such issues as soil quality, erosion and degradation.

Two sub-criteria would be then used herein: improbé or maintain soil quality, and avoid soil erosion and degradation. The joint measurement of both criteria, duly weighed, would result in the criterion of land use.

2.2.5.1 Soil Quality

The objective of this subcriterion included in the “Use of Soil” criterion is to evaluate the form in which the project contributes to improving soil quality in relation to toxic substance contents or potential risk for human healthin land use and land use change projects, since the country is interested in prioritising this kind of projects, as made clear by environmental policies and laws in force.

A qualitative indicator is used. It refers to the actions taken to improve soil quality at the place where the project being considered is located.

The **scale** would be as follows:

Scale	Unit
-1	Project actions significantly affect soil quality
-0.5	Project actions slightly affect soil quality
0	There are no changes in soil quality if compared to base scenario.
0.5	Project actions improve soil quality.
1	Project actions significantly improve soil quality.

2.2.5.2 Preventing Soil Erosion and Degradation.

An important problem of Uruguay is the high levels of soil erosion, which contribute significantly to desertification. Therefore, to foster projects that may prevent erosion and degradation becomes important, and thus this subcriteria is included (within the criteria “Use of Soil) in the set of criteria used for project approval .

For this, a qualitative indicator is used to measure the project impact on those areas susceptible to erosion or degradation, in order to assess whether project actions do or do not protect the soil from the risk and effects of both processes.

The **scale** would be as follows:

Scale	Unit
-1	Project actions significantly increae erosion/degradation risks or rates
-0.5	Project actions increae erosion/degradation risks or rates
0	Project actions do not modify erosion/degradation risks or rates
0.5	Project actions reduce erosion/degradation risks or rates
1	Project actions significantly reduce erosion/degradation risks or rates

2.2.6 Protection of biodiversity

The objective of this criterion is to evaluate the form in which the project contributes to maintenance of biodiversity in relation to soil use and soil use change.

A qualitative indicator is used, which refers to the actions taken to improve biodiversity protection at the place where the referred project is located.

The **scale** would be as follows:

Scale	Unit
-1	Project actions affect significantly local biodiversity
-0.5	Project actions affect lightly local biodiversity
0	Project actions do not affect local biodiversity in relation to base scenario
0.5	Project actions protect or promote local biodiversity
1	Project actions protect or promote significantly local biodiversity.

2.2.7 Risk of environmental emergencies

Environmental emergencies will be assessed on the basis on the precautory principle and the worst scenario hypothesis of an environmental emergency with serious consequences for a) Human Health, b) Environment and c) Property. It is worth noting that that is the internationally accepted priority order. Although for a complete evaluation a support matrix can be used for each option and later superimpose them, it is suggested in this case to carry out only one assessment taking into account the three elements as a whole, and respecting the priority order. It is worth considering that the environmental risk can happen as time goes by and not due to an environmental accident or emergency; but it is considered that this situation must be assessed in relation to project sustainability.

The indicator selected is qualitative and uses the following scale:

Scale	**Unit**
-1	Possible environmental emergencies arising from Project actions (in any stage) could affect significantly the human health, the environment and the property.
-0.5	Possible environmental emergencies arising from Project actions (in any stage) could affect slightly the human health, the environment and the property.
0	Possible environmental emergencies arising from Project actions (in any stage) could not affect the human health, the environment and the property
0.5	--------- No positive values are foreseen. [2]
1	--------- No positive values are foreseen.

2.3 Social Criteria

Indicate the positive effects of project on the country's social development in comparison with reference scenario

The criteria used for this category refer to the main social problems detected in Uruguay.

Therefore, the activities of the project in question should generate positive effects on the social development of Uruguay, which clearly exceed those of the reference scenario.

It is hereby intended that the criteria applied consider both direct and indirect effects. In this latter case, those, which are most clearly apparent from the point of view of the information managed in the project, should be prioritised.

Besides, both short-term and long-term effects on social development are included.

2.3.1 Contribution to net generation of employment

Indicates the change in employment level when comparing the project scenario and reference scenario.

The number of jobs generated per unit of emission reduction obtained by the project assessed.

Counting the number of jobs associated to the project may imply to consider those activities indirectly related to the project. Indirect employment should be taken into account in the results of the indicator used provided it may be quantified under reasonable criteria.

[2] It could be assessed with 0.5 positive, if the Project contains a Contingency Plan that ensures an own answer capacity that leads to avoid impacts on human health, environment and property. The remediation* capacity of the site is not considered as answer capacity.

The indicator used is the difference in the number of jobs (direct and indirect) created by the project during its cycle exceeding those of the reference scenario, divided between the number of emissions reduced, expressed in thousands of tons of CO2eq.

Under this criterion the reduction of one job per every ten thousand tons of CO2eq is the maximum negative value of the scale, that is, it is assigned the value -1. On the contrary, the maximum corresponds to the creation of one job per every ten thousand tons of CO2e, which is assigned the value 1, as specified above. These levels are consistent with the results of project studies made under the framework of the Program of General Measures for Mitigation and Adaptation to Climate Change (PEMEGEMA) being carried out by the Climate Change Unit of DINAMA.

Values are calculated according to the following **formula**:

$EN=(EG_p-EG_b)/(CER)$

Where,

EN = net employment per every thousand tons of CO2e emissions reduced per year

EG_p = number of jobs created per year (average) during the life of the project

EG_b = number of jobs created per year (average) under the baseline.

CER = Reduction of Certified Emissions in thousand tones of CO_2e

This formula and the definitions adopted conform the following **scale**:

Scale	Result EN
-1	-0.1
-0.5	-0.05
0	0
0.5	0.05
1	0.1

2.3.2 Impacts on income of low resource population

Indicates both direct and indirect effects on the resources of low-income sectors in relation to the reference scenario.

This criterion assess the incomes generated by the project in the low-income sectors of the population and its consequences in comparison with the reference scenario.

These effects may produce relevant socio-economic benefits. Therefore, it should be verified whether the project contributes to the availability of services and the development of productive activities at national and local level that may improve life quality and income generation of the society as a whole .

However, in order to simplify the scheme used herein, with criteria and subcriteria classification, it was decided to use an indicator that reflects the quantitative aspects and allows to measure such criterion, although it does not consider specifically some aspects as those above mentioned..

Therefore, the indicator used refers basically to the income and is the percentage of participation of low-income sectors of the population in the total income generated by project activities, after deducting that corresponding to the base scenario.

Values are calculated using the following **formula**:

$IPBR=100* (IPBR_p/IT_p-IPBR_b/IT_b)$

where,

IPBR= net income % of low-income sectors in total income

$IPBR_p$= income of low-income sectors generated during the cycle of the project in adjusted dollars .

IT_p= total income generated during the cycle of the project in adjusted dollars.

$IPBR_b$= low-income sectors incomes generated during the base scenario in adjusted dollars.

IT_b= total income generated in base scenario in adjusted dollars.

The formula and definitions adopted lead to the following **scale**:

Scale	Result IPBR
-1	-100%
-0.5	-50%
0	0%
0.5	50%
1	100%

2.3.3 Contribution to Capacity Building

Indicates the generation of opportunities in high quality capacity building.

An analysis is made of the possibilities of the project to enable capacity building in research and development, increase of labour quality and education improvement, among other, throughout its whole cycle. For that purpose a baseline should be prepared that clearly defines its own scope, so as to be able to determine the changes in the research capacity, quality and quantity training and education offered and any additional opportunity provided by the project on this field.

The indicator used to measure the contribution of this criterion to sustainable development is a qualitative one and represents the evaluation of the project maker about the changes in opportunities of capacity building generation in the mentioned issues throughout the whole project cycle.

From this start point, the **scale** for this criterion is as follows:

Scale	Unit
-1	Significantly less opportunities for capacity building
-0.5	Scarcely less opportunities for capacity building
0	No changes respect to base scenario
0.5	Scarcely more opportunities for capacity building
1	Significantly more opportunities for capacity building

2.3.4 Contribution to technological self-sufficiency

Indicates the application of innovative technologies, which are locally maintained and managed, in comparison to the reference scenario.

This criterion intends projects to apply technologies that imply an innovation in the country, which come from local developments and that could also be maintained and managed in the long run. Therefore, the contribution to technological capacities in the country indicates an increase in the project sustainability in this field, since it enables to adopt and develop domestic technologies.

In this case, a qualitative indicator is used consisting of the evaluation of the project analyst, which considers from transfer of imported technologies, up to the support of external experts, and finally the development of local technological development capacities provided by the project, which exceed the specifications of the baseline.

The measurement should be based on the following **scale**:

Scale	Unit
-1	Technological transfer cannot be maintained or managed in the long run
-0.5	Implementation capacities required must be brought from abroad with the transferred technology
0	Technological transfer not included
0.5	Local implementation capacities may be developed with assistance of external experts.
1	There is potential local capacity to maintain and manage technology implementation.

2.3.5 Impacts on local population

2.3.5.1 Impacts on local population livelihood

The evaluation basis is the economic aspect, in reference to the impact and/or change of the livelihool or economic activity of the neighbourhood, in relation to the following scale.

Scale	**Unit**
-1	Project actions have a significant negative impact on the main livelihood sources of local population.
-0.5	Project actions have a light negative impact on the main livelihood sources of local population
0	No changes in the main livelihood sources of local population
0.5	Project actions improve slightly the main livelihood sources of local population
1	Project actions improve significantly the main livelihood sources of local population

2.3.5.2 Impacts on local population habits

The evaluation basis is the social aspect referred to changes in neighbourhood habits (recreation, public transport, landscape enjoyment, etc.) arising from project activities as eventual disturbing noises and smells, higher intensity of load transport, in relation to the following scale.

Scale	**Unit**
-1	Project actions cause a significant impact on the development of local life habits.
-0.5	Project actions cause a light impact on the development of local life habits
0	Project actions do not impact the development of local life habits
0.5	Project actions improve slightly the development of local life habits
1	Project actions improve significantly the development of local life habits

2.4 Economic Criteria

Indicate the positive effects of the project on the sustainable economic development of the country if compared to base scenario

When analysing a project contribution to economic sustainable development, several variables should be considered which are interrelated. Therefore, evaluation is relatively complex, and a relatively large number of indicators should be taken into account.

However, this can be simplified in certain aspects, focusing the analysis on some criteria that reflect the main lines of the economic policy of the country.

Firstly, projects should be economically-financially feasible themselves; for this purpose the micro-economic sustainability criterion applies, measured by the project profitability. On the other hand, the project must contribute to the economy as a whole, and so an indicator showing the economic sustainability of the project is included.

Uruguay practices an opening policy and has a small dimension, therefore net foreign currency income or its saving constitutes a permanent concern. However, this criterion should be relativised since a significant investment in imported equipment may generate a foreign currency deficit along time, but a positive economic impact for the country. This is a relatively common situation in a country that depends highly on foreign investment and imported equipment.

Furthermore, another criterion considered as contributing to sustainable development is the maintenance of a balance in public accounts, which may enable a healthy administration of the country's resources.

The measurement of the effects of above stated criteria should take into account both direct and indirect impacts (according to the information available). Besides, the results throughout the project cycle should be considered.

2.4.1 Contribution to Microeconomic sustainability

Indicates the project feasibility and its sustainability in the long run in comparison to the reference scenario.

This consists of an evaluation of the project contribution to microeconomic sustainability, which is measured by the cash flows in both scenarios, using for that purpose a classic economic-financial tool, the Internal Return Rate (IRR) applied to the net flow of funds obtained in the comparison of both situations, with and without project implementation.

The project IRR should be compared with the opportunity cost of the capital, defined by the authorities for the country. In our case this cost is a 10% annual rate in constant values of the year of beginning of the project.

Taking this into account, the zero value in the scale of this criterion is equal to such rate, a rate of 0% is the minimum (-1) and one of 20% the maximum (+1).

The definitions adopted conform the following **scale**:

Scale	Internal Return Rate (% per year)
-1	0%
-0.5	5%
0	10%
0.5	15%
1	20%

As complement, an analysis on the current net value of emission abatement per ton of CO2 avoided is recommended. To update earnings, costs and quantities, the discount rate corresponding to the opportunity cost -following national accounting practice- as considered in this proposal is suggested. The lesser the cost (or greater the benefit) per unit in the project scenario respect to the reference scenario, greater its contribution to microeconomic sustainability.

2.4.2 Contribution to economic sustainability

It indicates the contribution in terms of goods and services of the project to the economy as a whole, thus ensuring project feasibility and long-term sustainability.

This project contribution to economic sustainability is obtained through a cost-benefit analysis, that assess monetary, both direct and indirect, the costs and benefits of the project. This assessment corresponds to an adjustment of the cash flows used in the previous criterion, so that the benefits and costs are expressed at efficiency price, i.e. without market restrictions. For that purpose in Uruguay the Account Price Relations (APR) are used, elaborated by the Planning and Budget Office. In turn other economic benefits and cost are added to such flows, for example cost savings and economic resource liberation as project benefits.

Starting from such calculated flows, the Economic Return Internal Rate (ERIR) can be also calculated; the difference between this rate and the rate calculated with the previous criterion is that the latter uses efficiency prices, costs and benefits referred to the economy as a whole, and not only to the private and financial field of the project.

The project ERIR is compared with the economic opportunity cost of capital, defined by the national authorities for the whole country. In our case, the latter is considered equal to the financial one, i.e. at an annual rate of 10% in constant values of the initial year of the project.

Starting from that, it is assumed that the zero value in the following scale is equal to such rate, while for the minimim value (–1) corresponds an annual rate of 0%, and for the maximum value corresponds an annual rate of 20%, similar to the previous criterion.

The above mentioned definitions create the following **scale**:

Scale	Economic Return Internal Rate (annual %)
-1	0%
-0.5	5%
0	10%
0.5	15%
1	20%

2.4.3 Contribution to the sustainability of pay balance

Indicates the net balance of foreign currency, in comparison with the reference scenario.

This criterion shows the change produced in the flow of external goods and services, including both technology and equipment as inputs required from abroad and/or saved, as well as exports, throughout the project cycle, and pared with the reference scenario. In other words, the interference of the project with national imports and exports is verified.

A decrease in foreign currency expenditure or an increase in foreign currency saving may indicate a greater sustainability of pay balance. For example, as a result of a CDM project, imports of fossil fuel may decrease implying net saving of foreign currency.

This indicator should be relativised, since a negative foreign currency balance caused by a significant investment may efficiently contribute to the country, despite its receiving a negative mark under this criterion. This consideration should be then taken into account.

The indicator used to measure this criterion is foreign currency net balance, taking into account foreign currency movements, both direct (exports or costs of imports of the project), and indirect; i.e. the foreign currency cost implied by project inputs in reference to baseline, against the total amount of CERs to be obtained, all of them expressed in the currency of the year of start of the project in question.

In case of calculation of indirect components of foreign currency in the goods and services herein referred, it is proposed that only components in foreign currency belonging to the immediate previous link of the production or commercialisation chain of any one of the goods or services included in this indicator.

Values are calculated according to the following **formula**:

$BNDC= (BD_p-BD_b)/CER$

Where,

BNCD= Relation between foreign currency balance and incomes on account of CERs in adjusted dollars

BD_p= foreign currency balance in adjusted dollars corresponding to the project.

BD_b= foreign currency balance in adjusted dollars corresponding to baseline.

CER = Certified Emmission Reduction in adjusted dollars.

This formula and the definitions adopted provide the following **scale**:

Scale	Result BCND
-1	-5
-0.5	-2.5
0	0
0.5	2.5
1	5

Lastly, it should be mentioned that the values used as limits for the indicator used arise from the results of projects considered under PEMEGEMA, the same as in the case of other indicators.

2.4.4 Contribution to fiscal sustainability

Indicates the change in public finance if compared to the reference scenario.

Evaluates the influence of the project scenario on the public sector accounts. The project contributes w with income generation or fiscal cost saving arising from CDM projects, when compared to the reference scenario. Public accounting includes the taxes and subsidies applied or avoided, transfers, variations in public expenditure, etc.

The indicator used to measure this criterion is the fiscal balance between income or expenditure saving in relation to expenditures or expenditure reduction, considering the differences between project scenarios and the reference scenario, with respect to the total amount of CERs to be obtained, all of these expressed in the currency of the year of beginning of the corresponding project.

Values are calculated according to the following **formula**:

$SFNC=(SF_p-SF_b)/CER$

Where,

SFNC= Relation between the net fiscal balance and income per CER in adjusted dollars.

SF_p= fiscal balance in adjusted dollars corresponding to project.

SF_b= fiscal balance in adjusted dollars corresponding to baseline.

CER = Certified Emission Reduction in adjusted dollars.

This formula and the definitions adopted provide the following **scale**:

Scale	Result SFNC
-1	-10
-0.5	-5
0	0
0.5	5
1	10

The same as in previous cases, these values have been obtained from PEMEGEMA experiences.

2.4 Political Criteria

2.4.1 Citizen participation

Indicates the grade of citizen and community participation in the elaboration and/or monitoring of the project

Scale	Unit
-1	No publicly available information
-0.5	Scarce information available
0	The community and the public at large were duly informed about all aspects related to the project
0.5	There is public access to relevant information, the community was duly informed and took part in project elaboration.
1	There is public access to pertinent information, the community was informed and took part in project elaboration, and there are provisions in relation to the participation of the community in project monitoring.

2.4.2 Participation of local authorities

It indicates the grade of participation of Municipal Governments, Local Councils and Community Centers in the elaboration and/or monitoring of the Project.

Scale	Unit
-1	No information submitted to local authorities
-0.5	There was scarce information available
0	Local authorities were duly informed of all aspects related to the project
0.5	Local authorities were duly informed and participated in the elaboration of the project
1	Local authorities were duly informed and participated in the elaboration of the project, and there are provisions in relation to their participation in project monitoring.

Annex 5: CDM Project Design Document (CDM-PDD)

CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT (CDM-PDD)
Version 01 (in effect as of: 29 August 2002)

Introductory Note

1. This document contains the clean development mechanism project design document (CDM-PDD). It elaborates on the outline of information in Appendix B "Project Design Document" to the Modalities and Procedures (decision 17/CP.7 contained in document FCCC/CP/2001/13/Add.2).

2. The CDM-PDD can be obtained electronically through the UNFCCC CDM web site (http://unfccc.int/cdm), by e-mail (cdm-info@unfccc.int) or in printed from the UNFCCC secretariat (Fax: +49-228-8151999).

3. *Explanations* for project participants are in italicized font.

4. The Executive Board may revise the project design document (CDM-PDD), if necessary. Revisions shall not affect CDM project activities validated at and prior to the date at which a revised version of the CDM-PDD enters into effect. Versions of the CDM-PDD shall be consecutively numbered and dated.

5. In accordance with the CDM M&P, the working language of the Board is English. The CDM-PDD shall therefore be submitted to the Executive Board filled in English. The CDM-PDD format will be available on the UNFCCC CDM web site in all six official languages of the United Nations.

6. The Executive Board recommends to the COP (COP/MOP) to determine, in the context of its decision on modalities and procedures for the inclusion of afforestation and reforestation activities in the CDM (see also paragraph 8-11 of decision 17/CP.7), whether the CDM-PDD shall be applicable to this type of activities or whether modifications are required.

7. A glossary of terms may be found on the UNFCCC CDM web site or from the UNFCCC secretariat by e-mail (cdm-info@unfccc.int) or in print (Fax: +49-228-815 1999).

CONTENTS

A. General description of project activity

A.1 Title of the project activity:

A.2. Description of the project activity:

(Please include in the description
- the purpose of the project activity
- the view of the project participants of the contribution of the project activity to sustainable development (max. one page).)

A.3. Project participants:

(Please list Party(ies) and private and/or public entities involved in the project activity and provide contact information in Annex 1.)

(Please indicate at least one of the above as the contact for the CDM project activity.)

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1 Host country Party(ies):

A.4.1.2 Region/State/Province etc.:

A.4.1.3 City/Town/Community etc:

A.4.1.4 Detail on physical location, including information allowing the unique identification of this project activity *(max one page)*:

A.4.2. Category(ies) of project activity

(Using the list of categories of project activities and of registered CDM project activities by category
available on the UNFCCC CDM web site, please specify the category(ies) of project activities into which this project activity falls. If no suitable category(ies) of project activities can be identified, please suggest a new category(ies) descriptor and its definition, being guided by relevant information on the UNFCCC CDM web site.)

A.4.3. Technology to be employed by the project activity:

(This section should include a description on how environmentally safe and sound technology and know-how to be used is transferred to the host Party, if any.)

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the

proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

(Please explain briefly how anthropogenic greenhouse gas (GHG) emission reductions are to be achieved (detail to be provided in section B.) and provide the total estimate of anticipated reductions in tonnes of CO_2 equivalent as determined in section E. below.)

A.4.5. Public funding of the project activity:

(In case public funding from Parties included in Annex I is involved, please provide in Annex 2 information on sources of public funding for the project activity, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.)

B. Baseline methodology

B.1 Title and reference of the methodology applied to the project activity:

(Please refer to the UNFCCC CDM web site for the title and reference list as well as the details of approved methodologies. If a new baseline methodology is proposed, please fill out Annex 3. Please note that the table "Baseline data" contained in Annex 5 is to be prepared parallel to completing the remainder of this section.)

B.2. Justification of the choice of the methodology and why it is applicable to the project activity

B.3. Description of how the methodology is applied in the context of the project activity:

B.4. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity *(i.e. explanation of how and why this project is additional and therefore not the baseline scenario)*

B.5. Description of how the definition of the project boundary related to the baseline methodology is applied to the project activity*:*

B.6. Details of baseline development

B.6.1 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*:

B.6.2 Name of person/entity determining the baseline:

(Please provide contact information and indicate if the person/entity is also a project participant listed in Annex 1.)

C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

(For a definition by the Executive Board of the term "starting date", please refer to UNFCCC CDM web site. Any such guidance shall be incorporated in subsequent versions of the CDM-PDD. Pending guidance, please indicate how the" starting date" has been defined and applied in the context of this project activity.)

C.1.2. Expected operational lifetime of the project activity: *(in years and months, e.g. two years and four months would be shown as: 2y-4m)*

C.2 Choice of the crediting period and related information: *(Please underline the appropriate option (C.2.1 or C.2.2.) and fill accordingly)*

(Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, the starting date of the crediting period can be prior to the date of registration of the project activity as provided for in paras. 12 and 13 of decision 17/CP.7 and through any guidance by the Executive Board, available on the UNFCCC CDM web site)

C.2.1. Renewable crediting period *(at most seven (7) years per period)*

C.2.1.1. Starting date of the first crediting period *(DD/MM/YYYY)*:

C.2.1.2. Length of the first crediting period *(in years and months, e.g. two years and four months would be shown as: 2y-4m)*:

C.2.2. Fixed crediting period *(at most ten (10) years)*:

C.2.2.1. Starting date *(DD/MM/YYYY*):

C.2.2.2. Length (max 10 years): *(in years and months, e.g. two years and four months would be shown as: 2y-4m)*

D. Monitoring methodology and plan

(The monitoring plan needs to provide detailed information related to the collection and archiving of all relevant data needed to
- estimate or measure emissions occurring within the project boundary;
- determine the baseline; and;
- identify increased emissions outside the project boundary.
The monitoring plan should reflect good monitoring practice appropriate to the type of project activity. Project participants shall implement the registered monitoring plan and provide data, in accordance with the plan, through their monitoring report.

Operational entities will verify that the monitoring methodology and plan have been implemented correctly and check the information in accordance with the provisions on

verification. This section shall provide a detailed description of the monitoring plan, including an identification of the data and its quality with regard to accuracy, comparability, completeness and validity, taking into consideration any guidance contained in the methodology.

Please note that data monitored and required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.)

D.1. Name and reference of approved methodology applied to the project activity:

(Please refer to the UNFCCC CDM web site for the name and reference as well as details of approved methodologies. If a new methodology is proposed, please fill out Annex 4.)

(If a national or international monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.)

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

D.3. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

(Please add rows to the table below, as needed)

ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment

D.4. Potential sources of emissions which are significant and reasonably attributable to the project activity, but which are not included in the project boundary, and identification if and how data will be collected and archived on these emission sources.

(Please add rows to the table below, as needed.)

ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment

D.5. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHG within the project boundary and identification if and how such data will be collected and archived.

(Depending on the methodology used to determine the baseline this table may need to be filled. Please add rows to the table below, as needed.)

ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data variable	Data unit	Will data be collected on this item? (If no, explain).	How is data archived? (electronic/paper)	For how long is data archived to be kept?	Comment

D.6. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored. *(data items in tables contained in section D.3., D.4. and D.5 above, as applicable)*

Data *(Indicate table and ID number e.g. D.4-1; D.4-2.)*	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.

D.7 Name of person/entity determining the monitoring methodology:

(Please provide contact information and indicate if the person/entity is also a project participant listed in Annex 1 of this document.)

E. Calculation of GHG emissions by sources

E.1 Description of formulae used to estimate anthropogenic emissions by sources of greenhouse gases of the project activity within the project boundary: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

E.2 Description of formulae used to estimate leakage, defined as: the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and that is measurable and attributable to the project activity: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

E.3 The sum of E.1 and E.2 representing the project activity emissions:

E.4 Description of formulae used to estimate the anthropogenic emissions by sources of greenhouse gases of the baseline: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

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

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

F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts
(Please attach the documentation to the CDM-PDD.)

F.2. If impacts are considered significant by the project participants or the host Party: *please provide conclusions and all references to support documentation of an environmental impact assessment that has been undertaken in accordance with the procedures as required by the host Party.*

G. Stakeholders comments

G.1. Brief description of the process on how comments by local stakeholders have been invited and compiled:

G.2. Summary of the comments received:

G.3. Report on how due account was taken of any comments received:

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

(Please copy and paste table as needed)

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

NEW BASELINE METHODOLOGY

(The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A of the Kyoto Protocol within the project boundary. The general characteristics of a baseline are contained in para. 45 of the CDM M&P.

For guidance on aspects to be covered in the description of a new methodology, please refer to the UNFCCC CDM web site.

Please note that the table "Baseline data" contained in Annex 5 is to be prepared parallel to completing the remainder of this section.)

1. Title of the proposed methodology:

2. Description of the methodology:

2.1. General approach *(Please check the appropriate option(s))*

□ Existing actual or historical emissions, as applicable;

□ Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;

□ The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

2.2. Overall description (other characteristics of the approach):

3. Key parameters/assumptions (including emission factors and activity levels), and data sources considered and used:

4. Definition of the project boundary related to the baseline methodology:

(Please describe and justify the project boundary bearing in mind that it shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the project activity. Please describe and justify which gases and sources included in Annex A of the Kyoto Protocol are included in the boundary and outside the boundary.)

5. Assessment of uncertainties:

(Please indicate uncertainty factors and how those uncertainties are to be addressed)

6. Description of how the baseline methodology addresses the calculation of baseline emissions and the determination of project additionality:

(Formulae and algorithms used in section E)

7. Description of how the baseline methodology addresses any potential leakage of the project activity:

(*Please note: Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary and which is measurable and attributable to the CDM project activity.)*

(Formulae and algorithms used in section E.5)

8. Criteria used in developing the proposed baseline methodology, including an explanation of how the baseline methodology was developed in a transparent and conservative manner:

9. Assessment of strengths and weaknesses of the baseline methodology:

10. Other considerations, such as a description of how national and/or sectoral policies and circumstances have been taken into account:

Annex 4

NEW MONITORING METHODOLOGY

Proposed new monitoring methodology

(Please provide a detailed description of the monitoring plan, including the identification of data and its quality with regard to accuracy, comparability, completeness and validity)

1. Brief description of new methodology
(Please outline the main points and give a reference to a detailed description of the monitoring methodology).

2. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived

(Please add rows to the table below, as needed)

ID number *(Please use numbers to ease cross-referencing to table 5)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment

3. Potential sources of emissions which are significant and reasonably attributable to the project activity, but which are not included in the project boundary, and identification if and how data will be collected and archived on these emission sources
(Please add rows to the table below, as needed.)

ID number *(Please use numbers to ease cross-referencing to table 5)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment

4. Assumptions used in elaborating the new methodology:

(Please list information used in the calculation of emissions which is not measured or calculated, e.g. use of any default emission factors)

5. Please indicate whether quality control (QC) and quality assurance (QA) procedures are being undertaken for the items monitored. *(see tables in sections 2 and 3 above)*

Data *(Indicate table and ID number e.g. 3.-1; 3.-2.)*	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.

6. What are the potential strengths and weaknesses of this methodology? *(please outline how the accuracy and completeness of the new methodology compares to that of approved methodologies).*

7. Has the methodology been applied successfully elsewhere and, if so, in which circumstances?

After completing above, please continue filling sub-sections D.2. and following.

Annex 5

TABLE: BASELINE DATA

(Please provide a table containing the key elements used to determine the baseline (variables, parameters, data sources etc.). For approved methodologies you may find a draft table on the UNFCCC CDM web site. For new methodologies, no predefined table structure is provided.)

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Annex 6: CDM Simplified Project Design Document for Small Scale Project Activities (SSC-PDD)

Appendix A[1] to the simplified modalities and procedures for small-scale CDM project activities

CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
Version 01 (21 January, 2003)

Introductory Note

1. This document contains the clean development mechanism project design document for small-scale project activities (SSC-PDD). It elaborates on the outline of information in appendix B "Project Design Document" to the CDM modalities and procedures (annex to decision 17/CP.7 contained in document FCCC/CP/2001/13/Add.2) and reflects the simplified modalities and procedures (herewith referred as simplified M&P) for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3).

2. The SSC-PDD can be obtained electronically through the UNFCCC CDM web site (http://unfccc.int/cdm/ssc.htm), by e-mail (cdm-info@unfccc.int) or in print from the UNFCCC secretariat (Fax: +49-228-8151999).

3. Explanations for project participants are in italicized font *(e.g. explanation)*.

4. The Executive Board may revise the SSC-PDD if necessary. Revisions shall not affect small-scale CDM project activities validated prior to the date at which a revised version of the SSC-PDD enters into effect. Versions of the SSC-PDD shall be consecutively numbered and dated. The SSC-PDD will be available on the UNFCCC CDM web site in all six official languages of the United Nations.

5. In accordance with the CDM modalities and procedures, the working language of the Board is English. The completed SSC-PDD shall therefore be submitted to the Executive Board in English.

6. Small-scale activities submitted as a bundle, in accordance with paragraphs 9 (a) and 19 of the simplified M&P for small-scale CDM project activities, may complete a single SSC-PDD provided that information regarding A.3 (*Project participants*) and A.4.1 *(Location of the project activity)* is completed for each project activity and that an overall monitoring plan is provided in section D.

7. A small-scale project activity with different components eligible to be proposed[2] as a small-scale CDM project activity may submit one SSC-PDD, provided that information regarding subsections A.4.2 (*Type and category(ies) and technology of project activity*), and A.4.3 (*brief statement on how*

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[1] This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix A to that document. For the full text of the annex II to decision 21/CP.8 please see http://unfccc.int/cdm/ssc.htm).

[2] In paragraph 7 of simplified M&P for small-scale CDM project activities, on clarifications by the Executive Board on small-scale CDM project activities, the Board agreed that in a project activity with more than one component that will benefit from simplified CDM modalities and procedures, each component shall meet the threshold criterion of each applicable type, e.g. for a project with both a renewable energy and an energy efficiency component, the renewable energy component shall meet the criterion for "renewable energy" and the energy efficiency component that for "energy efficiency".

anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity) and sections B *(Baseline methodology)*, D *(Monitoring methodology and plan)* and E *(Calculation of GHG emission reductions by sources)* is provided separately for each of the components of the project activity.

8. If the project activity does not fit any of the project categories in appendix B of the simplified M&P for small-scale CDM project activities, project proponents may propose additional project categories for consideration by the Executive Board, in accordance to paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The project design document should, however, only be submitted to the Executive Board for consideration after it has amended appendix B as necessary.

9. A glossary of terms may be found on the UNFCCC CDM web site or from the UNFCCC secretariat by e-mail (cdm-info@unfccc.int) or in print (Fax: +49-228-8151999).

CONTENTS

A. General description of project activity

A.1 Title of the project activity:

A.2 Description of the project activity:

(Please include in the description
- the purpose of the project activity
- the view of the project participants on the contribution of the project activity to sustainable development (max. one page).)

A.3 Project participants:

(Please list Party(ies) and private and/or public entities involved in the project activity and provide contact information in annex 1 of this document.)

(Please designate one of the above as the official contact for the CDM project activity.)

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies):

A.4.1.2 Region/State/Province etc.:

A.4.1.3 City/Town/Community etc:

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity *(max one page)*:

A.4.2 Type and category(ies) and technology of project activity

(Please specify the type and category of the project activity using the categorization of appendix B to the simplified M&P for small-scale CDM project activities, hereafter referred to as appendix B. Note that appendix B may be revised over time and that the most recent version will be available on the UNFCCC CDM web site.

In this section you shall justify how the proposed project activity conforms with the project type and category selected (for simplicity, the rest of this document refers to "project category" rather than "project type and category").

If your project activity does not fit any of the project categories in appendix B, you may propose additional project categories for consideration by the Executive Board, in accordance with paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The final SSC-PDD project design document shall, however, only be submitted to the Executive Board for consideration after the Board has amended appendix B as necessary.)

(This section should include a description of how environmentally safe and sound technology and know-how is transferred to the host Party, if such a transfer is part of the project.)

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

(Please state briefly how anthropogenic greenhouse gas (GHG) emission reductions are to be achieved (detail to be provided in section B.) and provide the estimate of total anticipated reductions in tonnes of CO_2 equivalent as determined in section E. below.)

A.4.4 Public funding of the project activity:

(Indicate whether public funding from Parties included in Annex I is involved in the proposed project activity. If public funding from one or more Annex I Parties is involved, please provide information on sources of public funding for the project activity in annex 2, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.)

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

(Please refer to appendix C to the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a debundled component of a larger project activity.)

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:

(Please refer to the UNFCCC CDM web site for the most recent list of the small-scale CDM project activity categories contained in appendix B of the simplified M&P for small-scale CDM project activities.)

B.2 Project category applicable to the project activity:

(Justify the choice of the applicable baseline calculation for the project category as provided for in appendix B of the simplified M&P for small-scale CDM project activities.)

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity *(i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario)*

(Justify that the proposed project activity qualifies to use simplified methodologies and is additional using attachment A to appendix B of the simplified M&P for small-scale CDM project activities.)

(National policies and circumstances relevant to the baseline of the proposed project activity shall be summarized here as well.)

B.4 Description of the project boundary for the project activity:

(Define the project boundary for the project activity using the guidance specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*:

B.5.3 Name of person/entity determining the baseline:

(Please provide contact information and indicate if the person/entity is also a project participant listed in annex 1 of this document.)

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity:

(For a definition of the term "starting date", please refer to the UNFCCC CDM web site).

C.1.2 Expected operational lifetime of the project activity: *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

C.2 Choice of the crediting period and related information: *(Please underline the selected option (C.2.1 or C.2.2) and provide the necessary information for that option.)*

(Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, the starting date of the crediting period can be prior to the date of registration of the project activity as provided for in paragraphs 12 and 13 of decision 17/CP.7 and in any guidance by the Executive Board, available on the UNFCCC CDM web site.)

C.2.1 Renewable crediting period *(at most seven (7) years per crediting period)*

C.2.1.1 Starting date of the first crediting period *(DD/MM/YYYY)*:

C.2.1.2 Length of the first crediting period *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*:

C.2.2 Fixed crediting period *(at most ten (10) years)*:

C.2.2.1 Starting date *(DD/MM/YYYY)*:

C.2.2.2 Length (max 10 years): *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

D. Monitoring methodology and plan

(The monitoring plan shall incorporate a monitoring methodology specified for the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities and represent good monitoring practice appropriate to the type of project activity.

The monitoring plan shall also provide information on the collection and archiving of the data specified in appendix B of the simplified M&P for small-scale CDM project activities to:
- Estimate or measure emissions occurring within the project boundary;
- Determine the baseline, as applicable;
- Estimate leakage, where this needs to be considered.

Project participants shall implement the registered monitoring plan and provide data, in accordance with the plan, through their monitoring reports.

Operational entities will verify that the monitoring methodology and plan have been implemented correctly and check the information in accordance with the provisions on verification. This section shall provide a detailed description of the monitoring plan, including an identification of the data to be collected, its quality with regard to accuracy, comparability, completeness and validity, taking into consideration any guidance contained in the methodology, and archiving of the data collected.

Please note that monitoring data required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

An overall monitoring plan that monitors performance of the constituent project activities on a sample basis may be proposed for bundled project activities. If bundled project activities are registered with an overall monitoring plan, this monitoring plan shall be implemented and each verification/certification of the emission reductions achieved shall cover all of the bundled project activities.)

D.1 Name and reference of approved methodology applied to the project activity:

(Please refer to the UNFCCC CDM web site for the most recent version of the indicative list of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

(If a national or international monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.)

D.2 Justification of the choice of the methodology and why it is applicable to the project activity:

(Justify the choice of the monitoring methodology applicable to the project category as provided for in appendix B.)

D.3 Data to be monitored:

(The table below specifies the minimum information to be provided for monitored data. Please complete the table for the monitoring methodology chosen for the proposed project activity from the simplified monitoring methodologies for the applicable small-scale CDM project activity category contained in appendix B of the simplified M&P for small-scale CDM project activities.

Please note that for some project categories it may be necessary to monitor the implementation of the project activity and/or activity levels for the calculation of emission reductions achieved.

Please add rows or columns to the table below, as needed)

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment

D.4 Name of person/entity determining the monitoring methodology:

(Please provide contact information and indicate if the person/entity is also a project participant listed in annex 1 of this document.)

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

(In E.1.1 please provide the formula used to calculate the GHG emission reductions by sources in accordance with the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.

In case the applicable project category from appendix B does not indicate a specific formula to calculate the GHG emission reductions by sources, please complete E.1.2 below.)

E.1.1 Selected formulae as provided in appendix B:

(Describe the calculation of GHG emission reductions in accordance with the formula specified for the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: *(for each gas, source, formulea/algorithm, emissions in units of CO_2 equivalent)*

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

E.2 Table providing values obtained when applying formulae above:

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity: *(if applicable, please provide a short summary and attach documentation)*

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

G.2 Summary of the comments received:

G.3 Report on how due account was taken of any comments received:

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

(Please repeat table as needed)

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postcode/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

- - - - -

Annex 7: Suggested Elements for the Elaboration of a Proposal Containing the Instructions for the National Approval of CDM Projects

1. Documentation

The proponent of a CDM Project should submit the following documents to the Climate Change Unit (UCC)[3] from the National Directorate of Environment (DINAMA) of the Ministry of Housing, Territorial Regulation and Environment (MVOTMA):

a. Application letter requesting approval, following form enclosed as Annex A of these Instructions, including the following administrative data:

i) Name of the project owner, indicating, legal name, address, and including notarial or certified original documentation accrediting the quality of legal person and his legal representation as well as corresponding tax-payer register number (RUC)

ii) If the address is not within Montevideo, an address should be indicated for all legal purposes (including fax and e-mail, if available).

iii) The undersigned shall clarify his/her signature and add his/her Identity Card Number. In the case of an attorney at law, he or she should so express it and submit the original power of attorney or a notarial testimony of such accrediting his/her representation.

iv) Documents shall be written in Spanish and preferably also in magnetic support (CD or floppy disk), at least those documents available in this format.

v) If a decision taken within this project were to affect the rights of any third parties, those third parties should be identified, indicating their corresponding addresses and other data, and, if possible, their consent to the project in writing. This is the case of the premise owners, when they do not coincide with the owners of the project.

vi) Any professional participation in the project presentation, must be accompanied by the corresponding stamps proving compliance with the fees provided for by the Social Security System of University Professionals.

b. Document of the Project prepared according to the international format[4] approved by CDM Executive Board.

c. Environmental Impact Assessment if either the project proponents or the Government believes that negative environmental or social impact from the project activity will be significant or if an EIA is legally required the corresponding Previous Environmental Authorization granted by the MVOTMA[5].

d. Written declaration of the proponent stating the project contribution to the sustainable development of the country. For that purpose all sustainable development criteria indicated in annex B shall be applied by the National Authority designated to evaluate the validity of the application.

e. Detailed information of that provided in section G (Stakeholders comments) of the Project Document including:

   i. observations received by the above mentioned declaration when divulged in public audience or consultation.

   ii. comments of the proponent respect to such observations

[3] Unidad de Cambio Climático, Rincón 422, piso 3, oficina 5, Montevideo, Uruguay;
tel: (598 2) 917 07 10 Ext. 4305; fax: (598 2) 917 0710 Ext. 4321;
e-mail: lsantos@cambioclimatico.gub.uy, web: http://www.cambioclimatico.gub.uy

[4] CDM Project Design Document (CDM-PDD) available at: http://unfccc.int/cdm/cdmpdd.htm or otherwise Small Scale CDM - Project Document Design (SSC-PDD) available at: http://unfccc.int/cdm/ssc.htm

[5] For information on steps and requirements to obtain the Previous Environmental Authorization contact División de Evaluación de Impacto Ambiental de la DINAMA: Rincón 422, Piso 4, Montevideo, Uruguay; Tel: (5982) 917 0710 Ext.4403

f. Document indicating the legal and administrative framework of the project according to its type and location, identifying applicable legal provisions and the permits or licenses required.
g. Magnetic or digital recording of the public audience or consultation with the observations and comments referred to in d.i) and d.ii) herein

2. Submission and processing

a. The UCC shall verify that all documents and the recording submitted by the proponent, bear the data required and shall file the application. Should the information provided prove inadequate or incomplete, the UCC shall so notify to the interested party for correction of any deficiency.

b. Upon verification of compliance of the information submitted with the above requirements, the UCC shall:
   i. file it in its register,
   ii. issue a statement of the status of the application proceeding and
   iii. send the project to the Advisory Technical Committee of the National Board for Climate Change Joint Projects (JNCC)[6] for analysis and evaluation

3. Project Evaluation

The Advisory Technical Committee shall
a. Evaluate the information contained in the documents and record submitted under numeral 1 above, taking into account the sustainable development criteria stated in Annex B, the legal and administrative framework, and any other information or elements arising during such process;
b. Present to the JNCC the corresponding report on the project adjustment to national and international legal provisions and proceedings regulating the activities of CDM projects, their contribution to the sustainable development of the country and the pertinence of its approval.

In the stage of project evaluation, the Advisory Technical Committee shall request from the project proponent submission of any clarification or complementary information as it deems convenient.

The JNCC shall resolve upon the elements provided by the Advisory Technical Committee, together with those antecedents of the project proposal and shall or not finally decide to recommend its approval by the designated National Authority (MVOTMA). If the project's approval is recommended, the file shall be submitted to the Authority for its final consideration and resolution, otherwise, the grounds for not recommending approval of the project shall be communicated to the proponent, who shall study them within a term of 10 working days.

The ministerial resolution granted by the MVOTMA shall exclusively refer to the voluntary participation of the national participant and the project contribution to the

[6] Before the designation of the advisory committee a provisional consultation instance shall intervene, with same composition and duties.

sustainable development of the country. The UCC shall issue a copy of such resolution to the proponent and another to the CDM Executive Board.

Annex 8: Control Form for Applications of Promotional Declaration for Projects

Application Committee (COMAP)
Law Nº 16.906, January 7, 1998

Ministry of Economy and Finance
Economic Financial Consultant's Office

1) Control form for Promotional Declaration Applications for Industrial and Agroindustrial projects.

(This form should be completed and submitted jointly with the project)

The submission will consist of:

A) Promotional Declaration request letter.
B) Document certifying the representation and legal representation (if applicable).
C) Investment project according to COMAP's projects presentation guidelines (original, 3 copies and 2 diskette copies).
D) Public or private evaluation option form.
E) Documentation certifying compliance of the requisites established in Article 11, paragraph 3 and Article16 of Law Nº 16.906
F) The companies developing activities included in Article 2 of the Environmental Impact Evaluation regulations, approved by Decree 435/994 of 21 September 1994, shall submit the corresponding documentation certifying that they have followed the necessary steps for obtaining the corresponding certificate. Otherwise, an affidavit indicating that they are not comprised under this regulation, and that the project complies with all the departmental provisions relative to environmental pollution and wastewater emissions and the corresponding treatment measures thereof.

Applications that do not certify that the project has been elaborated in accordance with the project submission Guidelines specifications will not be processed.

ESSENTIAL REQUISITES	Page Number	For COMAP Use only	
		YES	NO
1- Regular account statements corresponding to the last three (3) financial years (accompanied by the respective annexes).			
2- Chart of investments and financing of the project's Fixed Assets, including Equipment and Civil Works			
3- Completed pro forma invoices and brochures of the equipment to be imported			
4- Quotation of Civil Works			
5- Bank letter certifying the project's financing and its conditions			
6- Installed production capacity of the enterprise with and without the project			
7- Plant lay-out with and without the project			
8- Costs structure			
9- Current products' prices:			

a) Local prices b) International prices			
10- Commercialisation channels			
11- Project's market analysis			
12- Evaluation of the results and of the company's situation with the project			
13- Evaluation of results and situation of the incremental project			
14- Analysis, risks variables and sensitiveness to main indicators.			
15- Social-economic justification, account prices used			
16- Were there any project investments during the last six months? In which items were investments already made? In what percentage? Civil works Land Machinery			
17- Investments schedule (including beginning and ending dates thereof)			
18- Diskette with GUIDELINES projection tables, in LOTUS or EXCEL (Specify source)			

Upon submission of the application it will be verified that all items of this form are developed in the project

Project ready to be sent for its evaluation:
Date

2) Project data

Company Name

Project Title

Activity branch

Farming	
Food	
Forestation	
Automotive industry	
Chemical industry	
Others	
Plastic	
Textile	
Tourism	

Company location: Montevideo Interior

New company

New project

New product

Investment total amount US$

Job posts/positions

Persons in-charge of Project

Telephone

Fax

Annex 9: Guideline for the Presentation of Projects in the Investment Promotion System

SUMMARY AND CONCLUSIONS

Include a brief description with the projects' most relevant aspects, a summary of the objective of the project, investments, financing and commercial aspects.

1. GENERAL INFORMATION

1.1. Existing enterprises

1.1.1. Names of holders, members, directors and persons in-charge of the projected activity, with certified representation.

1.1.2. Corporate domicile.
1.1.3. Telephone, fax, etc.
1.1.4. B.P.S. (Social Pension Plan) affiliation number and D.G.I. (General Tax Collection Office) Taxpayer Register affiliation number, Certificate of regular payments situation (B.P.S. and D.G.I.) and all other information deemed pertinent.
1.1.5. Legal nature of the enterprise.
1.1.6. Line of business, main and secondary (if applicable).

1.2. New enterprises

1.2.1. Names of the persons in charge of the project with certified representation.

1.2.2. Domicile.
1.2.3. Telephone and Fax.
1.2.4. Enterprise's projected nature.
1.2.5. Commercial and industrial backgrounds of the persons in-charge.
1.2.6. Line of business, main and secondary.

2. OPERATIONAL BACKGROUND

A more detailed information will have to be provided for the products affected by the project during the last three financial years.

2.1. Goods production

2.1.1. Main products (NAM* classification). (*) Mercosur tariffs nomenclature
2.1.2. Describe production process and submit outline of flow diagram
2.1.3. Physical facilities (size of constructions and type of machinery).
2.1.4. Installation plant distribution.
2.1.5. Shifts and working hours.
2.1.6. Production annual capacity by product or by product family and usage percentage.
2.1.7. Quality and years of service of actual equipment.
2.1.8. Director Plan. Situate the actual project in mentioned plan.

2.2. Markets

2.2.1. Sales in physical and monetary units by product, classified according to local market or exports. Indicate exchange rate used.

2.2.2. Exports by country of destination.

2.2.3. Commercialisation channels used for market place local sales and exports.

2.3. Inputs

2.3.1. Main inputs (NAM classification).

2.3.2. Origin of inputs (national or imported with main origins).

2.3.3. Inputs suppliers.

2.3.4. Input-product technical relations.

2.4. Employment

2.4.1. Number of managing directors, administrative officials and workers.

2.4.2. Average salaries by category discriminating social charges.

3. FINANCIAL BACKGROUND

3.1 Standard account statements accompanied by the respective annexes and notes to the balance sheet (last 3 financial years).

3.2. Indicators of liquidity, income-yield capacity and obligations of the enterprise.

3.3. Indicate whether the enterprise counts with external auditing.

4. THE PROJECT

4.1. Purpose and scope of the proposal

4.1.1. Give the reasons that justify the projected investment.

4.1.2. If already in operation, enumerate the limitations found to-date for the development of your activity, which will have to be solved with the new investments.

4.1.3. Describe the objectives of the new investment.

4.2. Investment to be made and its financing

4.2.1. Relate the projected investment in detail, specifying its total cost and of each one of the items that integrate mentioned investment, as well as the corresponding financing, duly justified and documented.

PROJECTED INVESTMENT	U$S (excluding VAT)	FINANCING		
		Own Resources	Credits	Funds generated
- Intangibles -Machinery and equipment **(*)**				
Civil Works - Land - Constructions - Infrastructure Works - Installations - Others				
TOTAL				

(*) Give the technical information of the machinery and equipment to be imported with exemptions (brochures, catalogues with specifications, etc.)

4.2.2. Working capital projected.

- Total
- Structure
- Criteria assumed in the calculation

4.2.3. Cost of project elaboration.

- Fees/Honorariums
- Others

4.2.4. Schedule of project implantation for each one of the items that comprise the investment.

5. COMMERCIAL JUSTIFICATION

The corresponding sources of the information given in this paragraph will have to be provided.

5.1 Sectoral information

Describe in broad outlines the most relevant aspects of the sector in which the project will participate and the impact of the enterprise and the project in the sector (volume, inputs demand, technology, etc.).

5.2. The Product

- Most important characteristics
- Classification by varieties
- Technical and commercial specifications

- NAM (MERCOSUR tariffs nomenclature) Code

5.3. Market

Make an analysis of supply, demand and price concerning the project's destination market that includes:

5.3.1. Supply analysis.

a. National production of the market of destination.

Describe:
Volumes (last three years) and characteristics (Number of suppliers, production capacity estimates, technological level, etc.).
Future projections of supply and foundations.

b. Competitive imports.

Describe:
Type of products, NAM code and country of origin.
Imports in the last three years (in physical and monetary units).
Future projections and foundations.

5.3.2. Demand analysis.

a. Market of destination.

Describe:
Consumption evolution during the last three years.
Future projections and foundations.

b. Exports.

Describe:
Exports in the last three years (in physical and monetary units), discriminating the destination markets.
Projections and foundations.

5.3.3. Analysis of the project's market in the framework of the MERCOSUR

5.3.4. Prices behaviour.

Describe for the destination market in the last three years:

a. Local prices
b. International prices

Future projections and foundations.

5.4. Project's sales projections

The information must be provided in physical and monetary units, discriminated by markets (local, exports by destination).

5.5. Commercialisation channels and organisation of sales foreseen for the commercialisation of the project's products.

6. TECHNICAL JUSTIFICATION

6.1. Describe: the following situations differentiating with and without the project and technical justification of the changes.

- Production process (include projected flow diagram),
- Production balance,
- Lay-out,
- Working shifts and generation of jobs by category,
- Projected goods-product relation,
- Technical obsolescence of the project's components,
- If having technological support, licenses, patents and trademarks.

6.2. Size definition and justification.

6.3. Justification of the localisation and city-planning viability of the proposal.

6.4. Criteria foreseen to minimise environmental impact:

- treatment of wastewater,
- etc.

7. ECONOMIC-FINANCIAL JUSTIFICATION

7.1. Projections' antecedents and suppositions.

7.2. Projection of entries/incomes and incremental costs.

7.3. Projection of incremental results

7.4. Projection of Sources and Uses of incremental funds and of the enterprise.

7.5. Evaluation of the "Total Investment" income-yield capacity (TIR and VAN).

7.6. Evaluation of results and situation of the enterprise with project.

7.7. Risks analysis.

7.7.1. Identification of risk variables.
7.7.2. Sensitivity to main indicators.

8. SOCIAL ECONOMIC JUSTIFICATION

8.1. Account prices used and respective adjustments.

8.2. Economic Internal Return Rate (TIRE)

9. COMPLIANCE OF CONDITIONS ESTABLISHED IN THE REGIME CREATED BY LAW No. 16.906, Art. 11 (Paragraph 3rd.) and Art. 16.

IMPORTANT: IN ALL CASES THE SUBMISSION OF THE FOLLOWING ANNEXES IS OBLIGATORY:

- INVESTMENTS IN CAPITAL ASSETS IN FOREIGN CURRENCY
- INVESTMENTS IN CAPITAL ASSETS IN LOCAL CURRENCY
- WORKING CAPITAL PROJECTION
- INCOMES AND COSTS PROJECTION
- STATUS OF PROJECTED RESULTS
- STATUS OF SOURCES AND FUNDS USES PROJECTED
- INTERNAL RETURN RATE AND NET ACTUAL VALUE

THE INVESTMENTS PROMOTION REGIME APPLICATION COMMITTEE (COMAP) WILL REQUEST INFORMATION OR ADDITIONAL DOCUMENTATION WHENEVER DEEMED CONVENIENT

THE BENEFITS GRANTED TO THE ENTERPRISES COMPRISED IN THE REGULATION OF ENVIRONMENTAL IMPACT EVALUATION, APPROVED BY DECREE 435/994, OF 21 SEPTEMBER 1994, SHALL BE SUBJECT TO THE PREVIOUS ENVIRONMENTAL AUTHORISATION, FORESEEN IN THE ARTICLE 7TH OF LAW 16.466, OF 19 JANUARY 1994, GRANTED BY THE MINISTRY OF HOUSING, TERRITORIAL REGULATION AND ENVIRONMENT.

The applications shall be submitted in original with three (3) copies and two (2) diskette copies, from Monday through Friday as from 12.15` to 18.00 hours at the COMAP.

Appendix II

Certified Emission Reductions (CERs) in Uruguay: Issue and Trading Regulations

Table of Contents

1 Introduction

The Climate Change Unit reporting to the National Environment Directorate (DINAMA) of the Ministry of Housing, Territorial Order and Environment (MVOTMA) is currently performing studies in support of the implementation of the Clean Development Mechanism (CDM) in Uruguay, within the framework of the Kyoto Protocol, ratified by our country.

Within these studies, we have identified project ideas and performed several advances on the same, oriented towards generating a project portfolio aimed at reducing greenhouse gas (GHG) emissions, while generating the rights emerging from these reductions, within the different forms set forth by the Kyoto Protocol and subsequent related agreements reached so far.

Non-Annex I countries as it is the case with Uruguay, are entitled to implement projects that reduce GHG emissions beyond the base line set forth in each stage, and sell these reductions to Annex I countries to aid them in honouring their GHG reduction commitments. This will enable our future participation in international carbon markets.

These operations may currently be conducted within the framework of certain funds developed to such effects, as it is the case of the Prototype Carbon Fund, PCF or its derived bodies, the Bio-Carbon Fund or the Fund for Small Communities, or those of the Canadian, Dutch and Japanese governments, among others, created as of this date. GHG emission reductions are verified, validated and certified, thus becoming an asset (right) for those owners of the projects that can be traded with those players that support the Project from Annex I parties to the Kyoto Protocol.

Sales of CERs are an income from the project that, in some cases, becomes crucial for its profitability, and, in other cases, implies an additional contribution to the financial results of the project. It is, therefore, important for projects to be designed in line with country policy requirements in these fields.

We will now proceed to analyze the chances of implementation of the CERs in Uruguay, within the current regulatory and legal framework.

2 Objectives

The objective of this work is to view the impact of the current regulatory system in Uruguay affecting the issue and trading of those CERs generated by the projects developed in Uruguay within the CDM framework.

With this in mind, we should first define the legal substance of the CERs within Uruguay's legislation, with the purpose of then moving on to view the terms and structure of the contracts and their impact on current regulations where applicable.

3 Work Methodology

First of all, we reviewed the background of existing carbon markets worldwide, in connection with the treatment and trading of CERs in each case. Here, we highlight, on the one hand, that of the United Kingdom Emissions Trading Scheme (UK ETS), started in April 2002, which is the first scheme developed in the world for the purpose of handling national carbon transactions, and, on the other hand, the development of a similar scheme by the Australian Greenhouse Office (AGO).

Then, we analyzed the funds supporting the development of GHG mitigation projects and the creation of CERs, such as the Prototype Carbon Fund (PCF), the Clean Development of Holland, the Bio-Carbon Fund, the Community Development Carbon Fund (CDCF) and others handled at governmental level, such as those of Canada, Japan, etc.

In line with this, we also analyzed the format of prototype contracts of the PCF on the trading of CERs and those performed by this Fund in the cases of the Hydroelectric Project of Chacabuquito in Chile and "Plantar" in Brazil.

We reviewed several publications and web pages on carbon markets and CERs to conduct a survey of the treatment given to the latter, both from the current regulatory standpoint and from that of the existing and/or proposed contracts.

Meanwhile, we extracted various concepts for analysis from the publications issued by Colombia, Argentina and Bolivia on the National Strategies for the introduction of the CDM in those countries. These threw light on the viewpoint of non Annex I countries to the Kyoto Protocol, and on the share and nature of their participation in the international CERs trading market.

We reviewed our national legislation to determine the nature of these instruments and their treatment from different standpoints and thus complete the analysis based on the surveyed background.

We also resorted to a report prepared by a legal expert in environmental topics from the MVOTMA, which contributed the first approach to CERs definitions and their consideration within the legal scheme currently in force in Uruguay. This report is enclosed as an annex to the present document, since the comments serve as a complement to those made herein.

Last, we conducted a series of interviews to local experts in the investment promotion field (from the General Directorate of Industries of the Ministry of Industry, Energy and Mining -MIEM- and from the Forestry Directorate of the Ministry of Agriculture, Livestock and Fisheries –MGAP-) and in the tax field (of the General Tax Directorate of the Ministry of Economy and Finance –MEF- and independent professionals) to complete the overview of the future implementation of projects that generate Certified Emission Reductions (CERs).

4 Certified Emission Reductions (CERs)

First, we must bear in mind that this report did not go deep into strictly legal topics, since these exceed the speciality of the consultant, so the statements made here in the said field should be subject to review and further research at a later stage by an expert in this matter.

As a complement to this first approach to the subject of CERs issue and trading, we attach the report of a legal expert from the MVOTMA, as previously mentioned.

We also recommend the addition of a report answering a binding consultation with the local tax authorities (General Tax Directorate) that can be further used in the future as an official interpretation made by the tax authorities in this matter, defining and providing a clear standard on the tax treatment to be given to these mechanisms.

4.1 Definition

The legal and contracting definitions reviewed in the background survey are a first approach to the concept of the CERs, even if they may contain limitations and uncertainties as a result of the reviewed literature and the nature of the interviews.

The existing literature is not clear and concise enough regarding the legal nature of the CERs and the topic is too fresh to allow much development in this field. Quoting an expert in this matter: "we are selling something that is not going to be made and we are buying something that is not actually there", referring to the difficulties in addressing the issue.

Moreover, we must perform a significant distinction, since this document will basically address those Certificates obtained from projects conducted in a non-Annex I country to be sold to and used by a company or government of an Annex I country, and this leaves aside the analysis of the trading of emissions conducted by the remaining mechanisms developed within the framework of the Kyoto Protocol.

Based on the reviewed background, we may define that the reduction of emissions is a right of property of the owner of the project as a result of performing the activity defined within this project. This right would then be validated, verified and then certified by the Executive Board of the CDM in a mechanism that goes beyond the purpose of this report. The certifications thus obtained are the documents that prove these rights of the owners of the projects.

However, there is reasonable doubt on the legal specificity of the certificates, given the current Uruguayan regulatory status, as determined from the analysis reported by the legal expert in the Annex.

Therefore, the previous statement responds more to international practice in this field as researched in the background survey, than to the Uruguayan legal system itself, where there is a regulatory vacuum in this matter.

4.2 CER Trading

If CERs were a legal right of property, a definition used in the Clean Development Mechanism, that Uruguay has ratified by passing a law, or a contractual right, since their trading is ruled by a contract, then CERs would be subject to no limitations as to their issue and trading among individuals.

These rights could be traded both domestically and abroad, except in those cases where there is a specific mechanism to the contrary. In these cases, according to the Kyoto Protocol, the CDM and subsequent resolutions of the United Nations Framework Convention on Climate Change (UNFCCC), the mechanics of the Carbon funds and the scarce practices known as of today lead us to assume that, in this case, such rights would be traded abroad, from the host country (Uruguay) to the Annex I country that would use it to at least partially fulfill commitments, or could sell it to other countries, though there is still doubt concerning this topic.

The CERs are issued by the CDM Executive Board to the owner of the project in Uruguay, who would thus acquire a right to be sold to another company or government within the CDM framework, obtaining an income. At the same time, attention must be paid to compliance commitments and potential actions to be taken against countries falling into breach.

Our national legislation does not yet have any regulations on CERs and serious doubt still remains on the type of rules to be applied in these cases. We only find the ratification of the Kyoto Protocol, so only the rules and regulations deemed to be applicable in each case are actually used.

Moreover, some legal issues could be resolved by means of contractual provisions, such as those observed in sale-purchase contracts between the owners of the projects and the PCF, or in the mechanics of other funds, or in the UK ETS, etc.

Therefore, in Uruguay, this analysis should be furthered within the scope of a multi-sector analysis, with the purpose of clearing doubts on different fields, prior to starting operations with CERs. This would contribute to the transparency of the trading process, defining the fungibility, divisibility or indivisibility of the right, the participation of the public sector in these mechanisms, securities, insurance other secondary commitments, problems and solutions to cases of breach, efficiency in their use and recording or accounting issues, among other related matters.

In this way, we could throw some light on the problems concerning the definition of the nature of the CERs, while facilitating the attraction of investors for the potential projects of GHG emission reduction, by minimizing the country risk with the transparent knowledge of the trading process, its cost and legal and tax implications.

The background information obtained shows that it is very useful to keep accounting record of CERs on a national level, not only within the CDM and the receiving country. It must be kept in mind that the host country has the responsibility of providing initial approval of the projects. This is actually a definition of no objection, based on the prior characterization that the country has adopted for its sustainable development and within which all projects of this kind must be held.

These national records enable, for example in the case of UK ETS, a significant follow through of the CERs and their holders, all through the use of this right. This keeps track of the mechanism as a whole and gives some control to the host country, improving the image and the security of the process as it appears to potential foreign investors, at least from the conceptual standpoint, since the Government is informed of the evolution of CERs and their actual effective generation versus the original project forecast, and is, therefore, in a position to implement control processes to avoid leaks, etc.

4.3 Conclusions

Summing up, the CERs are rights that can be assigned from one owner to the next, based on a money operation, as set forth in a trading contract, i.e. they can be exchanged for money or an equivalent consideration, and the property is then conveyed to the purchaser.

In most cases there is a prior contract of purchase obligation by the investor and a prior contract of sale obligation by the owner of the project, in order to provide security to these operations and minimize their initial risk.

On the other hand, other entities may participate, such as governments or brokers, etc., but this is not essential to the effects of this report, so we shall not go any deeper into this matter here.

In any case, there is reasonable doubt on the true definition of these instruments and their legal scope, as explained in the attached Annex, and this leads to our recommendation of proceeding immediately to conduct consultations with experts of different fields to resolve these doubts beyond the conclusions provided herein.

5 ANNEX: Legal Aspects Affecting CER Issue and Trading in Uruguay

CONTENTS

1. Introduction

The Climate Change Unit of the National Environment Directorate (DINAMA) of the Ministry of Housing, Territorial Order and the Environment (MVOTMA) has started a series of studies in support of the implementation of the Clean Development Mechanism (CDM) in Uruguay, within the framework of the Kyoto Protocol (1997) of the United Nations Framework Convention on Climate Change, approved by means of Law Nº 17.279, of November 23, 2000.

The core objective is to stabilize the concentration of greenhouse gases in the atmosphere at levels that prevent dangerous anthropogenic interference with the climate system. With this in mind, a series of measurable goals of emission reduction for such gases were set for those countries included in the so called Annex I of the Framework Convention, as well as special instruments in order to attain them.

The CDM is one of these instruments, by which all Parties to the Framework Convention, those appearing in Annex I and the remainder of the parties, are allowed to jointly develop activities and projects for mutual benefit that result in certified emission reductions (CERs) of greenhouse gases (GHG).

For countries such as Uruguay, that do not appear in Annex I, it is possible for those reductions beyond the corresponding baseline to generate transferable ownership rights that could create a true international carbon market.

The present report is aimed at analyzing a few legal issues in connection to these rights and their trading mechanisms, as a complement to the financial and tax report "Certified Emission Reductions (CERs) in Uruguay – Impact of Current Legislation on their Trading", of December 2002.

This report will, therefore, focus on two specifically requested issues:

a) The legal conceptualization of the CERs in Uruguay, as a means of enabling the review of their implications under national legislation, both regarding the ownership of these rights and the application of the corresponding tax regulatory system.

   After pointing out the difficulties and the importance of this characterization, we shall methodologically analyze first the elements that make up the legal transaction, setting them up within a specific conceptual frame.

b) The review of the role played by the State within the framework of a system or scheme of transferable certifications of this kind.

2. Legal Conceptualization of the CERs

2.1. Difficulties and Importance

It is not easy to legally define CERs. There is no specific legislation on this matter in Uruguay and we do not yet find grounds to affirm that it is necessary to pass a set of regulations on this topic.

In the international arena, there are still not enough details available so as to define the legal nature of the CERs with much precision, so there is no clear or unanimous idea yet on this issue.

This definition would enable us to accurately know the regulatory framework that rules them, even though not specifically, at least at the level of general common Law, providing grounds for actual transactions to take place and revealing the applicable conditions, related risks and required securities, in addition to tax provisions and consequences.

Even in the case of international certifications that could circulate and be used under legislations different from the Uruguayan system, national rules will become significant in connection with their issue and execution, especially in the event of breach of contract.

Different international documents, after describing the legal aspects in that sphere, point out the crucial issue of the analysis of rules needed to ensure compliance, domestic (national) regulations, and those in connection with taxes and the securities exchange market.

2.2. Transaction Analysis

On a first approach, the CERs considered here would be derived from the existence or execution of a project (by a private or public entity), performed in a non-Annex I country, by means of which GHG emission reductions and/or sequestration achieved can be transferred and used by a company or government of an Annex I country, once validated, verified and certified by the Executive Board of the CDM (within the framework of the Kyoto Protocol), to issue GHG equivalents and/or to fulfill the GHG reduction goals imposed on the Parties included in the said Annex.

a) As a Right: Assignment of Rights

The first approach suggests that we are confronted by a project from which a right is derived for the owner or for the State where the project is executed, consisting of the possibility of issuing GHG equivalents, but this right is to be transferred to a company or government of an Annex I country.

We would, therefore, consider that we are dealing with a case of assignment of rights over “incorporeal property”, a singular succession where only the active situation of the legal relationship is transferred from one owner to the next. From this standpoint, the advantage would be posed by the transferability, with no need for consent of the debtor and with full maintenance of the right, also comprehending the “accessories” or collateral thereof.

However, here we would be confronted by a few drawbacks. We are focusing on the generation of a right with no clear acknowledgment by the national legal system and to be exercised under a different legislation framework.

On the other hand, the transferring party of this right coincides with the obligated party, i.e. he remains within the legal relationship, as opposed to the regular assignment where the assigning party transfers all rights and obligations to the receiving party that fully takes the place of the former.

The assignment of rights would most clearly define the transaction between different Annex I companies or governments that further transfer and own the rights derived from the execution of the project and the corresponding certification of GHG reductions. These transactions will surely be ruled by a foreign legal system, while our Law only foresees the assignment of credits.

b) As an Obligation: Contract and Contract Assignment

A second alternative would be to consider that we are confronted by a project that gives rise to an obligation of doing or not doing something by the owner or by the State where it is executed, that consists of executing and/or maintaining the project in such a way as to ensure the continuity of the achieved GHG emission reductions and/or sequestrations. Such an obligation is contracted with an Annex I country company or government, in consideration for the funding or payment thereof, obtaining a benefit (the possibility or the right to issue GHG equivalents), but that nevertheless does not define the legal transaction.

This alternative is the one that could appear as obvious. From the bilateral relationship created, a set of rights and obligations are derived for each party leading to an agreement to be recorded in the form of a contract.

A difference with the prior alternative is that it is irrelevant whether our legal system acknowledges the right to issue CERs derived from the project or if some foreign legislation does so, or whether this occurs in the same or in different proportions. The right or faculty acquired by the co-contractor is that of demanding that the project be executed, maintained and that GHG emissions be reduced as per the agreed terms, even regardless of the possibility of emitting or fulfilling its reduction goal commitments.

On the contrary, there is a set of conditions that have been surely documented and agreed upon with the autonomy granted by the will of the parties. This quality also makes it necessary to obtain the consent of both parties for the assignment to take place, including the consent of the obligated or the assign-receiving party, unless there should be an express provision to the contrary.

In this case, it will be essential to know what type of contract we are confronted with.

It could be a sale-purchase (article 1661 and subsequent ones of the Civil Code) insofar as we admit that the sale-purchase of incorporeal property is possible even when such property is a set of rights, since regarding the transaction as a simple “sale of obligations” does not appear to be possible. If the object of the contract is a set of rights, then we once again fall prey to the objection applicable to the prior viewpoint regarding the questionable nature of the object of the sale.

It could be construed that we are dealing with a rent, works or services contract (article 1831 and subsequent ones of the Civil Code), that probably most resembles the contract conditions derived from this deal. However, the tax consequences of this option would not be at all attractive.

Finally, we could be standing before a new contract form, a contract with no name, not foreseen by common law, based on one of the basic principles of our contractual order,

the principle of autonomy of the will, which enables the parties to enter a deal without adapting to the margins posed by civil law, insofar as the limitations of this autonomy of the will, as presented by public law in a wide sense, are not trespassed.

However, this last alternative could well be regarded to bring further uncertainty to the international investor, instead of providing a solution or definition of the issue.

c) As an Obligation: Titles or Negotiable Securities

Finally, a third view could be based on the same approach to the deal used in the prior option, but seeking different legal consequences.

Here, we also find ourselves confronted by a project from which an obligation emerges, either to execute the project or not to do something in connection with it, by the owner or by the State where the project is executed, for the purpose of reducing GHG emission and/or increasing GHG sequestration.

The difference is that such an obligation would be unilaterally assumed, by means of the owner of the project issuing bonds or securities representing such obligation. The conditions would be uniform or serial, easily adaptable to the existence of a future market due to the qualities of transmissibility and literality, among others, and demandable by the bearer or holder of the document at a foreseen time and under foreseen conditions.

The bond or security would vest a right on the holder, i.e. the capacity to demand compliance with the obligations of the project and, only indirectly and subject to international or foreign law, the possibility of vouching valid GHG emissions or fulfillment of reduction goals.

Our country has a special regulatory system in this matter, headed by the Law of Securities and Bonds Exchange Market (Law Nº 16.749, of May 30, 1996) widely regulating that such securities may be issued for public or private trading, and setting forth mechanisms to facilitate the determination of the applicable law and jurisdiction and, especially, a more favorable tax treatment than that given to the other types of contracts referred to above.

Although this may call for objections from the regulatory standpoint, the difficulty lies in the basis of the instrument that was created to document a credit or an investment, i.e. a financial-type obligations that certainly do differ from the obligations considered herein.

It is evident that these issues require a study in further depth, with the participation of experts in different fields, based on the advances made within the Kyoto Protocol concerning the definition and clarification of the nature and details of the mechanism.

3. Revision of the Role of the State

3.1. Participation vs. Absence

The second object of this report aims at reviewing the role that may be assigned to the State regarding the CERs system or scheme.

This issue calls for considerations similar to those made in the prior item, based on the uncertainty derived from the national situation, and from the fact of having to address a new instrument that is still under development even in the international sphere.

Prior to entering into any form of analysis, it is possible to determine that the State may assume a wide set of roles. These range from complete absence of participation, leaving the matter completely in the hands of stakeholders (from the private and even the public sectors), for them to cover all the phases and even the consequences of the CERs, except for the role of settling disputes derived from the execution or breach that fall within the jurisdiction of the courts of the Republic of Uruguay.

However, such an extreme position appears already ruled out, both from a political and legal standpoint. Uruguay actually has an active participation in the international environmental policy. One of the basic principles of national environmental policy is the principle of international cooperation in the matter (articles 1 and 6 of the General Law of Environmental Protection, Law No. 17283 of November 28, 2000) and Uruguay is a Party to the UNFCCC and the Kyoto Protocol.

Moreover, the Uruguayan government has assigned certain tasks in connection with this topic to state entities and has developed specific projects in this matter. For example, article 10 of the above-mentioned General Law of Environmental Protection, assigns to the MVOTMA the task of regulating and implementing the international instruments in connection with this matter, with sufficient power to coordinate the assignments and functions of other public and private entities related to this subject.

In addition, we have sector policies promoted by the State affecting projects with specific relations with the CERs, and these show a clear interest of the Government in the matter.

It deserves to be noted that, eventually, the existence of CERs linked to projects executed now or in the future in Uruguay will necessarily call for State participation, insofar as these projects give rise to a few obligations for the State itself. This could be the case of maintaining certain base line conditions that make it possible to have actual emission reductions or sequestration of GHG, which can then be transferred.

Hence, if we assume that this case involves government participation, we shall now proceed to define the scope and purpose thereof.

This participation is closely linked to the above-noted aspects. It is evident that the absence of specific legislation in the matter or the identification of a single small set of regulations is usually construed to involve low State participation or no participation at all. In this case, most of the conditions and characteristics of the projects and the CERs that are not derived from international regulations will be set forth by contract or agreement between the parties thereto.

On the contrary, the higher the participation desired by the State, the larger the legal base that should be established and the regulatory system that should be developed.

3.2. State Functions

The first and most basic function to be assumed by the State is that of promoting the mechanism. This appears as essential, considering that it is an international instrument created within the framework of a multilateral agreement. This function involves reporting, disseminating, identifying sources of funding or projects and even providing advice for obtaining certifications.

In a second more active role, the State could devise mechanisms to support or endorse projects, based on evaluation and quality assurance procedures and even ensuring the compliance of the projects. This does not imply that other stakeholders or projects cannot apply for the mechanism, but they will not be entitled to government sponsorship.

Such participation would be accompanied by information and dissemination mechanisms devised to be used abroad in connection with projects that have already been assessed and backed by the State, or even keep some form or record that, aside from providing information, should give legal certainty on the characteristics, conditions and other elements of the projects and/or of the CERs (for instance, ownership).

Up to here, state participation would take place when executing the assignments given to the Central Administration agencies, but it would suffice with the passing of regulations that clarify these legal aspects.

No minor issue to consider is the way in which the State will handle the cases of non compliance with these regulations, especially whenever the State has granted endorsements or authorizations that were not fulfilled as requested. The MVOTMA is especially empowered to penalize these trespasses.

A third level of involvement would be marked by deeper participation of the State in organizational or financial and economic aspects of the projects.

The former could imply that the State will support or create groups of projects as a means of building the clout of small farmers and investors or even of other projects that may be significant at national scale but smaller in international terms.

The latter involve granting tax exemptions, special credit lines and other benefits to projects. We will not go further into these aspects, a topic dealt with in the report we quoted at the beginning of this report. However, it is clear that these aspects require the issue of special legal provisions, unless the referred exemptions are derived from the current regulatory bodies, especially the Law of Investment Promotion and Protection (Law No. 16.906 of January 7, 1998).

Obviously a concession of exemptions or benefits by the State will call for higher participation and control beyond the merely environmental aspects.

Finally, the State could adopt a strict standard whereby it would only admit the application of projects that have been subjected to prior assessment and approval, or even undertake a level of management of the projects. It is evident that these aspects will require a special law to be passed and an administrative structure to support them.

This last aspect is directly linked to the ownership of the CERs.

CERs would first appear to be owned by, or property of, the owner of the project, who will be responsible for the assignment or original sale of the asset and for complying with the obligations emerging therefrom.

Eventually, the State could opt out for being the owner of the CERs, but, in this case, besides assuming a significant number of obligations and administrative and financial liabilities, it would require a national regulatory system ruling this matter enabling this participation while at the same time being compatible with the Kyoto Protocol.

4 Conclusions

In view of the above considerations, we conclude on the following:

a) It is not easy to define CERs without yet having enough details to define the legal nature of these instruments in a precise manner.

b) There is no specific legislation in Uruguay and it is too early to state that it is absolutely necessary to pass legislation on this matter.

c) National regulations will have a significant impact on the issue of CERs and their execution, particularly in case of breach.

d) There are different types of applicable types of transactions and contracts, all of which present their pros and cons. A system based on contracts is obvious, though the consequences have not yet been well outlined. However, if CERs were structured as securities, then the legal and tax systems would be more favourable.

e) These matters call for a deeper study, by experts in various fields, based on the advances made within the sphere of the Kyoto Protocol to further define and clarify the nature and details of the mechanism.

f) The role that could be assigned to the State regarding the CERs system or scheme may cover a wide variety of them, ranging from maximum absence to heavy participation.

g) The extreme of absolute absence is ruled out for Uruguay both from a legal and political standpoint.

h) The possibilities and means of participation of the State are closely linked to the existence of specific legislation or regulations.

i) Only if a strict standard were to be adopted, whereby only pre-approved projects could apply, this could make CERs ownership doubtful, which in principle would be the property of the project owner, who would be responsible for the assignment or original sale of the certifications and liable for the obligations resulting from them.

Appendix III

Tax System to be Applied to CERs

Table of Contents

1 Taxes to be considered

As considered in the document "Certified Emission Reductions (CERs) in Uruguay: Issues and Trading Regulations", in reference to the legal conceptualisation of the CERs and corresponding fiscal system, interpretations of these aspects are still not clear. It is, thus, yet uncertain whether CERs would not be under the scope of national fiscal law.

In order to consider this possibility, a first approximation to the problem has already been made, assuming the case that CERs are affected by national taxes, that is to say they are taxable matter.

This should be considered as a preliminary report, which will require further investigation, in particular through consultations with the General Fiscal Directorate (DGI), that is, the division in charge of officially defining applicable taxes, and the advice of experts of the various disciplines involved.

This document includes an analysis of the main national taxes that may apply to the generation and trading of CERs in our country, according to the provisions of the Ordered Text of Laws, Decrees and DGI resolutions. Such taxes are basically those affecting Industry and Trade Income, Natural and Legal Person Assets, and Added Value.

1.1 Industry and Trade Income Tax (IRIC by its acronym in Spanish)

Under the assumption of burdening of the revenues of CERs sale with the Industry and Trade Income Tax (IRIC), on the grounds that it would imply an increase of the project owner assets, literal G of Art 10, Title 4 of the Ordered Text of Fiscal Laws, Decrees and Resolutions (TO by its Spanish Acronym) applies. In this case, incomes arising from CERs purchase would constitute gross profit and would therefore be liable to burden through this tax.

If transaction costs of CERs, i.e. those corresponding to project design and project validation, verification, certification and monitoring, were thus considered, for instance, these would be deducted and the difference between CER price and those transaction costs would constitute the net profit (as defined by art.13 of IRIC, TO). IRIC(30%) rate would apply to such net profit.

It should also be taken into account that according to Law 17.433, of December, 2001, expenses incurred by those interested in obtaining a quality certification under accepted international standards could be computed as one and half times their real amount when considered for calculation of IRIC deduction. This could also apply to CERs.

Summing up, 30% of the net income generated by the sale of CERs, after deduction of transaction costs, could be destined to Uruguay's fiscal system. This amount would exceed the present estimates of the total transaction costs, clearly showing its significance in economic calculations when undertaking a GHG mitigation project aiming at obtaining CERs and their respective trading.

1.2 Assets Tax

If IRIC applies, CERs would also be burdened by the Assets Tax , under Title 14, TO of DGI.

Rates of this tax oscillate between 0.7% and 3% of the total assets in the case of natural persons and their general value for legal persons is 1.5%, with some special cases of a higher rate which may amount to 3.8% to be calculated on the Assets fiscally adjusted.

The cost of this tax for CERs can only be determined for each particular project, since tax calculation takes into account the different treatment given to assets and liabilities.

1.3 Value Added Tax

Considering the definitions used herein as a first approximation to the legal nature of CERs, also the Value Added Tax (VAT) could apply, as CERs purchase should be considered an onerous contract, i.e. one generating reciprocal obligations whereby one party provides an advantage or profit which gives cause to a counter-benefit. This is set forth in articles 1 and 2 , TO, DGI, corresponding to Title 10: Value Added Tax.

However, the VAT of the Uruguayan fiscal system would not apply considering that CERs, although generated in Uruguay, are sold abroad, which would imply a treatment similar to that of exports (circulation outside national territory).

In the case of VAT paid by the project and included in local market purchases corresponding to transaction costs, a consultation should be made to the DGI respect to their fiscal treatment. If same criteria as that of goods exports were applied, this purchase VAT would generate a fiscal credit that might be used to pay other taxes, or else, under certain circumstances, be traded to other companies for their use in tax payment.

2 Alternatives to Avoid or Minimize Fiscal Costs

Some alternatives are analysed in this document aiming at avoiding or minimizing these fiscal costs, which, if applied, would be considerably high, and their amounts would probably exceed all the other transaction costs.

Hence, it seems important to take actions that may exempt CER sale from IRIC and Assets Tax, thus providing a stimulus or at least preventing them as barriers to this type of project. A significant fiscal burden would probably hinder the concretion of several CER projects.

Therefore, below we comment on the regulations of the General Law of Environment and the possibilities of making specific tax exempting laws or otherwise inserting these projects in the system applied for investment promotion.

2.1 Regulation of the General Law of Envionment.

This situation is shown by the provisions of Law No. 17.283, December, 2000, the so called General Law of Environment Protection, which in article 13 grants the Executive Power capacity to grant fiscal benefits to investments in movables destined to the elimination or mitigation of negative environmental impact, or the recovery of environmental conditions, and those investments in permanent improvements of the environmental effects of agricultural and industrial activities.

This law shows the intention of the legislator to provide a special treatment to those investments related to environmental improvement by releasing them from some fiscal burden. There area several initiatives for decrees, which, if approved would enable advances in investment exemption for these projects that may reach CERs trading.

2.2 Elaboration of Specific Tax Exemption Laws

In view of the importance of these issues, specific rules may be considered to exempt CERs sales from both taxes, although it is a complicated process since it requires to pass a law, it cannot be done simply through a decree.

An IRIC and Assets Tax Exemption law for these cases would be highly specific and would apply to the project activities and consequently to the CERs.

If such laws were passed, a regulation could be included in order to allow the generation of a fiscal credit on account of VAT paid in purchases made under the transaction costs intended to CERs attainment.

Another alternative of this type, a highly ambitious one, would be the elaboration of a law directly including the fiscal benefits of Law No. 17.283 within the Investment Promotion Law, instead of leaving it to the criteria of the Executive Power.

However, it is currently considered very difficult to obtain exemption through new laws due to lack of knowledge of and experience in the issue in the country, in addition to the inherent difficulties in the elaboration of a law and respective regulations.

2.3 Exemptions through the current system of investment promotion

The solutions described above seem rather difficult to implement, which leads us to think of new alternatives. An interesting possibility arises from reconsidering art. 13 of the Law of Environment Protection where investment promotion links environment health improvement and the investment promotion system in force, i.e. basically with Law 16,906 of January, 1998.

From this starting point, a reasonable proposal would be to adjust the design of projects generating CERs to the system established in the Guideline for Industrial and Agroindustrial Project Submission to the Application Committee (COMAP by its acronym in Spanish) of the Ministry of Economy and Finance (MEF) under such Law. Following this line tax exemption covering IRIC and Assets Tax would be obtained.

2.3.1 Presentation, Evaluation and Approval under Investment Promotion Law

The COMAP first receives an Application Control Form designed for industrial and agroindustrial investment projects that applied to a Promotional Declaration. The documents of the project itself are attached to such application.

Following, a project is evaluated (either in a private or public manner, as chosen by the proponent) in a term that should not exceed 60 days. When an agroindustrial or industrial project is evaluated in a public manner, this is generally done by the Administration of Industrial Promotion Actions, a division of the National Directorate of Industry, Ministry of Industry Energy and Mining (MIEM).

Once the evaluation has been completed and the project accepted, the fiscal benefits to be approved are stated, the COMAP approves them and sends them to the MIEM, for approval, and the subsequent approval of the MEF. Finally the project is considered by the Council of Ministers, which declares it a Promoted Project and therefore grants it

the corresponding benefits, under Promotion Laws. This stage lasts approximately one month.

2.3.2 Fiscal benefits of the promotion system

The benefits granted at present under this system correspond to the charges and taxes on importation or local purchase of goods not competitive with national production (VAT, Contribution to Social Security (COFIS), and Specific Internal Tax (IMESI))

The project is also exempted from Assets Tax for a period of up to 3 years in Montevideo and 5 years in the Interior of the country, and fiscal credit is granted on account of the VAT paid in the local market for the purchase of materials for civil works, in an amount up to 15% of the total of such works, after deducting professional fees and social laws.

The laws in force also enable exemption of the project from the IRIC applied to net profits generated by the project for a period of up to 10 years as from the first fiscal year. Also the so-called self-channeling of the amount corresponding to the IRIC can be obtained, considering this amount a part of the contribution of the proponent included in the project, for at least two fiscal years.

The above mentioned benefits, if obtained by projects that generate CERs, would enable minimization of transaction costs.

2.3.3 Conclusions

The projects related to GHG mitigation activities enabling CERs generation might fairly be adapted to the requirements of the promotion system to be considered, evaluated and declared a Promoted Project, therefore being entitled to the commented exemptions.

Besides, it would be important to include in the guidelines for project presentation references to environmental concerns, at least those directed to GHG emission and mitigation in order to ensure procurement of the benefits commented for CERs trading.

3 Conclusions and Recommendations

In brief, the legislation system in force related to investment promotion would enable a reduction in the fiscal cost of the Certified Emission Reductions, by adapting the guidelines for presentation of projects under the investment promotion system to the characteristics of prospective projects generating CERs.

There are also other more ambitious ways to step further, which are focused on the creation of new laws and decrees specifically designed to enable fiscal exemptions for the CERs.

We recommend, first to conduct further research on the legal conceptualisation of these certificates, and complement it with further research on applicable fiscal law, and the adaptation of the information provided by the Guidelines for project submission to COMAP with adequate information on CERs generating projects.

At a second stage, and if so required by a legal definition implying the application of the mentioned taxes on the CERs, the requirements of the guidelines might be adapted in order to include these type of project with their specific features. So far, it is believed that they might be readily included under the regulations in force, in order to be considered and declared Promoted Projects.

Part 2

Portfolio of Clean Development Mechanism

Projects in Uruguay

PROJECT IDEA NOTES

PROJECT BRIEF DESCRIPTIONS

Project Idea Notes

I. Fuel Oil Replacement by Natural Gas in FANAPEL Power Plant

1. Executive Summary

FANAPEL (Fábrica Nacional de Papel S.A), leader paper manufacturer in Uruguay, plans to reconvert its power plant, substituting the use of fuel oil for natural gas. The installation of pipelines, a new boiler, as well as the adaptation of existing equipment to substitute a consumption of approx. 20,000,000 l of fuel oil per year are included in the project, with a total investment of US $ ***1,502,700.***

FANAPEL has internal studies that can relate the fuel oil consumption in past years with paper production that make it possible to establish a baseline

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

The NPV of the net benefits without the sale of the CERs amounts ***US $8,9 millions****; if CERs incomes are included, it reaches* ***US $ 9,5 millions*** *(at a discount rate of 12% yearly).*

The sale of CERs generates an up-to-date income of ***US $ 519 thousands****, which represents 2% of the total benefits.*

The ***Financial Internal Rate of Return is 87%*** *without including the sale of CERs and* ***91%*** *including the sale of CERs.*

The contribution of the company to finance the project reaches US $ 451 thousands (30% of the initial investment), and the rest (US $ 1051 thousands) will be financed with credit of the equipments suppliers.

The project will reduce emissions of ***518,874*** *ton CO2 during project lifetime*

Project will have a duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

The marginal cost of this project is a negative value of ***US $49*** *for ton of equivalent CO2; the project gives a marginal benefit in this case.*

The main risks of this project for the external investor are future changes in the prices of natural gas and/or fuel oil and the depression of the markets in Argentina and Brazil. In spite of being a family business, which may be perceived as a factor of risk, Fanapel is a long-established company (1898) and has successfully operated in the local capitals market during the last few years, even during the current economic recession.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The project consists of the fuel oil replacement in FANAPEL power plant.

FANAPEL (Fábrica Nacional de Papel S.A.) was founded in 1898. Today it is the most important paper enterprise in Uruguay and one of the largest industries in the country.

The FANAPEL plant is situated in the very heart of the Southern Common Market (MERCOSUR) by the port of Juan Lacaze on the River Plate, only 150 kms from the city of Montevideo and 50 kms form the city of Buenos Aires.

A very important investment in technological updating made in 1994 and 1995 and the changes made in the organization in line with the new Mercosur scenario, have given FANAPEL the clearly defined profile it shows today.

Fanapel owns eucaliptus plantations, produces pulp and manufactures paper for printing, writing and wrapping, as well as the coated paper it specializes in. Altogether this makes Fanapel a company which can add to its traditional quality, an internationally competitive offer.

FANAPEL is ISO 9002 certified and has received the National Quality Award in 1998.

The project includes:

-Instalation of a new boiler (45000 kg/hr, 22 bar), adapted to burn fuel oil and natural gas.

-Adaptation of existing “BERKES” boiler to burn fuel oil/natural gas.

-Installation of external pipeline from Juan Lacaze City Gate.

-Instalation of internal pipeline for natural gas distribution.

-Instalation of driers in paper machine and stuccoed paper machine and adaptation for use with natural gas

Objectives

•To reduce greenhouse gas emissions by substitution of fuel oil by natural gas.

•To diversify the fuel options (fuel oil and natural gas), not depending entirely on petroleum imports.

•To reduce operational costs.

•To improve energy efficiency by replacing existing equipment.

Baseline scenario

FANAPEL consumes approx. 20,000,000 l of fuel oil per year. This consumption will be replaced by natural gas.

3. Proposed baseline methodology

FANAPEL has internal studies that can relate the fuel oil consumption in past years with paper production that make it possible to establish a baseline.

4. Technical Assessment

The technology that will be used is known and common for other fuel replacement projects:

a) Boiler (steam generator):

Type : D

Brand: Turboflow

Steam production (nominal) : 45 ton/hr

Under license of: Turboflow-CIR

According to Standard: ASME Pressure Vessel and Boiler Code, Section I.

Includes spare parts, control instrumentation, etc.

b) Adaptation of existing “BERKES” boiler to burn fuel oil/natural gas.

Total investment: US $ 759,500

c) Instalation of external pipeline from Juan Lacaze City Gate.

2600 m of steel pipeline, 150 mm, 24.5 bar and a reduction-measuring unit.

Total investment: US $ 227,400

d) Installation of internal pipeline for natural gas distribution.

Transport capacity of 9000 Mm3/hr

Total investment: US $ 75,800

e) Installation of driers in paper machine and stuccoed paper machine and adaptation for use with natural gas

Total investment: US $ 440,000

TOTAL INVESTMENT: US $ 1,502,700

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs amounts US $8,9 millions; if CERs incomes are included, it reaches US $ 9,5 millions. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of US $ 519 thousands, which represents 2% of the total benefits.

The Financial Internal Rate of Return is 87% without including the sale of CERs and 91% including the sale of CERs.

These results obey the influence of a moderate initial investment and similar costs of operation and maintenance between the baseline and the mitigation scenario, compared to high cost savings for the substitution of fuel oil for natural gas, in function that the foreseen price for the natural gas is significantly inferior to that of the fuel oil.

In relation to the project financing the contribution of the company reaches US $ 451 thousands (30% of the initial investment), and the rest (US $ 1051 thousands) will be financed with credit of the equipments suppliers. Resources for repayment of this credit will be obtained from expected large savings in energy costs

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

i) before 2008

The estimated reduction is 82944 ton CO^2.

ii) during 2008-2012

The estimated reduction is 113361 ton CO^2.

iii) during entire project lifetime

The project will reduce emissions of **518,874** ton CO2 during project lifetime.

See detailed information in Annex 1 and Annex 2.

7. Estimated lifetime and crediting period for project

Project will have duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

Current status: external pipeline is being built.

Project starts its complete activities in 2004

8. Estimated cost per tonne of CO2 equivalent

The cost will be low due to the baseline study and monitoring during the project. The company maintains records that will facilitate these operations and will reduce the involved costs.

The marginal cost of this project is a negative value of US $49 per ton of equivalent CO2; the project gives a marginal benefit in this case.

9. Documentation on environmental impacts

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

These include:

•reduction of carbon dioxide emissions by substitution of fuel oil by natural gas;

•emissions increases and reductions due to changes in the logistics of fuel distribution.

11. Estimated investor risk

The main risks of this project for the external investor are:

A change in the differences of the prices of fuel oil and natural gas, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.) of both fuels or the direct import of the fuel oil and the application of international prices in this case.

-The markets in Uruguay, Argentina and Brazil are depressed. A lack of recovery in the sales of paper, especially of writing, printing and stuccoed paper (where the company is leader in the region), pose a risk to the investor.

In spite of being a family business, which may be perceived as a factor of risk, Fanapel is a long-established company (1898) and has successfully operated in the local capitals market during the last few years, even during the current economic recession. Besides, Fanapel has recently bought Celulosa Argentina, a leading Argentinean paper company.

12. Potential reproduction

The use of natural gas use in Uruguay is new. The fuel replacement, from the commonly used fuel oil to natural gas, can be adopted by many other companies in the country because it is more environmentally friendly; it presents economic advantages and facilitates the industrial operations.

13. Technical summary of the technology used

-Reconversion of existing “BERKES” boiler to burn fuel-oil/natural gas.

-Replacement of boiler by a new equipment to burn fuel oil an natural gas.

-Pipeline extension and construction of a reduction-measuring unit

-Installation of internal pipeline for natural gas distribution.

- Installation of driers in paper machine and stuccoed paper machine and adaptation for uses with natural gas

14. Contextual information including:

Assessment of project sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

•the new boiler will be manufactured in Uruguay.

•reduction of Uruguay’s dependence on petroleum, replacing it for a fuel received from a country that shares the same economic region.

•improvement in energy efficiency, through the use of modern equipment.

•improved positioning of FANAPEL in the domestic, regional and world market.

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM

Full contact information

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Annex 1

GHG emmissions calculations

Fuel oil consumption: 20,000,000 l/year

CO2 emmission for boilers burning fuel oil:

8.138 X 10^1 kg CO2/GJoule

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía.

CO2 emmission for boilers burning natural gas:

5.429 X 10^1 kg CO2/GJoule

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía

Fuel oil: 10,200 kcal/kg

Natural gas: 9300 kcal/Nm^3

20 X 10^6 l/year X 10200 kcal/kg X 0.85 kg/l X 4186.8 Joules/kcal = 7.26 X 10^{14} Joules/year equivalent to 7.26 X 10^5 Gjoules/year

7.26 X 10^5 Gjoules/year X (81.38-54.29) kg CO2/GJoule = **19,667.3 ton CO2/year**

Annex 2

Cash Flow

In US$ of the year 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	1.502.700	1.388.466	1.416.235	1.444.560	1.473.451	1.502.920	1.532.978	1.563.638	1.594.911	1.626.809	3.162.045
Investments	1.502.700	0	0	0	0	0	0	0	0	0	1.502.700
Consumption of natural gas	0	1.388.466	1.416.235	1.444.560	1.473.451	1.502.920	1.532.978	1.563.638	1.594.911	1.626.809	1.659.345
Residual value of the investments											
Benefits											
Cost savings		2.732.330	2.786.977	2.842.716	2.899.570	2.957.562	3.016.713	3.077.047	3.138.588	3.201.360	3.265.387
Fuel oil savings		2.671.957	2.725.396	2.779.904	2.835.502	2.892.212	2.950.056	3.009.057	3.069.239	3.130.623	3.193.236
Net CER sales		60.373	61.581	62.812	64.069	65.350	66.657	67.990	69.350	70.737	72.152
Net benefits	-1.502.700	1.343.864	1.370.742	1.398.156	1.426.119	1.454.642	1.483.735	1.513.409	1.543.678	1.574.551	103.342
Net benefits without sale of CERs	-1.502.700	1.283.491	1.309.161	1.335.344	1.362.051	1.389.292	1.417.078	1.445.419	1.474.328	1.503.814	31.191
Reduced emissions in tons of CO2		20.124	20.527	20.937	21.356	21.783	22.219	22.663	23.117	23.579	24.051

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	1.692.532	1.726.383	1.760.910	1.796.129	1.832.051	1.868.692	1.906.066	1.944.187	1.983.071	3.525.432	1.106.757
Investments	0	0	0	0	0	0	0	0	0	1.502.700	0
Consumption of natural gas	1.692.532	1.726.383	1.760.910	1.796.129	1.832.051	1.868.692	1.906.066	1.944.187	1.983.071	2.022.732	2.063.187
Residual value of the investments											-956.430
Benefits											
Cost savings	3.330.695	3.397.309	3.465.255	3.534.560	3.605.251	3.677.356	3.750.904	3.825.922	3.902.440	3.980.489	4.060.099
Fuel oil savings	3.257.100	3.322.242	3.388.687	3.456.461	3.525.590	3.596.102	3.668.024	3.741.385	3.816.212	3.892.537	3.970.387
Net CER sales	73.595	75.066	76.568	78.099	79.661	81.254	82.879	84.537	86.228	87.952	89.711
Net benefits	1.638.163	1.670.926	1.704.345	1.738.432	1.773.200	1.808.664	1.844.838	1.881.734	1.919.369	455.056	2.953.342
Net benefits without sale of CERs	1.564.568	1.595.860	1.627.777	1.660.333	1.693.539	1.727.410	1.761.958	1.797.197	1.833.141	367.104	2.863.630
Reduced emissions in tons of CO2	24.532	25.022	25.523	26.033	26.554	27.085	27.626	28.179	28.743	29.317	29.904

NPV (12%) of the net benefits without CERs	**US$**	**8.980.525**
FIRR of the net benefits without CERs		**87%**
NPV (12%) of the net benefits incl. CERs	**US$**	**9.499.560**
FIRR of the net benefits without CERs		**91%**

Price of CER without transaction costs: 3 US$/T CO2 eq

Natural gas price: 65US $/1000 m3

Growth of fuel consumption: 2% per year

II. Fuel Oil Replacement by Natural Gas in CONAPROLE

1. Executive Summary

The project consists of the replacement of the fuel oil in three plants of CONAPROLE, leader dairy products manufacturer in Uruguay, for the use of natural gas.

The installation of pipelines and the adaptation of three existing boilers to substitute a consumption of approx. ***4983000****l of fuel oil per year are included in the project, with a total investment of US $* ***270.000.***

CONAPROLE has internal studies that can relate the fuel oil consumption in past years with dairy products production and milk reception in plants that make it possible to establish a fuel oil consumption baseline.

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

The NPV of the net benefits without the sale of the CERs amounts ***US $1,07 millions****; if CERs incomes are included, it reaches* ***US $ 1,17 millions*** *(at a discount rate of 12% yearly).*

The sale of CERs generates an up-to-date income of ***US $ 105 thousands****, which represents 6% of the total benefits.*

The ***Financial Internal Rate of Return is 68%*** *without including the sale of CERs and* ***73%*** *including the sale of CERs.*

The contribution of the company to finance the project reaches US $ 135 thousands (50% of the initial investment), and the rest (US $ 135 thousands) will be financed with credit of the equipments suppliers. Resources for repayment of this credit will be obtained from expected large savings in energy costs

The project will reduce emissions of ***114,354*** *ton CO_2 during project lifetime*

Project will have a duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

The marginal cost of this project is a negative value of ***US $28*** *for ton of equivalent CO2; the project gives a marginal benefit in this case.*

Conaprole participates in two joint ventures with world leading dairy companies (Bongrain and Glanbia) for operating a cheese manufacturing plant in Uruguay and for worldwide distribution of dairy products. Conaprole exports dairy products to different countries (Mexico, Brazil, Venezuela, Colombia, Argentina, USA and others) for a total value of almost US$ 90 million/year (61% share of 2001 Uruguay's dairy export market).

The main risks of this project for the external investor are future changes in the prices of natural gas and/or fuel oil and the depression of the domestic and international markets.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The project consists of the fuel oil replacement in three plants of CONAPROLE.

CONAPROLE (Cooperativa Nacional de Productores de Leche) the National Co-operative of Dairy Producers, created on 1 June 1936.

CONAPROLE runs 12 plants in Uruguay, employs 2200 persons including workers, technicians and administrative personnel and it is the most important milk transformer, receiving more than 70% of the country's production of milk processed in industrial plants.

The Co-operative's annual invoicing exceeds 320 million dollars, more than 60% of which is accounted for by domestic consumption.

Its co-operative members are currently 3020, whose farms are distributed over practically the whole territory of Uruguay and cover an area of 400.000 hectares.

CONAPROLE is one of the most important exporters of Uruguay, and one of the biggest exporters of dairy products in the region.

The Co-operative owns two plants in Montevideo (Plants 1 and 2) that will be eliminated and transferred to a new plant in Paso de la Arena. The three boilers (from plant 1 and 2) will be transformed from burning fuel oil to natural gas.

CONAPROLE also owns Plant 11 in Rincón del Pino, San José.

The two boilers in plant 11 will also be transformed from burning fuel oil to natural gas.

The project includes:

Adaptation of existing three boilers (from plant 1 and 2) to burn fuel oil/natural gas in the new Paso de la Arena plant.

-Installation of external pipeline for the new Paso de la Arena plant.

-Installation of internal pipeline for natural gas distribution in the new Paso de la Arena plant.

-Design of a new plant, so a 10% in energy efficiency increase will be achieved compared to the present situation (Montevideo plants 1 and 2).

-Adaptation of existing two boilers in plant 11 to burn fuel oil/natural gas.

-Installation of external pipeline for plant 11.

-Installation of internal pipeline for natural gas distribution in plant 11.

Objectives

•To reduce greenhouse gas emissions by substitution of fuel oil by natural gas.

•To diversify the fuel options (fuel oil and natural gas), not depending entirely on petroleum imports.

•To reduce operational costs.

Baseline scenario

Plant	Fuel consumption (l/year)
1	1,566,000
2	1,248,000
11	2,169,000
Total	**4983000**

3. Proposed baseline methodology

CONAPROLE has internal studies that can relate the fuel oil consumption with milk products production that make it possible to establish a baseline.

4. Technical Assessment

The technology that will be used is known and common for other fuel replacement projects:

a) Adaptation of 5 existing boilers to burn fuel oil/natural gas.

Adaptation cost per boiler: USD 25.000

Total investment: USD 125.000

b) Installation of external pipeline for Paso de la Arena Plant

Total investment: USD 100,000

d) Installation of internal pipeline for natural gas distribution in Paso de la Arena Plant.

Total investment: USD 20.000

e) Installation of external pipeline for Plant 11.

Total investment: USD 5.000

f) Installation of internal pipeline for natural gas distribution in Plant 11.

Total investment: USD 20.000

Total investment (all items): USD 270.000

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs amounts US $1,07 millions; if CERs incomes are included, it reaches US $ 1,17 millions. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of US $ 105 thousands, which represents 6% of the total benefits.

The Financial Internal Rate of Return is 68% without including the sale of CERs and 73% including the sale of CERs.

These results obey the influence of a low initial investment and similar costs of operation and maintenance between the baseline and the mitigation scenario, compared to high cost savings for the substitution of fuel oil for natural gas, in function that the foreseen price for the natural gas is significantly inferior to that of the fuel oil.

In relation to the project financing the contribution of the company reaches US $ 135 thousands (50% of the initial investment), and the rest (US $ 135 thousands) will be financed with credit of the equipments suppliers. This credit is almost insignificant with respect to company's returns.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

iv) before 2008

The estimated reduction is 13.431 ton CO_2.

v) during 2008-2012

The estimated reduction is 25340 ton CO_2.

vi) during entire project lifetime

The project will reduce emissions of **114.354** ton CO_2 during project lifetime.

See detailed information in Annex 1 and Annex 2.

7. Estimated lifetime and crediting period for project

Project will have a duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

Current status: Paso de la Arena plant is under design.

Project starts its complete activities in 2005

8. Estimated cost per tonne of CO2 equivalent

The cost will be due to the baseline study and monitoring during the project. The company maintains records that will facilitate these operations and will reduce the involved costs.

The marginal cost of this project is a negative value of US $28 for ton of equivalent CO2; the project gives a marginal benefit in this case.

9. Documentation on environmental impacts

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

These include:

•reduction of carbon dioxide emissions by substitution of fuel oil by natural gas;

•emissions increases and reductions due to changes in the logistics of fuel distribution.

11. Estimated investor risk

The main risks of this project for the external investor are:

-A change in the differences of the prices of fuel oil and natural gas, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.) of both fuels or the direct import of the fuel oil and the application of international prices in this case.

-The exports and internal sales are growing very slowly or are depressed, and this situation could maintain in the future, if the national gross product of Uruguay and the region doesn't recover its previous dynamics

12. Potential reproduction

The use of natural gas use in Uruguay is new. The fuel replacement, from the commonly used fuel oil to natural gas, can be adopted by many other companies in the country because it is more environmentally friendly, it presents economic advantages and facilitates the industrial operations.

13. Technical summary of the technology used

-Reconversion of existing boilers to burn fuel-oil/natural gas.

-Installation of external pipelines for Plant 11 and Paso de la Arena

-Installation of internal pipeline for natural gas distribution.

-Increase in energy efficiency for new design in Paso de la Arena Plant.

14. Contextual information including:

Assessment of project sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

•reduction of Uruguay's dependence on petroleum, replacing it for a fuel received from a country that shares the same economic region.

•improvement in energy efficiency, through the use of modern equipment.

•improved positioning of CONAPROLE in the domestic, regional and world market.

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM

Full contact information

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Annex 1:

GHG emissions calculations

Fuel oil consumption: **4983000** l/year (year 2002)

CO2 emission for boilers burning fuel oil:

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía.

8.138 X 10^1 kg CO2/GJoule

CO2 emission for boilers burning natural gas:

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía.

5.429 X 10^1 kg CO2/GJoule

Fuel oil: 10,200 kcal/kg

Natural gas: 9300 kcal/Nm^3

4.983 X 10^6 l/year X 10200 kcal/kg X 0.85 kg/l X 4186.8 Joules/kcal = 1.81 X 10^{14} Joules/year equivalent to 1.81 X 10^5 Gjoules/year

1.81 X 10^5 Gjoules/year X (81.38-54.29) kg CO2/GJoule = **4,900.1 ton CO2/year**

The Paso de la Arena Plant will be a fully new designed one, so CONAPROLE considers that a 10% in energy efficiency will be gained:

2,814,000 l fuel-oil/year for Montevideo (Plants 1 and 2) X 0.1= **281,400 l fuel-oil/year**

equivalent to 276.7 ton CO2/year

Total CO2/year: 5176.8 ton CO2/year

Annex 2:

Cash Flow

In US$ of the year 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	0	270.000	491.186	503.465	516.052	528.953	542.177	555.731	569.625	583.865	598.462
Investments		270.000	0	0	0	0	0	0	0	0	0
Consumption of natural gas		0	491.186	503.465	516.052	528.953	542.177	555.731	569.625	583.865	598.462
Residual value of the investments											
Benefits		0	682.411	699.472	716.958	734.882	753.254	772.086	791.388	811.173	831.452
Fuel oil savings	0	0	668.981	685.706	702.849	720.420	738.430	756.891	775.813	795.209	815.089
Net CER sales	0	0	13.430	13.766	14.110	14.463	14.824	15.195	15.575	15.964	16.363
Net benefits	0	-270.000	191.226	196.006	200.907	205.929	211.077	216.354	221.763	227.307	232.990
Net benefits without sale of CERs		-270.000	177.796	182.241	186.797	191.467	196.253	201.160	206.189	211.343	216.627
Reduced emissions in tons of CO2		0	4.477	4.589	4.703	4.821	4.941	5.065	5.192	5.321	5.454

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	883.423	628.759	644.478	660.590	677.105	694.032	711.383	729.168	747.397	766.082	785.234
Investments	270.000	0	0	0	0	0	0	0	0	0	270.000
Consumption of natural gas	613.423	628.759	644.478	660.590	677.105	694.032	711.383	729.168	747.397	766.082	785.234
Residual value of the investments											-270.000
Benefits	852.238	873.544	895.383	917.767	940.712	964.229	988.335	1.013.043	1.038.369	1.064.329	1.090.937
Fuel oil savings	835.466	856.353	877.762	899.706	922.198	945.253	968.884	993.107	1.017.934	1.043.383	1.069.467
Net CER sales	16.772	17.191	17.621	18.062	18.513	18.976	19.451	19.937	20.435	20.946	21.470
Net benefits	-31.185	244.785	250.905	257.177	263.607	270.197	276.952	283.876	290.973	298.247	305.703
Net benefits without sale of CERs	-47.957	227.594	233.283	239.116	245.093	251.221	257.501	263.939	270.537	277.301	284.233
Reduced emissions in tons of CO2	5.591	5.730	5.874	6.021	6.171	6.325	6.484	6.646	6.812	6.982	7.157

NPV (12%) of the net benefits without CERs US$	**1.068.468**
FIRR of the net benefits without CERs	**68%**
NPV (12%) of the net benefits incl. CERs US$	**1.173.248**
FIRR of the net benefits without CERs	**73%**

Price of CER without transaction costs: 3US$/T CO2 eq

Natural gas price: 87 US $/1000 m3

Growth of fuel consumption: 2,5% per year

III. Fuel Oil Replacement by Natural Gas in Industries Covered by GASEBA

1. Executive Summary

Gaseba Uruguay -Group Gaz of France manage the gas Production and Distribution for the city of Montevideo and metropolitan area. Gaseba has invested more than US$ 20 million since 1995, in development of new networks, installation of pressure regulator stations and LGP plants, and improvement of product quality. They plan to invest US$ 7.1 millions for using natural gas in homes in Montevideo, and to reconvert 20 industries in a 10 year period, substituting the use of fuel oil for natural gas. New pipelines will be installed, and the present equipments will be reconverted to use natural gas. The estimated investments amount ***US D 2,350,000.***

Historical information will be available that can relate the fuel oil consumption with industrial production in order to establish a baseline.

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

The NPV of the net benefits without the sale of the CERs amounts ***US $172 thousands****; if CERs incomes are included, it reaches* ***US $ 577 thousands*** *(at a discount rate of 12% yearly).*

The sale of CERs generates an up-to-date income of ***US $ 405 thousands****, which represents 2% of the total benefits.*

The Financial Internal Rate of Return is 14% without including the sale of CERs and 18% including the sale of CERs.

In relation to the project financing the contribution of the company reaches US $ 1.175 thousands (50% of the initial investment), and the rest will be financed with credit of the equipment suppliers. This credit is very small with respect to company revenues.

The project will reduce emissions of ***521.159*** *ton CO2 during project lifetime*

Project will have a duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

The marginal cost of this project reaches US $0.49 for ton of equivalent CO2; this value is significantly low and higher than the present CERs prices.

The main risks of this project for the external investor are future changes in the prices of natural gas and/or fuel oil, the depression in the industrial activity and the level of the CERs prices and transaction costs. The CER sales are important in the project returns.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The project consists of the fuel oil replacement in approx. 20 industries covered by GASEBA in a 10 year period.

Gaseba Uruguay -Group Gaz of France manages the gas Production and Distribution for the city of Montevideo and metropolitan area. It started its activities in January of 1995, and it will continue with them for the 30 year term according to the concession contract. . At the moment Gaseba faces a transformation process that will allow it to substitute the distribution of manufactured gas by natural gas.

GAZ DE FRANCE

Leader company in the world energy market, and one of the biggest operators in the gas industry of the world.

Gaz de France owns 28.000 km of pipelines, 135.000 km of distribution networks, serves 12.000.000 of clients in the entire world, and has a billing of 10.500 million dollars a year.

At the present time, it contributes with its experience and technology for the development of projects linked with the production, terrestrial and marine transport, underground storage, and distribution of gas.

The project includes:

-Adaptation of existing equipments to burn fuel oil/natural gas.

Estimated investment: US D 25000 per industry.

Total investment: USD 500000.

-Installation of external pipeline to the different industries.

Estimated total investment: US D 1.5 millions in total.

-Installation of internal pipeline and regulators for natural gas distribution.

Estimated investment: US D 17500 per industry.

Total investment: USD 350000.

TOTAL INVESTMENT: US D 2350000

Objectives

•To reduce greenhouse gas emissions by substitution of fuel oil by natural gas.

•To diversify the fuel options (fuel oil and natural gas), not depending entirely on petroleum imports.

•To reduce operational costs.

Baseline scenario

The target of this project is to substitute the fuel oil consumption in 20 industries covered by GASEBA Uruguay. The total projected consumption of natural gas is 25 million m^3/year.

3. Proposed baseline methodology

Historical information will be available that can relate the fuel oil consumption with industrial production in order to establish a baseline.

4. Technical Assessment

The technology that will be used is known and common for other fuel replacement projects:

It will include:

-Adaptation of existing equipments to burn fuel oil/natural gas.

-Installation of external pipeline to the different industries.

-Installation of internal pipeline for natural gas distribution.

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs amounts US $172 thousands; if CERs incomes are included, it reaches US $ 577 thousands. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of US $ 405 thousands, which represents 2% of the total benefits.

The Financial Internal Rate of Return is 14% without including the sale of CERs and 18% including the sale of CERs.

These results obey the influence of moderate initial investments and similar costs of operation and maintenance between the baseline and the mitigation scenario, compared to high cost savings for the substitution of fuel oil for natural gas, in function that the foreseen price for the natural gas is inferior to that of the fuel oil.

In relation to the project financing the contribution of the company reaches US $ 1.175 thousands (50% of the initial investment), and the rest will be financed with credit of the equipments suppliers. This credit is very small with respect to company revenues.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

See detailed information in Annex 1 and Annex 2.

vii) before 2008

The estimated reduction is 41.147 ton CO^2.

viii) during 2008-2012

The estimated reduction is 116.388 ton CO^2.

ix) during entire project lifetime

The project will reduce emissions of 521.159 ton CO2 during project lifetime.

7. Estimated lifetime and crediting period for project

Project will have a duration of 20 years after reconversion of the plant. Carbon credits will be produced over the same period.

Current status: natural gas is connected to Montevideo pipeline. GASEBA is starting to distribute natural gas.

Project starts its activities in 2004

8. Estimated cost per tonne of CO2 equivalent

The cost will be low due to the baseline study and monitoring during the project. The company maintains records that will facilitate these operations and will reduce the involved costs.

The marginal cost of this project reaches US $0.49 for ton of equivalent CO2; this value is significantly low and higher than the present CERs prices.

9. Documentation on environmental impacts

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

These include:

•reduction of carbon dioxide emissions by substitution of fuel oil by natural gas;

•emissions increases and reductions due to changes in the logistics of fuel distribution.

11. Estimated investor risk

The main risks of this project for the external investor are:

-A change in the differences of the prices of fuel oil and natural gas, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.) of both fuels or the direct import of the fuel oil and the application of international prices in this case.

-The industrial production in Uruguay has fallen in the last years and its actual level is similar to the beginning of the previous decade. It is possible that this recessive scenario will remain in the next future and the industrial production could not grow. This may restrict the adoption of natural gas by industries.

-The level of the CER prices and transaction costs. The CER sales are important in the project returns.

12. Potential reproduction

The use of natural gas use in Uruguay is new. The fuel replacement, from the commonly used fuel oil to natural gas, can be adopted by many other companies in the country because it is more environmentally friendly; it presents economic advantages and facilitates the industrial operations.

13. Technical summary of the technology used

-Adaptation of existing equipments to burn fuel oil/natural gas.

-Installation of external pipeline to the different industries.

-Installation of internal pipeline and regulators for natural gas distribution.

14. Contextual information including:

Assessment of project sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

•reduction of Uruguay's dependence on petroleum, replacing it for a fuel received from a country that shares the same economic region.

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM.

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Annex 1

GHG emissions calculations

CO2 emission for boilers burning fuel oil:

8.138 X 10^1 kg CO2/GJoule

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía.

CO2 emission for boilers burning natural gas:

5.429 X 10^1 kg CO2/GJoule

Source: Table B.7.a.: Factores de Emisión, Estudio para la Identificación de Medidas de Mitigación de Emisiones de Gases de Efecto Invernadero en el Sector Energía

Fuel oil: 10,200 kcal/kg

Natural gas: 9300 kcal/Nm^3

25 X 10^6 m^3/year X 9300 kcal/kg X 4186.8 Joules/kcal = 9,73 X 10^{14} Joules/year equivalent to 9,73 X 10^5 Gjoules/year

9,73 X 10^5 Gjoules/year X (81.38-54.29) kg CO2/GJoule = **26359 ton CO2/year**

Annex 2:

Cash Flows

In US$ of the year 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	235.000	505.000	785.800	1.077.724	1.381.105	1.696.283	2.023.611	2.363.447	2.716.161	3.082.132	3.461.750
Investments	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000
Consumption of natural gas	0	270.000	550.800	842.724	1.146.105	1.461.283	1.788.611	2.128.447	2.481.161	2.847.132	3.226.750
Residual value of the investments											
Benefits											
Cost savings		314.716	642.021	982.131	1.335.428	1.702.302	2.083.155	2.478.401	2.888.461	3.313.772	3.754.778
Fuel oil savings		306.809	625.890	957.611	1.302.351	1.660.498	2.032.449	2.418.615	2.819.414	3.235.277	3.666.648
Net CER sales		7.908	16.132	24.520	33.076	41.804	50.706	59.786	69.047	78.494	88.130
Net benefits	-235.000	-190.284	-143.779	-95.593	-45.677	6.018	59.544	114.954	172.300	231.639	293.028
Net benefits without sale of CERs	-235.000	-198.191	-159.910	-120.113	-78.753	-35.786	8.839	55.168	103.253	153.145	204.898
Reduced emissions in tons of CO2		2.636	5.377	8.173	11.025	13.935	16.902	19.929	23.016	26.165	29.377

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	3.526.285	3.592.111	3.659.253	3.727.738	3.797.593	3.868.845	3.941.521	4.015.652	4.091.265	4.168.390	2.132.058
Investments	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000	235.000
Consumption of natural gas	3.291.285	3.357.111	3.424.253	3.492.738	3.562.593	3.633.845	3.706.521	3.780.652	3.856.265	3.933.390	4.012.058
Residual value of the investments											-2.115.000
Benefits											
Cost savings	3.829.873	3.906.471	3.984.600	4.064.292	4.145.578	4.228.489	4.313.059	4.399.320	4.487.307	4.577.053	4.668.594
Fuel oil savings	3.739.981	3.814.780	3.891.076	3.968.897	4.048.275	4.129.241	4.211.826	4.296.062	4.381.983	4.469.623	4.559.016
Net CER sales	89.892	91.690	93.524	95.395	97.302	99.249	101.233	103.258	105.323	107.430	109.578
Net benefits	303.588	314.360	325.347	336.554	347.985	359.645	371.538	383.669	396.042	408.663	2.536.536
Net benefits without sale of CERs	213.696	222.670	231.823	241.160	250.683	260.396	270.304	280.410	290.719	301.233	2.426.958
Reduced emissions in tons of CO2	29.964	30.563	31.175	31.798	32.434	33.083	33.744	34.419	35.108	35.810	36.526

NPV (12%) of the net benefits without CERs US$	**171.836**
FIRR of the net benefits without CERs	**14%**
NPV (12%) of the net benefits incl. CERs US$	**577.228**
FIRR of the net benefits without CERs	**18%**

Price of CER without transaction costs: 3 US$/T CO2 eq

Natural gas price: 110 US $/1000 m3

Growth of fuel consumption: 2% per year

IV. Energy Efficiency in the Industrial Sector in Uruguay

1. Executive Summary

The project consists of the rationalization of the use of energy in the industrial sector in Uruguay in order to reach a 10% reduction.

The Laboratorio Tecnológico del Uruguay, LATU, (Technological Laboratory of Uruguay, LATU) is offering a new service to improve the use of energy in the industrial sector. LATU works following an ESCO (Energy Service Company) scheme: the energy consumptions are measured against an initial consumption baseline and a fraction of these savings are used to pay the professional fees.

The establishment of consumption baseline and the monitoring plan of the consumptions along the time are inherent characteristics of the work.

Approximately fifty two industries in Uruguay will participate in a program to increase the efficiency in energy use within their industrial processes.

*The NPV of the net benefits without the sale of the CERs amounts **US $223 thousands**; if CERs incomes are included, the amount is **US $373 thousands**. The utilized discount rate is 12% yearly.*

*The sale of CERs generates an up-to-date income of **US $ 150 thousands**, which represents 9% of the total benefits.*

*The Financial Internal Rate of Return is **18%** without including the sale of CERs and **23%** including the sale of CERs.*

These results depend of the results of the actions to save energy and of the level of the CERs prices. The investments and the professional fees by company are adequate to the revenues of the project.

*In relation to the project financing the contribution of the company reaches **US $650 thousands** (50% of the total investment), and the rest will be financed by LATU*

*The project will reduce emissions **of 92.808 ton CO2** during project lifetime*

*The marginal cost has a negative value of **US $ 4, 61** that represents a marginal benefit of the project.*

Project will have a duration of 9 years.

The main risks of this project for the external investor are the failure in the forecasts of the energy savings, a reduction in energy prices and the level of the CER prices and transaction costs.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The rationalization of the use of energy in the industrial sector can lead to important GHG emissions reduction if considered in total.

The Laboratorio Tecnológico del Uruguay, LATU, (Technological Laboratory of Uruguay, LATU) is offering a new service to improve the use of energy in the industrial sector. It consists of an energy audit, a report with measures to be taken in order to save energy and a follow-up scheme of these savings in time.

LATU works following an ESCO (Energy Service Company) scheme: the energy consumptions are measured against an initial consumption baseline and a fraction of these savings are used to pay the professional fees.

The establishment of consumption baseline and the monitoring plan of the consumptions along the time are inherent characteristics of the work.

Description of LATU

The Technological Laboratory of Uruguay (LATU), was created as fruit of the combined effort of the national private-official sectors.
LATU is a non state public person, administered by a Governing body with the following integration: a delegate of the Executive Power (Ministry of Industry, Energy and Mining) who officiates of President; a delegate of the Chamber of Industries of the Uruguay like Secretary and a delegate of the Bank of the Oriental Republic of the Uruguay, acting as Treasurer.

Mission of LATU

To develop all actions tending to satisfy the current and future necessities of the productive and public sectors, to offer products and services of appropriate quality, to maintain a continuous process of improvement and of increase of added value, in order to achieve the opening and consolidation of markets, as well as the optimization of their administration

Facilities

The different operative areas are located in a property of 11 hectares and 23.500 built m².

The technical areas are developed in 11 modules constituted by Pilot Plants and Laboratories belonging to each specific area.

LATU works in diverse areas: technological, commercial, of consultancy and of training by means of the adaptation of existent structures, the creation of units with autonomy administration and the establishment of societies and strategic alliances with Institutions and companies of international recognition.

LATU services include:

- Traditional analytic and technological Services.

- The Processes of Consultancy in Implementation of Systems (LATU offers a consulting service for the implementation of Systems of Administration of Quality based on the pattern of

the norm ISO 9001:2000 or its version 1994) of Administration of Quality, in Logistics and in Optimization of acquisitions for Bid or Direct Purchase.

-Energy and Water Efficiency Service.

- Incubator of Companies of Software.

- Park of Exhibitions.

- Espacio Ciencia: interactive museum of science and technology

Alliances and Associations

LATU has celebrated Strategic Alliances and Associations:

- with institutions and companies of Argentina, Brazil, Mexico, Chile, Costa Rica, Paraguay, Ecuador, Dominican Republic and Republic of El Salvador for development of cooperation and technological exchange, and for the establishment of joint services.

- with SQS of Switzerland, OQS and OVQ of Austria, DGQ of Germany, UKAS of United Kingdom, INMETRO of Brazil among others, to obtain international recognition to its services.

LATU offers a wide range of technological services directed to the Forest, Textile Sectors, Leather, Fermented Drinks, Fruits and Vegetables and Industrialized, Meat Cereals, Pack, Milky, Environment, Thermal Processes, Wools, Constructions, Plastics, etc..

Project objectives

- To achieve a 10% increase in energy efficiency in a selected part of the industrial sector of Uruguay.
- To reduce greenhouse gas emissions by substitution of a fossil fuel by natural gas.
- To diversify the fuel options (fuel oil and natural gas), not depending entirely on petroleum imports.
- To reduce operational costs.

Baseline scenario

The industrial sector in Uruguay consumes mainly fuel-oil and electricity in its plants.

An Industrial Survey, performed by the Climate Change Unit (from the National Environment Direction, depending of the Ministry of the Environment), shows the following:

	FUEL-OIL	GAS-OIL	ELECTRICITY	NATURAL GAS
Company	L/year	L/year	KWH/YEAR	M3/YEAR
1	7,772,020	5,500	13,000,000	
2	6,810,000			
3	2,487,047	76,832	8,130,000	
4	2,380,000	10,000	10,500,000	
5	2,220,000	156,000	14,400,000	
6	2,112,000			
7	2,076,000			
8	2,041,848	144,276	43,695,060	
9	2,000,000	150,000	4,150,000	
10	1,640,000	4,800	2,500,000	
11	1,554,404	17,730	10,000,000	
12	1,492,228	36,000	8,400,000	
13	1,431,481	57,539	3,379,500	
14	1,300,000	45,000	8,020,000	
15	1,248,000		3,240,000	
16	1,200,000	12,000	4,800,000	
17	1,058,040		3,694,500	
18	696,000	36,000	840,000	
19	666,000			
20	480,000			
21	457,704	4,800	935,400	
22	288,000	12,000	3,660,000	
23	240,000	900,000	22,000,000	
24	230,000	9,000	6,000,000	
25	190,000	110,000	11,500,000	5,400,000

	FUEL-OIL	GAS-OIL	ELECTRICITY	NATURAL GAS
Company	L/year	L/year	KWH/YEAR	M3/YEAR
26	183,000			
27	157,181	25,830	1,764,000	
28	120,000	6,000	3,360,000	
29	110,000			
30	60,000	96,000	18,000,000	
31	40,000		50,000	
32	33,600	9,600	216,000	
33	20,760	2,400	49,200	
34	20,000	1,800	24,000	2,160,000
35	19,200	480	1,800,000	
36	9,000	2,400	96,000	
37	2,400		48,000,000	
38		140,000	5,400,000	
39		54,000		3,720,000
40		45,000	4,100,000	
41		70,000	600,000	
42			9,600,000	
43			1,452,000	
44		18,000	6,000,000	
45		2,352	415,800	
46		28,200	3,600,000	
47			9,500	
48		3,600	2,400,000	
49			720,000	
50			140,000	
51				
52			378,000	
TOTAL	**44,845,913**	**2,293,139**	**291,018,960**	**11,280,000**

Source: Climate Change Unit

Proposed activities

Approximately fifty two industries in Uruguay will participate in a program to increase the efficiency in energy use within their industrial processes.

The work will be done by LATU's specialists and include:

a) Audit of use of energy.

b) Baseline determination.

c) Project of changes to be adopted in order to achieve energy savings.

d) Monitoring of the savings.

The objective is to reduce 10 % the energy consumption in the selected industries.

The activities will be distributed in a five years period. It has been assumed that:

- The savings are distributed during the five years period.
- The savings are monitored during a 5 years period for each industry.
- Total expected project duration is 9 years

The necessary investments to achieve 10% reduction are estimated in USD 25.000 per industrial plant. They will be financed equally by LATU and the companies in a 2 years period.

The professional fees are 40% of energy savings during 3 years.

3. Proposed baseline methodology

Establishing a baseline of consumption is one of the points of the work to develop with the companies. The relationship between the energy consumption and the production of the industries will be considered, along with other factors involved with energy consumption.

4. Technical Assessment

The points in the industrial processes that can be improved will be monitored by the specialists with adequate testing equipment: boilers, steam lines, valves, electric motors efficiency, lighting, driers, insulations, etc.

It is considered that approx. 10 % of the energy can be saved through staff training, proper equipment maintenance and review of the lay out and plant design.

These activities will include investing money in new equipments (valves, steam traps, regulators, etc.).

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs amounts US $223 thousands; if CERs incomes are included, the amount is also negative for US $373 thousands. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of US $ 150 thousands, which represents 9% of the total benefits.

The Financial Internal Rate of Return is 18% without including the sale of CERs and 23% including the sale of CERs.

These results depend of the results of the actions to save energy and of the level of the CERs prices. The investments and the professional fees by company are adequate to the revenues of the project.

In relation to the project financing the contribution of the company reaches US $650 thousands (50% of the total investment), and the rest will be financed by the LATU.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The energy savings and the emissions reductions are distributed during the first five years of the project.

x) before 2008

The estimated reduction is 28.728 ton CO2.

xi) during 2008-2012

The estimated reduction is 64.080 ton CO2.

xii) during entire project lifetime

The project will reduce emissions of 92.808 ton CO2 during project lifetime.

See detailed information in Annex 1 and Annex 2.

7. Estimated lifetime and crediting period for project

Project will have a duration of 9 years after start of operations of the first plant. Carbon credits will be produced over the same period.

Projected start and completion dates of the proposed activities. Activities start during 2003

Current status

The service is starting its activities. Testing equipment has been purchased and commercial contacts have been established with the companies.

8. Estimated cost per ton of CO2 equivalent

The cost will be low due to the baseline study and monitoring during the project.

The marginal cost has a negative value of US $ 4, 61 that represents a marginal benefit of the project.

9. Documentation on environmental impacts

Environmental impacts will be positive and tending to reduce GHG emissions.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

Monitoring of the savings is one the foreseen activities with the industries.

These include:

- reduction of emissions for reduced energy consumption

11. Estimated investor risk

The main risks of this project for the external investor are:

-The failure in the forecasts of the energy savings

- A reduction in energy prices.

-The level of the CER prices and transaction costs.

12. Potential reproduction

The methodology of energy audits and the rationalization of the energy use can be extended to other industries. It can also be applied to shopping malls, hospitals, banks, etc.

13. Technical summary of the technology used

Energy audits.

Review of the plant design and lay out.

Staff training.

Adequate equipment maintenance.

14. Contextual information including:

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM

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Annex 1

Energy savings %	**10**				
Year	**1**	**2**	**3**	**4**	**5**
Savings of fuel oil (l/year)	896918	1793837	2690755	3587673	4484591
Ton CO2	2650	5299	7949	10598	13248
Electric energy savings (kWH/year)	5820379	11640758.4	17461137.6	23281516.8	29101896
Ton CO2 *	2619	5238	7858	10477	13096
Savings of natural gas (m^3/year)	225,600	451200	676800	902400	1128000
Ton CO2	477	954	1431	1908	2384
Total ton CO2	5746	11491	17237	22982	28728

Energy savings %	**10**				
Year	**6**	**7**	**8**	**9**	**Total**
Savings of fuel oil (l/year)	3587673.04	2690754.78	1793836.52	896918.26	22422957
Ton CO2	10598	7949	5299	2650	
Electric energy savings (kWH/year)	23281516.8	17461137.6	11640758.4	5820379.2	145509480
Ton CO2 *	10477	7858	5238	2619	
Savings of natural gas (m^3/year)	902400	676800	451200	225600	
Ton CO2	1908	1431	954	477	
Total ton CO2	22982	17237	11491	5746	143640

- 450 g CO_2/kw.hr was used as marginal saving.

Annex 2

Cash Flows

In US$ of the year 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total costs	260.000	329.589	341.485	382.228	382.228	122.228	122.228	69.589	0	0
Investments	260.000	260.000	260.000	260.000	260.000	0	0	0	0	0
Profesional fees	0	69.589	81.485	122.228	122.228	122.228	122.228	69.589	0	0
Benefits										
Cost savings		182.591	220.950	331.425	441.900	445.875	445.875	445.875	445.875	445.875
Energy savings		173.973	203.713	305.570	407.427	407.427	407.427	407.427	407.427	407.427
Net CER sales		8.618	17.237	25.855	34.474	38.448	38.448	38.448	38.448	38.448
Net benefits	-260.000	-146.998	-120.535	-50.803	59.672	323.647	323.647	376.285	445.875	445.875
Net benefits without sale of CERs	-260.000	-155.616	-137.772	-76.658	25.199	285.199	285.199	337.837	407.427	407.427
Reduced emissions in tons of CO2		2.873	5.746	8.618	11.491	12.816	12.816	12.816	12.816	12.816

NPV (12%) of the net benefits without CERs	**US$**	**223.291**
FIRR of the net benefits without CERs		**18%**
NPV (12%) of the net benefits incl. CERs	**US$**	**373.120**
FIRR of the net benefits without CERs		**23%**

Price of CER without transaction costs **3 US$/Ton CO2 equivalent**

V. Electricity Generation Using Natural Gas in Uruguay.

1. Executive Summary

The.National Administration of Electricity Generation and Transport (Administración Nacional de Usinas y Transmisiones Eléctricas, UTE) plans to install a 360 MW power plant using natural gas as fuel (combined cycle), at approx. 50 km from Montevideo. The company has failed in attracting a private investor, and decided to make the investment itself.

In Uruguay, the generation is made mainly from hydroelectric generators. Some energy is generated from thermal installations (mostly for back-up to hydroelectric system) when the hydrological regime demands it and some energy is purchased from Argentina. The hydroelectric potential for electricity generation has been almost completely used, so the thermal generation will substitute the purchases from Argentina and the demand increase in the next years.

The demand of the system, the price of the petroleum and of the natural gas, and the evolution of the characteristics of the hydraulic and thermal power stations are projected in a period of study for the definition of the baseline. The evolution of the average marginal cost of the energy from Argentina is also considered.

The power plant (combined cycle) will consist of a gas turbine, heat regeneration, steam turbine, electric generators, a 500 kV line to Montevideo station B, necessary buildings, a cooling tower, natural gas supply to the central, alternative fuel (gas-oil) pipeline and the water intake. ***The*** *estimated total investments are* ***USD 162.4 millions.***

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity from all relevant sources.

The NPV of the net benefits without the sale of the CERs has a negative amount of ***US $46.6 millions****; if CERs incomes are included, the negative amount is of* ***US $ 42.7 millions****. The utilized discount rate is 12% yearly.*

The sale of CERs generates an up-to-date income of ***US $ 3.9 millions****, which represents 3% of the total benefits.*

The Financial Internal Rate of Return is ***7%*** *without including the sale of CERs and* ***8%*** *including the sale of CERs.*

In relation to the project financing the contribution of the company reaches US $23 millions (14% of the initial investment). UTE has signed, with Uruguayan government approval, an agreement with a group of Argentinean companies, for the supply of natural gas for the projected central. The need to comply with this agreement will facilitate obtaining the supply of necessary funds and guarantees for building the plant.

The project will reduce emissions of ***4309381 ton CO_2*** *during 20 years project lifetime*

*The marginal cost of this project reaches **US $50** per ton of equivalent **CO_2**; this value is very high because of the important investments.*

The main risks of this project for the external investor are the relatively reduced internal return rates , the changes in the prices of fuel oil, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.), petroleum and natural gas in Argentina and the level of the CER prices and transaction costs.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The use of natural gas for the generation of electric energy in Uruguay can lead to important GHG emissions reduction.

The.National Administration of Electricity Generation and Transport (Administración Nacional de Usinas y Transmisiones Eléctricas, UTE), is a governmental body, created in 1912.

In 1931, UTE was granted a new monopoly: that of the phone communications for cable, passing to be denominated" General Administration of Electricity Generation and Telephones" until in 1974, soon after the creation of the State-run enterprise of Telecommunications (Antel), the competition of UTE returned to the original one.

UTE has been working in permanent form in the modernisation of their administration. In particular, starting in 1994, an oriented plan of activities was developed toward the promotion, diffusion and installation of a Process of Total Quality in the Company, that gave their fruits in 1998 when the Distribution and Commercial Area and the Systems of Information Division, obtained the National Prize of Quality, recognition that the Government of the Republic, gives every year to the leader Organisations in the application of processes of quality

In 1997 a significant change took place in the electric sector when the Law of the Regulatory Frame was approved that defines the Uruguayan electric market, separating the activities of regulation of the managerial ones. This law - among other dispositions - consecrates the freedom of generation and the free access to the transmission and distribution networks.

That same year, UTE defined its participation in the construction of the natural gas pipeline from Argentina.

In the month of October of 2000, after a long process of negotiation, UTE signed the supply agreement of

natural gas with the companies Pan American Energy and Wintershall Energy that will facilitate the arrival of natural gas to the south of the country.

The establishment of consumption baseline and the monitoring plan of the consumptions along the time are activities that will be included.

Description of the electric system in Uruguay

Electricity generation

In Uruguay, the generation is made mainly from hydroelectric generators. Some energy is generated from thermal installations (mostly for back-up to hydroelectric system when the hydrological regime demands it) and some energy is purchased from Argentina. The energy sold to Argentina and Brazil is variable.

The next table shows the situation during the last years:

Table 1. Energy: generation and exchange (GWh)

Production	**1995**	**1996**	**1998**	**1999**	**2000**	**2001**
Hydroelectric	2554	1586	3832	2125	3000	3659
Thermal	377	827	328	1616	490	9
Diesel (Autonomous)	4	4	6	5	5	6
Purchase						
Salto Grande	3197	3901	4556	3273	3103	4310
Argentina	188	309	78	708	1328	117
Total	6320	6627	8800	7727	7926	8107
Destination						
Brazil	12	17	25	9	0	73
Argentina	186	140	1575	166	88	165
Uruguay	6122	6470	7200	7552	7838	7869

Salto Grande generates hydroelectricity and belongs to Argentina and Uruguay.

Table 2. Generation Capacity (MW) for year 2001

Hydroelectric centrals	2001
Terra	148
Baygorria	108
Constitución	333
Thermal Units	
3-4	100
5	88
6	125
Gas Turbines	
AA	24
CTR	226
Diesel Generators (Autonomous)	8
Total UTE generation	1160
Salto Grande Uruguay	945
TOTAL GENERATION CAPACITY FOR URUGUAY	**2105**

Table 3. Fuel consumption

	1996	**1999**	**2000**	**2001**
Fuel oil (ton)	175490	342211	122794	3213
Gas oil (m^3)	58479	98945	16837	2652
Diesel oil (m^3)	516	----	----	----

UTE has employed 7102 people, has assisted 1195767 services and has billed USD 598 millions during the year 2001. The weighted average price per kWh was 9.34 USD cents, having experienced a 15 % reduction since 1996.

The hydroelectric potential for electricity generation has been almost completely used, so the thermal generation will substitute the purchases from Argentina and the demand increase in the next years.

In April 2001 UTE carried out a bid, which was declared deserted, for the acquisition of a 360 to 400 MW combined cycle power plant.

In November 2001, and for indication of the Executive Power, it was bid the energy and power acquisition coming from a power station to build for a private investor. In September 2002, the process was finished because economic offers were not presented.

Project objectives

- To install a 360 MW power plant, using natural gas as fuel (combined cycle), at approx. 50 km from Montevideo. Gas oil will be used as an alternative fuel.
- To reduce greenhouse gas emissions.
- To diversify the fuel options (fuel oil and natural gas), reducing dependency on petroleum imports.

Baseline scenario

The above described Uruguayan system shows a complex situation that depends very strongly on the hydrology, variable from year to year, which leads to changing amounts of energy generated from thermal sources or purchased from Argentina.

3. Proposed baseline methodology

The demand of the system, the price of the petroleum and of the natural gas, and the evolution of the characteristics of the hydraulic and thermal power stations are projected in a period of study for the definition of the baseline. The evolution of the average marginal cost of the energy from Argentina is also considered.

A series of historical scenarios, based on hydrological situations and marginal costs of Argentina and Brazil, are built (approx. 90 scenarios).

The objective is to look for an expansion of the resources of electric power production that minimizes the total cost of the system (including the investment and the variable costs) updated with a reference rate and averaged in the considered scenarios, subject to restrictions of guarantee of supply.

The results of the simulation are included in Annex 1.

4. Technical Assessment

The technology to be used is the most modern. The highest efficiencies will be obtained from generators manufactured by competent manufacturers.

The power plant (combined cycle) will consist of:

- Gas turbine, heat regeneration, steam turbine and electric generators.

Investment: USD 135.3 millions.

- 500 kV line to Montevideo station B

Investment USD 9 millions

- Buildings

Investment USD 12.6 millions

- Cooling tower

This equipment is selected, among other reasons, to reduce the thermal impact on the river.

- Natural gas supply to the central
- Alternative fuel (gas-oil) pipeline
- Water intake

Investment: USD 5.5 millions

The estimated total investments are USD 162.4 millions

The estimated project life is 20 years, which is quite reasonable for a generator which is designated mainly for thermal backup to the hydroelectric system.

Estimated operational costs are US D 3 millions per year.

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs has a negative amount of US $46.6 millions; if CERs incomes are included, the negative amount is of US $ 42.7 millions. The utilized discount rate is 10% yearly.

The sale of CERs generates an up-to-date income of US $ 3.9 millions, which represents 3% of the total benefits.

The Financial Internal Rate of Return is 7% without including the sale of CERs and 8% including the sale of CERs.

These results obey to the influence of the high investments in the energy plant in relation to moderate saving costs of operation and maintenance of the new plant.

In relation to the project financing the contribution of the company reaches US $23 millions (14% of the initial investment). UTE has signed, with Uruguayan government approval, an agreement with a group of Argentinean companies, for the supply of natural gas for the

projected central. The need to comply with this agreement will facilitate obtaining the supply of necessary funds and guarantees for building the plant.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The estimated GHG emissions reduction potential during project lifetime are:

xiii) before 2008

517711 ton CO_2

xiv) during 2008-2012

1024348 ton CO_2

xv) during entire project lifetime

4309381 ton CO_2

7. Estimated lifetime and crediting period for project

Project will have a duration of 20 years after start of operations of the first plant. Carbon credits will be produced over the same period.

Projected start and completion dates of the proposed activities: Building will start on 2003 and will be operational in 2005.

Current status:

The gas pipeline from Argentina has been constructed and is operational. The power plant is under design. UTE has received offers from important international companies to build the central.

Time required before becoming operational: 2 years.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of this project reaches US $50 per ton of equivalent CO2; this value is very high because of the important investments**.**

9. Documentation on environmental impacts

Environmental impacts will de positive and tending to reduce GHG emissions.

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

All environmental aspects will be covered and national permits from the authorities will be obtained, which will guarantee the accomplishment of national legislation.

In the absence of legislation in Uruguay, EPA standards will be applied.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources.

These include:

- Reduction of carbon dioxide emissions
- Emissions increases and reductions due to changes in the logistics of fuel distribution.

11. Estimated investor risk

The main risks of this project for the external investor are:

- Lack of support from Uruguayan government to make the investment.

-The internal return rates are relatively low and changes in investments or costs of operation and maintenance could make the project not viable.

- Changes in the prices of: fuel oil, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.), petroleum and natural gas in Argentina.

-The level of the CER prices and transaction costs.

12. Potential reproduction

UTE project will have an important impact on GHG reduction in Uruguay. The methodology for project presentation to CDM can encourage to other companies to do the same in Uruguay.

13. Technical summary of the technology used

The power plant (combined cycle) will consist of:

- Gas turbine, heat regeneration, steam turbine and electric generators.
- 500 kV line to Montevideo station B
- Buildings
- Cooling tower
- Natural gas supply to the central
- Alternative fuel (gas-oil) pipeline
- Water intake

14. Contextual information including:

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project. State of the art technology will be applied from well-known manufacturers worldwide.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM.

Full contact information

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Annex 1: Simulation results

Results for year 2008 are presented as an example.

2008	ENERGY (GWh)	With project																				
CASE	DEMAND	TERRA	BAYGORRIA	PALMAR	SALTO	5ATV	6ATV	CTR_L	CCN_G	CCN_L	IMPORT 1	IMPORT 2	IMPORT 3	IMPORT 4	IMPORT 5	IMPORT 6	EXPORT 1	EXPORT 2	FAILURE 1	FAILURE 2	FAILURE 3	FAILURE 4
1914	9621,1	983,2	632,4	2283,2	5001,4	26,9	42	13,4	1161,5	1,2	0	230,5	139,4	0	72,8	104,1	-952,5	-119,2	0,9	0	0	0
1915	9621,1	1102,4	734,6	2084,3	4576,9	16,9	21	2,6	1389,7	57,7	0	194,2	118,5	0	50	177,8	-838,4	-67,1	0	0	0	0
1916	9621,1	246,8	200,9	665,5	3317,5	306,5	279,3	387,9	2128,9	164,2	82,8	705,1	432,3	0	373,5	295	0	0	27,8	6,1	1,1	0,1
1917	9621,1	87	94,6	460	778,1	489,6	818,4	1415,5	2298,2	302,4	167,5	862,7	516,6	0	562,4	389,5	0	0	188,2	104,6	44,8	41,1
1918	9621,1	622,4	428,2	1596,7	3580,9	125,3	143,7	163,2	2281,3	103	21,5	357,6	217	0	161,4	123,7	-275,7	-37,7	8,7	0	0	0
1919	9621,1	745,9	500,4	1726,8	4474,9	37,1	34	8,3	1935,2	7	0	294,4	182,7	0	145,2	212	-643,7	-43,8	2,3	2,2	0	0
1920	9621,1	788,6	531,5	1695,8	3764,8	25,4	0	10,4	2342,8	18	0	369,1	224,8	0	129,6	0	-113,7	-166	0	0	0	0
1921	9621,1	988,6	641,3	2039,3	3216,1	17,6	0	20,4	2187,4	61,4	0	371,7	234,8	0	104,3	91,8	-295	-61,6	2,3	0,7	0	0
1922	9621,1	704,7	474,7	1507,4	4552	54,7	64,1	67,7	1639	1	0	369,1	229	0	198,2	70,2	-246,9	-64,3	0,7	0	0	0
1923	9621,1	514,2	379,2	1447,5	4610,1	87,6	122,1	72,1	1623,2	70,1	0	436	259,1	0	208,6	226,4	-405,9	-29,7	0,4	0,2	0	0
1924	9621,1	795,5	560,8	1536,4	2592,6	107,4	121	179,2	2356,4	99,7	0	489,7	293,6	0	202,1	313,3	-32,5	0	2,3	3,4	0,4	0
1925	9621,1	672,2	496,4	1645,4	3350,5	195	212,2	298,3	1629,5	169,1	26,2	440	259,2	0	220,5	346,5	-324,6	-19,6	4,3	0	0	0
1926	9621,1	782,2	523,9	1663,8	3327,1	140,4	180,6	162,2	2100,6	5,8	20,4	479,4	287	0	201,2	144	-241,5	-165,8	9	0,7	0,1	0
1927	9621,1	530,9	404,2	1185,5	2375,5	204,2	338,8	329	2268,4	279,3	0,3	798,3	483,5	0	396,6	11,8	0	-11,4	8	12,1	6,4	0
1928	9621,1	511,1	348,6	1118,3	4881	23,3	11	0,8	2111,7	8	0	309,7	177,2	0	92,4	91,4	-48,9	-14,3	0	0	0	0
1929	9621,1	456,9	379,4	1044,3	3516,7	147,4	136,5	116,3	1880,6	350,7	2,9	617,5	373	0	231,4	386,5	-20,9	0	2	0	0	0
1930	9621,1	836,9	592	1887,3	3789,8	33,5	21,7	0	1770,1	75,4	0	556,4	340	0	161,7	0	-260,4	-183,6	0	0	0	0
1931	9621,1	725	492,5	1632,4	3204	54	104,8	53,2	2326,5	1	0	513	309,6	0	213,2	21,9	-7	-22,7	0	0	0	0
1932	9621,1	669,3	440,6	1616,9	4569,1	102,4	134	0	1870,2	4,1	0	315,4	199,9	0	136,4	98,5	-421,7	-113,8	0	0	0	0
1933	9621,1	361,2	278,7	906	2056,5	313,4	444,3	428,4	2353,4	362,9	30,9	793,3	469,6	0	456,7	335,4	0	0	30,4	0	0	0
1934	9621,1	455,9	364,9	1245,9	3502,4	90,2	118,3	83,9	2107,4	53	0	621,7	355,5	0	236,3	385,7	0	0	0	0	0	0
1935	9621,1	231	189,3	666,2	3376,7	284,2	407,3	236	2095,9	325,3	0	702,4	425,6	0	336,6	337	0	0	5,9	1,6	0,1	0
1936	9621,1	903,4	609,9	2059,4	4305,6	10,7	15,5	0	1573	58,8	0	296,3	177,2	0	79,5	176,6	-591	-54	0	0	0	0
1937	9621,1	786,2	526,8	1682,9	3165,8	58,6	62,9	25,8	2300,7	177	0	399,7	229,5	0	121,8	392,1	-295,3	-13,4	0	0	0	0
1938	9621,1	724	481	1561,9	4036,7	14,6	10,5	14,5	2016,4	0,3	0	323,9	202,8	0	89,2	361,7	-213,4	-3	0	0	0	0
1939	9621,1	454,6	361,3	1094,3	4195,1	37	50,9	15,1	2006,5	89,3	0	484,2	291,3	0	171,6	370,1	0	0	0	0	0	0
1940	9621,1	927,7	612,7	2199,6	5198,6	7	0	0	1198,7	39,4	0	107	58	0	35,5	265,4	-960,1	-68,3	0	0	0	0
1941	9621,1	988,3	658,5	1978,3	5067,4	21,4	5	19	1737,8	61,7	4,9	109,2	72,6	0	40,7	21,8	-953,8	-211,7	0	0	0	0

1942	9621,1	821,4	597,6	1612,8	3887,9	70,6	105	65,5	1919,8	18,7	0	468,5	288,3	0	177,4	0	-247,5	-169,4	2,3	1,6	0,4	0
1943	9621,1	152,7	135,6	510,9	2400,1	340,8	553,4	730,8	2201,6	345,3	41,5	817,8	491,7	0	487,3	356,8	0	0	45,1	8,1	1,3	0,3
1944	9621,1	98,9	106,9	456,3	1758,8	441	700,2	995,9	2236,2	423,4	85,5	821,7	497,1	0	521,6	382,9	0	0	78,1	14,5	2,1	0
1945	9621,1	90,2	83,5	357,3	1633,2	487,3	718,1	1008,8	2345,9	362,9	96,9	825,5	494,4	0	507,3	383,5	0	0	129,4	52,1	29,4	15,4
1946	9621,1	329,7	258,2	1122,3	3964,4	101,9	100,3	109,9	2205,2	290,9	3,5	523,9	314,7	0	252,8	334,8	-289,4	-1,9	0	0	0	0
1947	9621,1	776,2	537,1	1514,9	3182,2	50,5	18,5	30,3	2333,7	65,4	0	412,1	243,3	0	155,7	310,9	-9,6	0	0	0	0	0
1948	9621,1	776,5	518,9	1833,2	4282,4	44	33,3	12,2	1911,4	1,7	5,1	334,2	199,2	0	103,2	85,1	-426,1	-99,4	2,3	3,5	0,5	0
1949	9621,1	815,2	592,8	1892,9	2655,5	87,6	87,9	32,7	2279,5	55,9	0	541,5	323,8	0	200,8	202,5	-133,6	-15,5	1,2	0,5	0	0
1950	9621,1	746,1	508,4	1795,8	3276,3	170,6	176,9	64,9	2215,3	91,5	0	422,6	258,1	0	219	152	-390,8	-85,7	0	0	0	0
1951	9621,1	419,2	380,8	1154,6	2554,7	241,8	374	703,5	2071,9	241,9	22,1	497,4	303,8	0	261,7	288,8	0	0	37,6	33,4	19,6	14,4
1952	9621,1	675,8	477,6	1698,3	3116,7	191	249,5	225,9	2315,9	11,3	0	477,6	295,5	0	254,7	0	-254,5	-125,3	9	2	0	0
1953	9621,1	550,6	422,5	1660,1	2874,7	172,7	184,5	92,9	2061,9	176,9	0	684	418,2	0	315,7	6,4	0	0	0	0	0	0
1954	9621,1	656,7	464,9	1468,2	4309	30,7	23	0,5	2166,7	32,8	0	368,3	217,9	0	97	0	-124,1	-90,6	0	0	0	0
1955	9621,1	667,2	482,9	1753,1	3561,2	100,3	178,4	101	1976,8	46,2	0,8	527,3	319,4	0	251,8	0	-229,4	-115,8	0	0	0	0
1956	9621,1	494,4	339	1434	3322,4	140,7	105,6	70	2295,3	362,9	0	519,9	309,1	0	207,1	155,8	-114	-21,1	0	0	0	0
1957	9621,1	463,4	331,7	1193,6	3277,5	207,7	244,4	146,9	2063,4	351,3	0	577	345	0	282,5	280,2	-130,2	-13,2	0	0	0	0
1958	9621,1	584,1	419,8	1646,1	3954,1	0	0	0	2025,2	390,2	0	340,5	202,5	0	182,9	173,7	-186,9	-111,1	0	0	0	0
1959	9621,1	1082,8	701,9	2222,9	4565	5,3	28,3	0,6	1528,8	19,2	0	178,8	97,8	0	49,4	50,8	-749,9	-160,5	0	0	0	0
1960	9621,1	815,7	550,5	1712,5	3190	112,3	145,2	126,5	1938,5	269,3	0	538,9	323,3	0	246,5	229,5	-493,2	-95,2	10,9	0	0	0
1961	9621,1	723	526,2	1585,7	4510,2	13,4	21	1,5	1923,7	13,6	0	292,5	181,9	0	81,9	90,3	-302,2	-41,6	0	0	0	0
1962	9621,1	577,5	468,6	1305,7	2221,8	177,3	281,2	334,4	2425	362,9	0	571	339,3	0	247,1	274,8	0	0	10,3	15	9,4	0
1963	9621,1	687,6	552,6	1910,7	3349,5	179,5	229,6	189	1746,7	362,9	0	464,5	265,5	0	217,6	0	-378,5	-158,8	2,2	0,5	0,3	0
1964	9621,1	717,4	529,3	1471,7	2567,7	72,4	67	32,8	2173,7	321,6	0	622,1	374	0	305,1	352,4	0	0	7	7	0	0
1965	9621,1	165	144,6	686,9	3722,5	154,6	270,7	202,8	2232,6	322,7	0	658,8	397,4	0	333,3	328,4	0	0	0,9	0	0	0
1966	9621,1	885	636,6	1779	5567,2	27,9	38	36,5	1451,3	0,9	0	78	45,4	0	16,5	123,4	-969,8	-94,8	0	0	0	0
1967	9621,1	1023,6	722,5	2048,7	3769,1	36,1	20,9	0	2007,4	41,8	0	310,1	166	0	120,7	110,4	-528,7	-227,4	0	0	0	0
1968	9621,1	520,6	417,9	1499,3	2302,2	259	352,3	96,8	2167	259,3	11,8	799,9	480,6	0	441,3	1,4	0	0	2,3	3,5	3,5	2,5
1969	9621,1	540	429,2	1173,9	3985,2	60,2	84	83,5	2215,2	41,3	0	424,1	263,2	0	182,1	139,1	0	0	0	0	0	0
1970	9621,1	531,8	412,7	1618,6	3706,3	98,8	87,4	69,4	2136	7,1	0	522,7	322,6	0	227,9	0	-40,5	-79,4	0	0	0	0
1971	9621,1	836,6	561,9	1862,1	4340,1	47,7	86,7	9	1935,5	1,7	0	279,4	169,3	0	132,2	58,4	-438,4	-261,1	0	0	0	0
1972	9621,1	647,6	447,1	1593,5	4383,2	120	107,4	19,3	1741,3	40,4	13,2	418,2	263,2	0	252	262,3	-634,5	-53,7	0,6	0	0	0
1973	9621,1	1007,8	655,7	2000,9	5386,6	12	5,2	0	1288,9	33,2	0	160,3	95,5	0	33,1	159,5	-1126,2	-91,3	0	0	0	0
1974	9621,1	793,8	567,2	1789,2	3658,5	5	8,7	0	2175,7	33,8	0	376,5	204,5	0	96,9	96,8	-139,9	-45,4	0	0	0	0
1975	9621,1	469,2	363,2	1238,3	4576,6	13,4	21	0	2092,1	123,4	0	308	182,2	0	81,6	198,7	-46,5	0	0	0	0	0
1976	9621,1	571	421,8	1182,3	4072,7	30,7	31,1	0,2	2032,7	146,4	0	443,5	252,8	0	147	299	-10,1	0	0	0	0	0

1977	9621,1	1005,7	666,4	2197	4873	28,8	17	0	1353,2	66,8	0	160,9	84,3	0	46,8	109,3	-945,9	-42,1	0	0	0	0
1978	9621,1	863,2	581,3	2196,9	2847,9	83,8	88,2	26,6	1928,6	159,3	0	434,2	228,2	0	147,1	316,5	-283	-2	2,6	1,5	0,3	0
1979	9621,1	450,4	320	1060,6	3839,1	89,5	111,9	2,4	2055,4	342,8	0	579,5	350,2	0	281,7	356,1	-215,9	-2,9	0,3	0	0	0
1980	9621,1	958,7	657,9	2179,2	4070,5	18,3	17	21,9	1599,7	75,9	0	272,8	148,2	0	86,4	169,9	-611,4	-43,9	0	0	0	0
1981	9621,1	942,3	665,9	2176	2733,1	47,5	62,1	24,8	1872,7	137,7	0	433,6	241,2	0	160,5	360,6	-227,7	-9,1	0	0	0	0
1982	9621,1	723,6	482	2119	4259,8	45,3	38,3	26,5	1613,5	3	0	384,2	217	0	133,7	258,9	-607,5	-76,1	0	0	0	0
1983	9621,1	909,3	571,7	2181,4	4992	3,7	10,1	0	1516	37,9	0	94,5	54,5	0	27	200,5	-916,7	-60,8	0	0	0	0
1984	9621,1	1060,3	692	2303,7	5085,9	0	0	0	1353,5	2,5	0	56,6	38,3	0	12,3	129,1	-1030,1	-83,1	0	0	0	0
1985	9621,1	862,9	569,4	1833,8	4240,6	55,2	45	28,3	1692,3	2,4	4,6	354,8	206,7	0	127,2	43,2	-375,2	-84,4	4,7	5,7	3,5	0,6
1986	9621,1	868,6	583,4	2100,8	4711	29,1	37,4	17,1	1503	0	13,9	210,9	133,1	0	101,7	161,5	-769,9	-90,9	2,3	3,5	3,5	1,3
1987	9621,1	970,8	639,1	1923,4	4922,7	20,5	8,1	12,9	1548	34,1	0	105,5	72,4	0	35,5	186,1	-816,1	-41,7	0	0	0	0
1988	9621,1	791,2	565,9	1566,2	3042	29,6	22	11,7	2233,7	134,9	0	546,1	303,6	0	177,5	320,2	-120,6	-2,9	0	0	0	0
1989	9621,1	195,7	172,7	460,8	3447,1	250,6	272,7	217,1	2354,9	372,8	0	714,6	435,2	0	355,8	371,2	0	0	0	0	0	0
1990	9621,1	594,4	409,1	1451,9	5318,5	26,9	19,4	46,8	1472,9	9,3	0	282,9	184,7	0	84,6	238,6	-472,7	-46,2	0	0	0	0
1991	9621,1	821	589,9	1637,3	3121,3	80	115,1	42,8	2077,4	18,5	0	528,5	294,6	0	213,1	329,2	-236,8	-10,8	0	0	0	0
1992	9621,1	874,1	602,6	1701,8	4913,2	10,9	0	2	1572,3	22,4	0	259,4	155,1	0	54,5	199,5	-688,3	-58,5	0	0	0	0
1993	9621,1	726,7	510,4	1721,8	4625,4	14,3	17	1,1	1771,9	0	0	277,2	155,1	0	73,8	241,9	-487	-28,5	0	0	0	0
1994	9621,1	931,9	602,3	1754,7	4740,8	4	10,5	0	1841	23	0	114,8	61,7	0	31,7	86,3	-489,4	-92,1	0	0	0	0
1995	9621,1	753,8	544,7	1501,4	3133,1	63,3	80,4	49,9	2289,5	150,1	0	414,6	243,3	0	177,7	251,3	-32,1	0	0	0	0	0
1996	9621,1	400,7	329,3	844,4	4148,8	72,7	63,3	24,9	2030,7	302,6	0	609,6	365,3	0	255,3	173,5	0	0	0	0	0	0
1997	9621,1	523,9	421	1033	4041,8	48,7	63	29,9	2071,3	72,8	0	537,8	328,2	0	165,8	356,9	-70	-2,9	0	0	0	0
1998	9621,1	1057,5	719,6	2142,8	5422	13,4	0	0	1220,7	0,4	0	106,8	77,6	0	42,1	141,6	-1209,1	-114,4	0	0	0	0
1999	9621,1	563,2	425,8	1370,4	3378,4	38,3	15,3	0	2391,9	55,9	0	552	341	0	257,3	231,7	0	0	0	0	0	0
2000	9621,1	774,9	508,1	1644,5	3862,9	136,3	244,1	146,9	2116,1	63,2	0	306,5	185,4	0	166,5	147	-555,1	-126,3	0	0	0	0
2001	9621,1	924,5	621,7	2041,3	5206,7	23	20,7	0,1	1301,4	76	0	133,4	66	0	34,8	199,4	-931,2	-96,7	0	0	0	0
1909	9621,1	550,5	411,7	1204,1	2472,2	139,7	170,8	136,6	2417,3	288,7	14,1	680,9	406,7	0	355,8	372,9	-3,4	0	2,5	0	0	0
1910	9621,1	372,3	305,9	1110,7	3622,7	170,4	194,9	202,1	1969,5	152,8	0	579,5	344,3	0	272,8	312,1	0	0	7,4	3,6	0,1	0
1911	9621,1	330,1	254,9	982,3	4136,7	172,7	254,6	248,3	1852,6	103,5	64	423,5	245,3	0	209,9	370,7	-42,6	-2,9	6,8	8,4	1,9	0,5
1912	9621,1	1019,2	658,4	2096,1	3768,3	27,7	0	0	1802	31,7	0	286,6	171,9	0	93,9	284,6	-578,1	-41,1	0	0	0	0
1913	9621,1	877,2	602,6	1982,4	3556,9	18,3	5,5	0	1874,6	202,8	0	403,7	236	0	109,4	104,9	-285,9	-67,3	0	0	0	0

2008	ENERGY (GWh)	Without project																		
CASE	DEMANDA	TERRA	BAYGORRIA	PALMAR	SALTO	5ATV	6ATV	CTR_L	IMPORT 1	IMPORT 2	IMPORT 3	IMPORT 4	IMPORT 5	IMPORT 6	EXPORT 1	EXPORT 2	FAILURE 1	FAILURE 2	FAILURE 3	FAILURE 4
1914	9621,1	1008,7	643,9	2324,4	5038,8	10	5,5	0	0	519,6	178,7	213,4	304,2	164,8	-675,6	-115,1	0	0	0	0
1915	9621,1	1128,2	727,7	2096,8	4637,7	23,5	30,1	17,7	0	656,1	213,4	233,1	269,3	240,4	-594,9	-58	0	0	0	0
1916	9621,1	212,6	165,1	589,2	3317,5	342,4	421,5	490,2	24,6	1563,2	483,8	680,7	967,8	336,6	0	0	25,5	0,4	0	0
1917	9621,1	81,7	89	444,5	778,1	483,8	783,8	1522,8	184,7	1725,1	516,6	871	1423,6	389,5	0	0	175,4	94	33,9	23,7
1918	9621,1	673,8	487,7	1648,6	3580,6	122,8	177,9	255,8	35,5	1100,7	321,4	456,3	609,9	224,6	-86,2	-29,5	21,9	19,5	0	0
1919	9621,1	722,9	474,3	1668,2	4461,9	96,8	121,3	0,7	0	931,9	304,5	336,6	502,2	287,8	-257,3	-30,8	0	0	0	0
1920	9621,1	810,4	549,3	1746,1	3754,8	42,7	36,8	0	0	1390	423,6	488,8	532,4	0	-19,1	-134,6	0	0	0	0
1921	9621,1	955,9	648,8	2035,1	3216,1	5,2	7,3	0	0	1315,5	398,4	451	515,4	193,5	-88,5	-32,6	0	0	0	0
1922	9621,1	709,6	474,6	1496,2	4517	89,6	65,8	1,7	0	1077,9	345,3	415,3	558,4	109,2	-198,7	-40,6	0	0	0	0
1923	9621,1	551	386,8	1415,1	4629	151,5	211,9	53,9	0	972,1	309,8	352,3	536,4	271,1	-187,8	-31,8	0	0	0	0
1924	9621,1	800,3	562,6	1507,7	2603,4	167,6	169	193,1	0	1516,2	450	535,1	743,9	369,7	0	0	2,4	0,1	0	0
1925	9621,1	748	538,1	1763,1	3350,6	161,3	204,7	153,6	26	1188,3	339,8	450,4	589,3	343,7	-209,8	-25,8	0	0	0	0
1926	9621,1	777,7	525,1	1632,9	3350,4	135,3	166,1	188,3	9,3	1273,5	388	506,5	661,4	181,5	-148,6	-39,7	13,6	0	0	0
1927	9621,1	510,5	406,2	1081,6	2357,8	308,6	330,5	394,5	0	1682,8	511,6	798,8	1187	62,7	0	-11,4	0	0	0	0
1928	9621,1	539	370,2	1158,7	4822,6	68,5	67,3	5	0	1265,2	402	347,4	435,7	142,2	0	-2,9	0,2	0	0	0
1929	9621,1	483,4	367,2	1108,9	3506,6	157,5	197,5	262,1	2,1	1463,6	461,7	550,1	672	388,6	0	0	0	0	0	0
1930	9621,1	911,7	627,8	1974,9	3771,8	39,7	47,3	51,6	0	1253,6	370,3	377,9	446	0	-54	-197,4	0	0	0	0
1931	9621,1	729,7	496,3	1638,9	3204	128,5	111,5	60,8	0	1404,3	432,2	543,6	828,4	42,3	0	0	0,6	0	0	0
1932	9621,1	706,1	468,2	1696,7	4549,1	75,3	179,9	0,1	0	1003,3	305,9	356,6	421,9	134,5	-207,7	-68,7	0	0	0	0
1933	9621,1	359,4	280	909,8	2064,8	421,1	631,6	440,1	59,6	1622,8	497,7	751,7	1186,6	343,2	0	0	52,9	0	0	0
1934	9621,1	451,6	348,7	1258,2	3494,3	96	110	114,4	0	1627,8	496,4	574,4	663,7	385,7	0	0	0	0	0	0
1935	9621,1	303,7	231,8	763,3	3397,2	305,2	390,9	159,6	0	1540,2	495,7	700,1	971,6	360,1	0	0	1,6	0,1	0	0
1936	9621,1	946,7	658,1	2109,3	4301,3	38,4	37,5	16,7	0	826,3	256,8	297,8	375,8	228,2	-416,4	-55,6	0	0	0	0
1937	9621,1	767,1	535,2	1717,9	3193,1	64,2	41,3	9,8	0	1428,3	428	505,6	633,6	402,5	-103,1	-2,8	0,5	0,2	0	0
1938	9621,1	739,7	465,4	1557,6	4068,9	13,7	5,5	0,3	0	1188,2	369,7	402,7	537,3	363,7	-90,6	-1,1	0	0	0	0
1939	9621,1	428,2	333,6	1093,9	4223,7	113,5	121,9	1,6	0	1346,8	430,9	497,7	663,9	369,8	-4,4	0	0	0	0	0
1940	9621,1	955,1	618,4	2232,4	5178,1	17,4	26,4	1,9	0	575	192	139,6	147,7	264,9	-674,1	-53,7	0	0	0	0
1941	9621,1	1047,5	693,6	2060	5089,4	18,9	26,6	13,8	0	610,7	203,7	162,5	135,5	45	-404,4	-81,9	0	0	0	0
1942	9621,1	871,1	607,3	1723,1	3876,4	76	110,3	1,2	0	1142,6	365,1	438,9	600,5	0,1	-31,7	-159,7	0	0	0	0
1943	9621,1	162,9	148,6	444,9	2400,1	415,9	537,3	819,8	40	1679,3	506,5	792,4	1259,3	362,9	0	0	50,2	1	0,2	0
1944	9621,1	97,8	100,1	454,9	1758,8	563,4	720,7	916,7	86	1708,5	513,1	838,2	1374,9	387,8	0	0	73,6	17,4	9,4	0

1945	9621,1	81,8	80,6	336,3	1644,2	448,7	667,1	1158,6	100,1	1712,7	516,6	852,7	1349,7	390,4	0	0	129,6	83,8	49,2	19,1
1946	9621,1	329,6	255,8	1085,9	3967,7	183,7	218,8	164,6	0	1326,4	408,9	598,7	845,4	332,4	-88,5	-15	6,6	0	0	0
1947	9621,1	761,6	526,8	1503,9	3173,4	95,9	57,7	50,5	0	1496,6	450,9	546,1	598,5	359,2	0	0	0	0	0	0
1948	9621,1	770,7	510	1817,2	4268,6	60,3	47,3	0,7	0	1089,2	342	354,9	461,4	162,7	-221,3	-42,5	0	0	0	0
1949	9621,1	844,5	588	1899,7	2627,2	120,7	153,2	15,1	0	1487,7	431,3	542	771,2	256,1	-96,1	-19,4	0	0	0	0
1950	9621,1	744,5	517,4	1819,5	3275,1	161,1	295,6	127,1	0	1184,8	349,4	481,9	692,9	174,3	-160	-43,2	0,8	0	0	0
1951	9621,1	402,6	373,8	1105,6	2535,8	254,6	362,5	705,8	62,9	1571,5	472,4	614,8	835,1	323,1	0	0	0,5	0,1	0	0
1952	9621,1	690,2	479,7	1704,4	3101,7	218,6	289,1	320	16,4	1252,7	385	524,4	785,4	0,1	-62,7	-88,4	4,4	0	0	0
1953	9621,1	535,7	388,4	1602,9	2891	197,8	198,9	142,5	0	1573	479,4	684,7	944,2	7,1	0	-24,3	0	0	0	0
1954	9621,1	687	491,3	1535,7	4319,7	48,1	52,6	11,5	0	1242,7	387,4	427,7	482,3	0	-32,5	-32,3	0	0	0	0
1955	9621,1	671	467,7	1764,5	3550,9	195	180,7	121,9	0	1237,1	376,9	528,6	742,3	0	-121,8	-93,6	0	0	0	0
1956	9621,1	495,1	356,9	1448,3	3311,3	184,9	196,1	91,7	0	1505	441,8	589,4	874,7	211,2	-64,2	-21,1	0	0	0	0
1957	9621,1	454,8	332,2	1213,8	3285,5	241,6	352,7	268,3	0	1355,5	426,2	577,5	828,8	363	-62,8	-15,9	0	0	0	0
1958	9621,1	596,1	420,6	1686,7	3986,4	48,1	47	0	0	1324,5	400,7	426,5	572,5	246,9	-56,4	-78,6	0	0	0	0
1959	9621,1	1118,7	709	2251,8	4515,6	9	10,9	0,6	0	769,4	234,5	252,2	222,2	91,2	-475,9	-88	0	0	0	0
1960	9621,1	819,5	551,4	1711,9	3184,3	221,4	266,5	153,1	0	1132,7	347	566,5	842,9	238,9	-359,5	-76,2	20,8	0	0	0
1961	9621,1	735	525,8	1599,8	4478	44,8	52,4	5	0	1033,1	325,6	343,6	430,2	218,4	-135,2	-35,4	0	0	0	0
1962	9621,1	575,6	473,4	1267,4	2221,8	314,1	348,9	507,7	21,7	1533	473,2	638	889,7	331,2	0	0	8,6	12,9	3,9	0
1963	9621,1	700,4	537,5	1955	3367,6	191,8	237,4	210,9	1,8	1242,2	375,7	474,3	638,8	0	-164,6	-147,8	0	0	0	0
1964	9621,1	709,9	508,9	1488,6	2567,7	171,2	157,4	39,3	0	1515,7	463,6	668,6	953,9	376,3	0	0	0	0	0	0
1965	9621,1	187,9	155,8	713,6	3755,9	278,8	350,8	215,6	0	1559,3	486,2	634,7	929,7	352,5	0	0	0,3	0	0	0
1966	9621,1	923,4	671,5	1808,9	5608,6	41,3	41,8	73,2	16,4	515,7	177	115,4	114,4	197,1	-605,6	-78	0	0	0	0
1967	9621,1	972,2	672,9	1938,9	3769,2	113	117,1	34,3	0	1048,5	305,1	424,9	510,2	144,6	-312,2	-117,6	0	0	0	0
1968	9621,1	511	397,1	1508,9	2304,1	308,4	407,5	108,4	6,8	1635,4	498,1	754,3	1171,7	9,2	0	0	0,2	0	0	0
1969	9621,1	574,6	421	1234,2	3984,7	70,2	33,5	3,6	0	1592,1	479,2	451,8	606,5	169,7	0	0	0	0	0	0
1970	9621,1	579,7	431,4	1708	3706,3	92,6	42,7	89,7	0,2	1330,2	405,2	527,8	789,9	0	0	-82,4	0	0	0	0
1971	9621,1	885,9	564,9	1960,1	4313	89,5	92,4	9,3	0	852,9	283,5	313,3	430,2	58,4	-70,6	-162	0,1	0	0	0
1972	9621,1	623,9	414,4	1524,1	4397,8	228,2	261,6	0,3	0	944	307,1	428,7	652,4	283,3	-390,3	-54,2	0	0	0	0
1973	9621,1	1020,7	658,3	2025,1	5437,2	22	0	18,2	0	466,5	156,5	158,8	246,6	251,5	-756	-84,3	0	0	0	0
1974	9621,1	843,3	574	1898,7	3658,8	16,8	10,3	0	0	1345,2	401,7	384,4	405,1	96	-0,7	-12,5	0	0	0	0
1975	9621,1	478,8	358,1	1307,2	4578,3	26,9	41,3	3,2	0	1394,2	432,4	322,6	378,7	299,4	0	0	0	0	0	0
1976	9621,1	638,7	449,6	1257,9	4083,4	27,5	21	2,6	0	1426,2	462,3	398,8	477,2	376	0	0	0	0	0	0
1977	9621,1	1083,2	695,2	2275,4	4900	13,4	20,5	28,5	11,7	461,7	155,9	140,2	123,8	188,8	-437,8	-39,4	0	0	0	0
1978	9621,1	892,7	587,1	2193	2847,9	45,2	55,5	13,1	0	1254,1	367,1	489,6	552,2	343,2	-19,7	0	0,1	0	0	0
1979	9621,1	473,5	333,8	1093,7	3798,8	145,5	187,5	32,7	0	1332,6	426,1	606,9	876,1	360,4	-44,2	-2,9	0,4	0,2	0	0

1980	9621,1	1009,2	639,6	2211,2	4051,9	13,4	20	26	0	865,4	280,2	275,6	366,8	164,1	-280,4	-21,9	0	0	0	0
1981	9621,1	953	622,4	2156,6	2733,1	13,3	10,1	2,3	0	1355,4	386,6	520,1	520,7	373,7	-21,1	-5	0	0	0	0
1982	9621,1	719,4	487,7	2126	4252,4	55,9	73,6	8,2	0	907,3	289,9	377,4	467,7	261,3	-340,2	-65,6	0,3	0	0	0
1983	9621,1	966,6	584,2	2260,5	4983,4	14,5	22,1	10,6	0	573,5	187,5	163,4	122,4	222,5	-435,3	-54,7	0	0	0	0
1984	9621,1	1074,8	723	2307,5	5079,1	0	0	0	0	498,5	170,3	123	122,5	205,8	-606,7	-76,7	0	0	0	0
1985	9621,1	886,1	583,6	1912,4	4231,7	41,4	50,7	3,2	0	938,7	293,3	340,5	448,3	85,8	-153,5	-41,1	0,1	0	0	0
1986	9621,1	910,8	605,5	2151	4698,3	59,8	100,4	1,5	0	600	202,1	239	338,2	224,8	-425,4	-84,8	0	0	0	0
1987	9621,1	1014,9	619,9	1955,7	4923	10,9	15,5	14,7	0	630,4	199,3	227,9	221,3	234,1	-415,3	-31	0	0	0	0
1988	9621,1	821,6	567,2	1667,4	3041,9	55,9	18	0,8	0	1353,8	414,8	626,9	743,2	356,9	-44,1	-2,9	0	0	0	0
1989	9621,1	175,1	158	431,8	3448,4	278,2	396,5	378,9	12,6	1639,8	512	728,6	1067,2	379	0	0	14,6	0,6	0	0
1990	9621,1	622,1	429,7	1516,4	5267,8	47,1	63	48,7	0	754,3	266,1	275,5	290,2	288,4	-211,2	-37	0	0	0	0
1991	9621,1	865,4	629	1652,1	3109,4	65,5	80,4	39,3	0	1302,6	403,2	534,8	681,5	338	-73,5	-6,6	0	0	0	0
1992	9621,1	981	655,6	1794,4	4916,1	22,1	15,7	3,6	0	665,5	216,8	232,1	302,9	257,3	-400,5	-41,4	0	0	0	0
1993	9621,1	773,1	549	1710,1	4665,6	0	0	0	0	973,2	307	297,5	305,2	311,7	-240,4	-30,9	0	0	0	0
1994	9621,1	986	632,9	1815,7	4739,5	13,5	16,3	0	0	775,7	240,5	232,2	248,1	112,7	-139,3	-52,8	0	0	0	0
1995	9621,1	759	545,2	1545,6	3133,1	93,3	68,5	89,5	0	1464,2	457,6	481,4	637,8	345,8	0	0	0	0	0	0
1996	9621,1	398,7	324,4	851,8	4157,2	166,8	149,8	7,4	0	1513,8	478	575,3	761,3	236,6	0	0	0	0	0	0
1997	9621,1	567,2	416,6	1113,5	4069	27,1	47,5	37,5	0	1512,6	470,3	502,2	550,8	354,8	-45,1	-3	0	0	0	0
1998	9621,1	1068,8	720,5	2126,3	5346,3	10,1	5	0	0	400,5	149,5	144,7	185,9	230,1	-663,3	-103,2	0	0	0	0
1999	9621,1	548,4	411,7	1362,5	3376,3	106,9	64,7	32,2	0	1496	465,7	612,4	835,2	309	0	0	0	0	0	0
2000	9621,1	799,9	539,6	1647,2	3854,4	167,4	280,4	226,8	23,8	1025,4	316,7	395,5	546,7	180,2	-314,7	-69,7	1,1	0,5	0	0
2001	9621,1	953,4	642,4	2099	5234,7	67,2	55,2	31,4	0	542,1	161,2	132	122,8	251	-598,3	-72,9	0	0	0	0
1909	9621,1	530,7	388,3	1168	2472,2	288,1	296,2	155,4	8,2	1698,2	509	701,5	1027,3	375,6	0	0	2,5	0	0	0
1910	9621,1	392,1	306,8	1122	3651,5	175,8	220,5	121,8	0	1566,6	475,6	534,2	702	352,2	0	0	0	0	0	0
1911	9621,1	404,5	296,1	1083,4	4126,1	208	252,9	299	60,3	1200,4	364,4	388,4	566,1	371,1	0	0	0,4	0	0	0
1912	9621,1	1050,3	674,8	2135,8	3793,7	21,4	21,6	0,2	0	935,5	279	343,4	403,9	317,6	-331,5	-24,8	0	0	0	0
1913	9621,1	928,8	618,5	2046,5	3552,9	42,4	35,2	41,7	0	1037,5	315,5	444,1	494,7	185,9	-84,7	-37,9	0	0	0	0

Year	**2008**
Tipo	**Promedio**
Initial year	*2003*
Final year	*2012*
Number of cases	*93*
Generator	**ton CO2 / MWh**
5ATV	0.810
6ATV	0.833
CTR_L	0.888
SALA_B	1.080
Import	0.469
Export	0,469
Project (gas)	0.365
Project (gas oil)	0.493
CO2 (tons)	**182255**
M USD	**0,547**
Demand *GWh*	**9621,1**

Annex 2

Cash Flow

In US$ of the year 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	12.600.000	149.800.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000
Investments	12.600.000	149.800.000	0	0	0	0	0	0	0	0	0
Operation and maintenance costs	0	0	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000
Residual value of the investments											
Benefits											
Cost savings		746.787	7.941.655	13.446.650	16.864.828	19.946.764	20.610.442	21.629.817	21.655.413	21.630.608	21.630.608
Energy costs savings	0	700.000	7.500.000	12.900.000	16.300.000	19.400.000	20.000.000	21.000.000	21.000.000	21.000.000	21.000.000
Net CER sales		46.787	441.655	546.650	564.828	546.764	610.442	629.817	655.413	630.608	630.608
Net benefits	-12.600.000	-149.053.213	4.941.655	10.446.650	13.864.828	16.946.764	17.610.442	18.629.817	18.655.413	18.630.608	18.630.608
Net benefits without sale of CERs	-12.600.000	-149.100.000	4.500.000	9.900.000	13.300.000	16.400.000	17.000.000	18.000.000	18.000.000	18.000.000	18.000.000
Reduced emissions in tons of CO2		15.596	147.218	182.217	188.276	182.255	203.481	209.939	218.471	210.203	210.203

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000
Investments	0	0	0	0	0	0	0	0	0	0	0
Operation and maintenance costs	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000
Residual value of the investments											0
Benefits											
Cost savings	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608	21.630.608
Energy costs savings	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000	21.000.000
Net CER sales	630.608	630.608	630.608	630.608	630.608	630.608	630.608	630.608	630.608	630.608	630.608
Net benefits	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608	18.630.608
Net benefits without sale of CERs	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000	18.000.000
Reduced emissions in tons of CO2	210.203	210.203	210.203	210.203	210.203	210.203	210.203	210.203	210.203	210.203	210.203

NPV (12%) of the net benefits without CERs US$	**-46.609.357**
FIRR of the net benefits without CERs	**7%**
NPV (12%) of the net benefits incl. CERs US$	**-42.662.294**
FIRR of the net benefits without CERs	**8%**

Price of CER without transaction costs: 3 US$/Ton CO2 equivalent

VI. Montevideo Landfill Gas Collection and Upgrade to Pipeline Quality Natural Gas

1. Executive Summary

The Municipality of Montevideo (IMM, Intendencia Municipal de Montevideo) currently disposes an average of 1500 tons/day of municipal solid wastes (MSW) in its own operated landfill site. The size of the landfill and type of refuse received makes this site a good candidate for a landfill gas (LFG) recovery system. The main objective of this project is to collect the LFG and upgrade it to pipeline quality natural gas in order to sell it to Gaseba, the private owner of the natural gas distribution network. The total investment for the project is about US $ 5,760,000, which includes the LFG collection, cleanup and enrichment systems, as well as connection to the network. The facility will produce an average of 30,7 millions Nm³/year of pipeline quality gas (min. 96% CH_4), equivalent to 1,042,000 MMBtu/year.

The baseline scenario is configured by legal constraints and current IMM's landfill management practices. Since no national nor local regulations regarding mandatory LFG capture are expected in the near future, sanitary landfilling with methane venting will be likely applied. CDM approved LFG generation models are used to predict methane emissions for baseline and project conditions.

Since already US $ 3,5: have been invested in landfill bottom liners, it is assumed that disposal of MSW in this landfill will continue in the future at similar rates, even when this should be previously confirmed by the Solid Waste Management Director Plan for the Metropolitan Area of Montevideo. In any case, the results of the Director Plan will be known in the next months.

The project is both profitable and technically feasible: NPV is US $ 3.4 millions if CERs incomes are included, and LFG enrichment through carbon dioxide removal is a well-proven technology. However, without including the sale of CERs, NPV has a negative amout of US $ -4 millions.

An investor must be located who is willing to take an ownership position in the landfill gas energy project, providing a private equity financing. This will be done through an international open tender bidding process. For the economical analysis, a downpayment of US $ 1.2 millions (20% of the initial investment) was assumed.

The project will roughly reduce emissions of 6,695,731 tons of CO2e during project lifetime (334,787 tons/year), with a marginal cost of US$ 2.14 for ton of CO2e.

Besides CO2 equivalent GHG emissions reduction through methane combustion, the substitution of a natural gas by a renewable fuel contributes to the reduction of GHG emissions. The project will also have a positive local environmental impact through the control of non-methane organic compounds (NMOCs), odour nuisance and flammable gas migration.

Methane content of high-BTU gas produced in the landfill will be continuosly monitored in order to assure the stringent specifications required for pipeline quality gas. Therefore, implementing a CER monitoring plan could be a relatively straightforward process, and will be made according to accepted procedures for CDM projects.

The main risks for investors are linked to the evolution of the natural gas price, the CERs price and transaction costs. The technological risks are: unachievable LFG production estimates, lack of experience of the LFG project developer and inefficient operation of the LFG recovery system.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The project consists of the gas extraction from the Montevideo new landfill area, its processing to pipeline quality high-BTU gas, and its injection into the natural gas distribution network. This approach requires close cooperation with the private natural gas distributor, to whom the enriched LFG will be sold.

With 0.3% of total country's land area, the Department of Montevideo is the smallest of the 19 political – administrative division unities in which Uruguay is divided. However, it holds about 40% of the total country's population. The IMM currently disposes in its own operated landfill an average of 1500 tons/day of MSW generated by the Department's 1.4 millions inhabitants. The size of the landfill, the largest of the country, and type of refuse received makes this site a good candidate for a LFG recovery system.

The landfill operated by the IMM is located in a 71 hectare site in the limits of Montevideo's urban area. Since 1989, domestic solid wastes, street sweepings, park wastes, demolition debris and some industrial wastes have been landfilled here in a controlled way. This should be understood as a landfill with frequent capping of the wastes, compacted low permability clay as bottom, and groundwater monitoring wells. The controlled landfill area of 29.5 hectares and 30+ meters high is about to be closed. Therefore, the IMM has already started disposing MSW in the new projected 40 hectare sanitary landfill. This new disposal area will have improved groundwater protection through leachate collection & treatment system and geo-membrane bottom liner, in which IMM has already invested US $ 3.5 millions. However, only passive venting rather than a LFG collection system has been projected.

The proposed GHG emission reduction project includes the following stages:

- LFG extraction system, including wells, well heads, piping, condensate collection and knockout, blowers and monitoring station.
- Flare stage in order to allow safe NMOCs thermal destruction and methane and combustion during emergency shut-downs
- Compression and gas enrichment stage
- Compression and pipeline to inject in natural gas network

3. Proposed baseline methodology

The baseline scenario is configured by legal constraints and current IMM's landfill management practices. Since no national nor local regulations regarding mandatory LFG capture are expected in the near future, sanitary landfilling with methane venting will be applied in a "bussiness-as-usual" scenario.

In order to estimate the methane emissions from solid wastes disposal sites, the IPCC Guidelines for National GHG Inventories Reference Manual encourages to apply the more complex derivative of the first order decay model rather than the default method, if there is sufficient data to do so. Therefore, the US EPA's Landfill Gas Emissions Model software, which employs a first-order equation, was used for both baseline and project conditions. Sources of

uncertainty are those considered in § 6.2.5 of the above mentioned manual. Main assumptions for the input data were the following:

MSW composition: domestic solid wastes (DSW) composition based on IMM's latest survey (1996); other fractions weights (street sweepings, demolition debris, garden and park wastes) based on IMM's 2001 data.

MSW quantity: based on IMM latest months average data. A conservative approach was taken, since projected annual MSW generation is considered constant and set in the low present value. Due to the recent country's strong economic recession, in few months the MSW generation dropped about 20%. Even when this may be a reversible process, this possiblity was not considered. In the same way, the local population growth incidence (2.4‰/year) was discarded, as it is not significant compared with economic factors.

First order decay model parameters: methane generation rate constant was based on results from local University (UdelaR) small-scale and field tests in the IMM landfill, supported by a pumping trial in another municipal landfill with similar MSW. The methane generation potential was estimated using the assumed MSW composition and the IPCC default method, with the Bingemer & Crutzen degradable organic carbon fractions (DOCs) values.

LFG composition: typical LFG composition with 50% of CH4 and 40% of CO2 was assumed. Limited data from the IMM landfill proves this estimation to be reasonable.

4. Technical Assessment

Electrical generation is the most usual worldwide landfill gas recovery application. However, local and regional fluctuating conditions of the electricity market determine higher levels of uncertainty for this option. Pipeline quality gas projects are generally in the 5 to 10 mmscfd (inlet flow) size range. This condition is met by the project, since the estimated average LFG flow during its life is 5.6 mmscfd. Another critical factor for the success of a LFG recovery system is the total amount of MSW in place at the beginning of the project. Since at least 2 million tons is required by LFG developers, project should start not before than 2004 to have enough refuse quantities in place and final cover to provide sufficient recoverable LFG. Actual IMM's landfill design is planned for a refuse depth of 100 ft, in compliance with the minimum 40 ft reccomended for LFG recovery.

Typical pipeline quality gas specifications require a minimun of 970 Btu/scf, to be free of environmental unacceptable substances, and must be pressurized to the pressure of the pipeline to which the gas production facility is interconnected.

The following steps must be taken to convert LFG to pipeline quality gas:

- Prevention of air infiltration into the LFG well field;
- Moisture removal;
- Sulfur removal;
- NMOC removal; and
- Carbon dioxide removal.

The removal of CO2 is the principal step taken to increase energy content. The prevention of air infiltration into the well field is also a critical step to satisfy tight gas specifications, since removing air from LFG is widely viewed as being prohibitively expensive. Carbon dioxide can be removed from LFG using three well-proven technologies: the membrane process, the molecular sieve or pressure swing adsorption (PSA), and solvent absorption. Even when all three are reliable, the latter requires a complex chemical plant and to purchase propietary liquids, and membrane process is expensive. Therefore, PSA was the choosen technology.

The IMM's MSW landfill is not only the largest one in Uruguay, but it is also one of the few in the region which has a leachate collection system and a bottom liner, which is on top of an already low permeability clay. This means that the potential investor in the LFG collection system will be less likely involved in claims regarding the environmental performance of the landfill. Even when those claims may not be the investor responsibility, they may influence his business. Furthermore, a well designed leachate system can help to control high liquid levels in the landfill, a problem that can reduce the effectiveness of extracting LFG from vertical wells. The liner may allow the safe recirculation of leachate to the landfill, something that may be used to enhance the gas production.

Power generation for connection to the grid was also considered among the alternatives. However, present low electricity prices resulted in a negative assessment. At this moment, the National Administration of Electricity Generation and Transport (UTE) will not pay more than what is being paid to Argentina when there is shortage of hydro power. Moreover, UTE plans to install a 360 MW power plant fueled with natural gas. Therefore, besides the drawback of electricity low prices, negotiations with UTE will be likely more complex than with the gas distribution company.

There is also the alternative to sell electricity to large consumers at better prices than would be get from UTE. However, there are still taxes to be paid to UTE for the use of transmission lines, and one or several large consumers with long-term reliability should be found with a steady demand of about 9 MW for the IMM landfill.

At least in one case (Montech, France), a landfill producing upgraded biogas was not authorised to inject to the natural gas grid because of possible contamination with NMOCs. This stresses the importance of strict quality controls on the gas produced. In the IMC landfill, where only medium Btu LFG will be produced, quality considerations may restrict the injection to the natural gas grid. If no upgrading of CO2 takes place, only a volume fraction of 8% of biogas (65% methane) can be present in the mixture with natural gas in order to have an acceptable Wobbe index.

Uncertainties regarding changes in the municipal government can be reduced with clear and proper contract terms with the bidder.

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs has a negative amount of US $4.2 millions; if CERs incomes are included, it reaches a positive value of US $ 3.4 millions. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of US $ 7,5 millions, which represents 49% of the total benefits.

The Financial Internal Rate of Return is 21% including the sale of CERs.

These results depend of the level of the CERs prices. The investments and the costs of operation and maintenance are high, and the price of the natural gas is low.

An investor must be located who is willing to take an ownership position in the landfill gas energy project, providing a private equity financing. This will be done through an international open tender bidding process. For the economical analysis, a downpayment of US $ 1.2 millions (20% of the initial investment) was assumed.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The estimated average annual CO2e emissions reduction is **334,787** ton/year, ranging from **181,274** to **489,408** ton/year.

Before 1008 estimated reduction potential is **1,051,844** ton CO2e, while during the 2008-2012 period is **2,068,417** ton CO2e. The project will reduce emissions of **6,695,731** ton CO2e during project lifetime.

See detailed information in Annex 1 and Annex 2.

7. Estimated lifetime and crediting period for project

Project will have duration of 20 years after LFG collection and processing starts. Carbon credits will be produced over the same period.

Current status: 20 hectares of the bottom area of the landfill have been lined with geo-membranes. About 100,000 tons of MWS have been already disposed in this area.

The project will start its complete activities not before than 2004.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of this project reaches US $2,14 for ton of equivalent CO2; this value is low and its level is similar to the CERs prices.

9. Documentation on environmental impacts

Besides CO2 equivalent emissions reduction through methane combustion, the substitution of a fossil fuel by a renewable one contributes to the reduction of GHG emissions. The project will also have a positive local environmental impact through the control of flammable gas migration and NMOCs emissions, which can cause other local and global environmental effects such as odour nuisances, stratospheric ozone layer depletion, and ground-level ozone creation. Other main landfill environmental aspects (i.e.: groundwater contamination) are already considered in the baseline scenario.

Jobs will be created on the landfill site to operate the LFG collection and proccessing units, and will be covered by local staff. Local staff will be trained on various fields to guarantee proper operation of the system.

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

10. Monitoring plan

Methane content of high-BTU gas produced in the landfill will be continuosly monitored in order to assure the stringent specifications required for pipeline quality gas. Therefore, implementing a CER monitoring plan could be a relatively straightforward process, and will be made according to accepted procedures for CDM projects.

11. Estimated investor risk

The main risks of this project for the external investor are:

- Changes in the prices of natural gas, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.).
- The natural gas price paid by Gaseba.
- The CERs prices and transaction costs, because of its importance in the project's revenues.
- Unachievable LFG production estimates. Lack of sufficient quantities of LFG is the most common impediment to successful projects. Hence, conservative values have been used for the estimation. Uncertainties of mehtane generation models are considered in § 6.2.5 of the IPCC Guidelines for National GHG Inventories Reference Manual
- Lack of experience of the LFG generator. In order to reduce this risk, proven technology has been choosen. Entering a partnering relationship with a developer with proven track record should be considered.
- Poor operation and maintenance of wellfield, landfill lecheate collection and final cover systems. Training of landfill operations personnel and material resources are needed to limit this problem.

12. Potential reproduction

LFG recovery systems to produce High-Btu pipeline quality gas have been usually limited to relatively large landfills due to the high capital and operating costs required. Therefore, being most landfills in the country small sized, potential for reproduction may not be extensive. However, continuous technological developments are being made to render the gas enrichment process economical for relatively small gas flows. In any case, experience gained with LFG recovery systems can be transferred to other commercial uses of LFG, as electrical generation, direct use as boiler fuel, space heating, or even just for gas flaring.

13. Technical summary of the technology used

a) LFG collection and flaring system

Includes vertical wells and wellheads, blowers, blower station condensation knockout, monitoring system, pipelines and enclosed flare.

Total investment: US $ 2,463,743

b) LFG cleanup and enrichment system

Includes compression for the process, gas drying and filtering, hydrogen sulfide and NMOCs removal units and pressure swing adsorption process.

Total investment: US $ 2,260,354

c) Compression and external pipeline connection to natural gas network

Total investment: US $ 995,650

TOTAL INVESTMENT: US $ 5,719,748

According to US EPA database, seven landfills in USA are operational producing High-Btu pipeline gas from LFG, while four are under construction. From all these landfills, at least one is using PSA technology[a] . Several biogas upgrading plants are operational in Europe, either in landfills or in sewage plants, and using the upgraded gas as vehicle fuel or as pipeline gas. Specifically, there are four locations in The Netherlands[b] and where LFG is upgraded with PSA and added to the natural gas grid.

a. Rumpke SLF Inc., Cincinnati (OH): Input: 9 million scf/d LFG / output: 4.5 million scf/d pipeline gas

b. Nuenen 3000 m³/h, Wijster 4000 m³/h, Vasse 300 m³/h and Wolvega 1800 m³/h

14. Contextual information including:

Assessment of project sustainability

As stated above, the project will have positive environmental and socioeconomic impacts, besides climate change mitigation. It is an opportunity to promote best practices to improve landfill management standards, and contribute towards global sustainable development.

Local viability

The 2000 GEF “Uruguay Landfill Methane Recovery Demostration Project” UY-GM-58303 implemented by World Bank has created the basis of local capacity for properly managing a LFG recovery project. Even when in this case the recovered LFG will be used for producing high-Btu pipeline gas rather than for generating elictricity, there is a good level of technical competence on which the project can be build the experience, provided some training in LFG purification and enrichment technology is given to the developers.

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM

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Annex 1: i

GHG emmissions calculations

US EPA E-PLUS (**E**nergy **P**roject **L**andfill **G**as **U**tilization **S**oftware) was used for the GHG emissions calculations. E-PLUS is a decision support system designed to analyze the opportunities for installation of a gas recovery system in landfills. The selected methane production estimate method in E-PLUS was the IPCC aproved[1] First Order Decay Model:

$$Q^T = 3\ Q^{T,x} \quad \text{for x = initial year to T}$$

$$Q^{T,x} = L_O\ R_x\ e^{-k\ (T\ -\ x)}$$

where:

Q^T	=	total methane generated to the year (T) by the waste Rx
$Q^{T,x}$	=	methane generated in current year (T) by the waste Rx
L_O	=	methane generation potential (m^3/Mg of refuse)
R_x	=	the amount of waste disposed in year x (Mg)
k	=	methane generation rate constant (1/yr)
x	=	the year of waste input
T	=	current year

Based on previous studies[2, 3] the adopted value for k was 0.20 1/yr. L_O was calculated with IMM's MSW composition data and IPCC's default degradable organic carbon (DOCs) factors for major waste streams, resulting in 1.310 cf/lb CH_4 or 82 m^3/Mg CH_4. This is a conservative value, since L_O values may range from less than 100 to over 200 m^3/Mg.

Modern LFG recovery systems can reach collection efficencies of more than 85%, so a 70% value was adopted as an achievable goal.

The amount of waste disposed by year was assumed to be fixed in 1500 Mg/day, wich is a conservative approach according to considerations discussed for baseline methodology.

1. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual - Methodologies to estimate methane emissions from solid waste disposal sites

2. Borzacconi, L.; López, I.; Gazzola, A.; Anido, A. (1998). Estimación de la producción de biogás en un relleno sanitario.

3. Horta, M. (1999) Proyecto demostrativo de recuperación y aprovechamiento energético del biogás de un relleno sanitario. Descripción de las actividades de campo. Unidad de Cambio Climático

Annex 1: ii

Emission Reductions in 1000 Mg/year				
Year	**CH_4 reduction**	**CO_2 equivalent reduction**	**CO_2 avoided by gas sale**	**Total CO_2e Reduction**
2004	7,68	161,32	19,96	181,27
2005	10,28	215,86	27,22	243,08
2006	12,41	260,53	32,66	293,19
2007	14,15	297,10	37,19	334,30
2008	15,58	327,05	40,82	367,87
2009	16,74	351,56	43,54	395,11
2010	17,70	371,63	46,27	417,89
2011	18,48	388,06	48,08	436,14
2012	19,12	401,51	49,90	451,41
2013	19,64	412,52	51,71	464,23
2014	20,08	421,54	52,62	474,16
2015	20,42	428,93	53,52	482,45
2016	20,71	434,98	54,43	489,41
2017	16,96	356,12	44,45	400,58
2018	13,88	291,57	36,29	327,86
2019	11,37	238,72	29,94	268,65
2020	9,31	195,44	24,49	219,94
2021	7,62	160,02	19,96	179,98
2022	6,24	131,02	16,33	147,34
2023	5,11	107,27	13,61	120,87
TOTAL	**283**	**5953**	**743**	**6696**
Average	**14,2**	**297,6**	**37,1**	**334,8**

Methane emission reduction (1000 tons/yr) = Methane generated (mmcf/yr) x Collection efficiency x 21.12 tons/mmcf x 21 ton CO_2/ton CH_4 x 1/1000

CO_2 equivalent of Methane emission reduction (1000 tons/yr) = methane emission reduction (mmcf/y) x 21.12 tons/mmcf x 21 ton CO_2/ton CH_4 x 1/1000

CO_2 equivalent avoided by gas sale (1000 tons/yr) = methane sold (mmcf/yr) x 21.12 tons/mmcf x 44/16 (CO_2/CH_4)

1 ton = 0.9072 Mg

1 mmcf = 28,32 1000 m^3

Annex 2

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	5.719.748	398.501	489.307	563.653	624.522	674.358	715.159	748.565	775.915	798.308
Investments	5.719.748	0	0	0	0	0	0	0	0	0
Operation and Maintenance	0	398.501	489.307	563.653	624.522	674.358	715.159	748.565	775.915	798.308
Residual value of the investments										
Benefits		1.115.135	1.493.771	1.802.301	2.055.132	2.261.896	2.430.415	2.569.861	2.682.787	2.776.237
Natural gas sales	0	571.314	764.530	922.722	1.052.239	1.158.279	1.245.096	1.316.177	1.374.372	1.422.019
Net CER sales	0	543.821	729.240	879.579	1.002.893	1.103.617	1.185.319	1.253.684	1.308.414	1.354.218
Net benefits	-5.719.748	716.634	1.004.463	1.238.649	1.430.610	1.587.539	1.715.255	1.821.296	1.906.871	1.977.929
Net benefits without sale of CERs	-5.719.748	172.813	275.223	359.069	427.717	483.921	529.937	567.612	598.457	623.711
Reduced emissions in tons of CO2		181.274	243.080	293.193	334.298	367.872	395.106	417.895	436.138	451.406

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	816.641	6.551.399	843.941	854.002	722.763	615.313	527.341	455.315	396.346	348.065	308.537
Investments	0	5.719.748	0	0	0	0	0	0	0	0	0
Operation and Maintenance	816.641	831.652	843.941	854.002	722.763	615.313	527.341	455.315	396.346	348.065	308.537
Residual value of the investments											0
Benefits	2.853.730	2.915.442	2.966.466	3.008.749	2.463.005	2.016.215	1.651.419	1.352.016	1.106.657	906.032	742.509
Natural gas sales	1.461.029	1.492.967	1.519.116	1.540.525	1.261.275	1.032.645	845.458	692.203	566.728	463.997	379.889
Net CER sales	1.392.701	1.422.475	1.447.350	1.468.224	1.201.729	983.570	805.961	659.814	539.929	442.035	362.620
Net benefits	2.037.088	-3.635.957	2.122.525	2.154.747	1.740.242	1.400.901	1.124.078	896.701	710.311	557.967	433.972
Net benefits without sale of CERs	644.387	-5.058.432	675.175	686.523	538.512	417.332	318.117	236.887	170.382	115.932	71.352
Reduced emissions in tons of CO2	464.234	474.158	482.450	489.408	400.576	327.857	268.654	219.938	179.976	147.345	120.873

NPV (12%) of the net benefits without CERs US$	**-4.152.417**
NPV (12%) of the net benefits incl. CERs US$	**3.366.148**
FIRR of the net benefits included CERs	**21%**

Price of CER without transaction costs: 3 US$/T CO2eq

VII. Canelones *Cañada Grande II* Landfill Gas Collection

1. Executive Summary

The Municipality of Canelones (IMC, Intendencia Municipal de Canelones) has two landfills sites in operation, Cañada Grande II and Cañada Marita II, where it currently disposes an average of 220 and 95 tons/day of municipal solid wastes (MSW), respectively. The relatively small size of these landfill preclude the implementation of some landfill gas (LFG) to energy options. The main objective of this project is to collect the Cañada Grande II LFG and either sell it to nearby consumers as Medium Btu gas or inject it in the natural gas network. According to the natural gas network distributor, some fraction of biogas may be injected in the grid, as long as the Wobbe index (MJ/m³) of the mixture is acceptable. The total investment for the Medium Btu project is about US $ 1,455,000, which includes the LFG collection, cleanup and compression through a 5 km pipeline. The facility could produce an average of 9,15 millions Nm³/year of Medium Btu gas, equivalent to 136,500 MMBtu/year.

The baseline scenario is configured by legal constraints and current IMC's landfill management practices. Since no national nor local regulations regarding mandatory LFG capture are expected in the near future, landfilling with methane venting will be likely applied. CDM approved LFG generation models are used to predict methane emissions for baseline and project conditions. It is assumed that disposal of MSW in Cañada Grande II will continue in the future at similar rates. However, this assumption should be previously confirmed by the Solid Waste Management Director Plan for the Metropolitan Area of Montevideo, which will be known in the next months.

Medium Btu gas production is the most simple LFG utilization technology, and has been succesfully proven in many countries all around the world. For this LFG direct use project, NPV is US $ 135,000 if CERs incomes are included, However, without including the sale of CERs, NPV has a negative amout of US $ -1.1 millions.

An investor must be located who is willing to take an ownership position in the landfill gas energy project, providing a private equity financing. This will be done through an international open tender bidding process. For the economical analysis, a downpayment of US $ 0.5 millions (65% of the initial investment) was assumed.

The project will roughly reduce emissions of 1,064,000 tons of CO2e during project lifetime (54,000 tons/year), with a marginal cost of US$ 3.43 for ton of CO2e.

Besides CO2 equivalent GHG emissions reduction through methane conversion to CO2, the substitution of natural gas by a renewable fuel also contributes to the reduction of GHG emissions. The project will also have a positive local environmental impact through the control of non-methane organic compounds (NMOCs), odour nuisance and flammable gas migration.

Since the price of the Medium Btu gas is function of its methane content, it should be continuosly monitored if gas produced is intended to be sold. Therefore, in this case implementing a CER monitoring plan could be a relatively straightforward process, and will be made according to accepted procedures for CDM projects

The main risks for investors are linked to the evolution of the natural gas price, the CERs price and transaction costs. The technological risks are: unachievable LFG production estimates, lack of experience of the LFG project developer and inefficient operation of the LFG recovery system.

The project is well suited to local conditions and is fully compatible with CDM. There are no restrictions in terms of human or physical resources needed for this project.

2. Project description

The project consists of the gas collection from the Cañada Grande II landfill site for direct use of Medium Btu gas or its partial injection in the natural gas grid. Some gas cleanup is required, which will depend of the end user's fuel specification. LFG will be distributed by a dedicated pipeline direct to the gas user and / or to the natural gas grid. The end user may need to modify its piping and fuel burning equipment to accomodate LFG firing.

With a population of about 480.000 Canelones is, after Montevideo, Uruguay's second most populated department (each of the 19 political administrative division unities in which Uruguay is divided). It also has one of the regions with highest population growing rate of Latinamerica. This region belongs to the metropolitan area of Montevideo, and easily duplicates its population during the summer vacation months. Although the IMC had several uncontrolled dumps in the past (up to 13 in 1985), since last year there are only two controlled landfills for the whole department: Cañada Grande II and Cañada Marita II. The first one receives in summer months 290 tons/day and 190 tons/day during the rest of the year, while the latter receives an average of 95 tons/day. Another 60 tons/day are transferred to Montevideo's municipal landfill. Due to its smaller capacity and to the fact that it will be closed in about 5 years, Marita II landfill was not considered for this project.

Cañada Grande II landfill is located in a 64 hectare site, about 40 km from Montevideo's center. MSWs disposal begun in this landfill in 1999, short time after the closure of Cañada Grande I, which is located 500 m away from the former. About 250,000 tons of MSWs have been already disposed in the new landfill. Although frequent capping of the wastes is applied, some environmental issues remain unsolved, such as proper groundwater protection. Likewise, only passive venting rather than a LFG collection system has been projected.

The proposed GHG emission reduction project includes the following stages:

- LFG extraction system, including wells, well heads, piping, condensate collection and knockout, blowers and monitoring station;
- Cleanup stage to reach the specifications of the end user(s)
- Flare stage in order to allow safe NMOCs thermal destruction and methane combustion of excess gas;
- Compression and pipeline delivery to end user.

3. Proposed baseline methodology

The baseline scenario is configured by legal constraints and current IMM's landfill management practices. Since no national nor local regulations regarding mandatory LFG capture are expected in the near future, sanitary landfilling with methane venting will be applied in a "bussiness-as-usual" scenario.

In order to estimate the methane emissions from solid wastes disposal sites, the IPCC Guidelines for National GHG Inventories Reference Manual encourages to apply the more complex derivative of the first order decay model rather than the default method, if there is sufficient data to do so. Therefore, the US EPA's Landfill Gas Emissions Model software, which employs a first-order equation, was used for both baseline and project conditions. Sources of uncertainty are those considered in § 6.2.5 of the above mentioned manual. Main assumptions for the input data were the following:

MSW composition: It is assumed to have the same composition of Montevideo's MSW: domestic solid wastes (DSW) composition based on IMM's latest survey (1996); other fractions weights (street sweepings, demolition debris, garden and park wastes) based on IMM's 2001 data. This assumption may be conservative, since Canelones is expected to have more garden & park wastes than Montevideo.

MSW quantity: based on IMC latest months average data. A conservative approach was taken, since projected annual MSW generation is considered constant and set in the low present value. Due to the recent country's strong economic recession, in few months the MSW generation dropped about 20%. This may be a reversible process. However, this possiblity was not considered. In the same way, the local population growth incidence was discarded, as it is not significant compared with economic factors, even when it is the fastest growing area of Uruguay.

First order decay model parameters: methane generation rate constant was based on results from local University (UdelaR) small-scale and field tests in the IMM landfill, supported by a pumping trial in another municipal landfill with similar MSW. The methane generation potential was estimated using the assumed MSW composition and the IPCC default method, with the Bingemer & Crutzen degradable organic carbon fractions (DOCs) values.

LFG composition: typical LFG composition with 50% of CH4 and 40% of CO2 was assumed. Limited data from the IMM landfill proves this estimation to be reasonable and suitable for Canelones.

4. Technical Assessment

Electrical generation is the most usual worldwide landfill gas to energy recovery application. However, local and regional fluctuating conditions of the electricity market determine higher levels of uncertainty for this option. On the other hand, pipeline quality gas projects are generally in the 5 to 10 mmscfd (inlet flow) size range, something which is not met by this project. Furthermore, preliminary economical assesment showed that this option is not acceptable. Regarding the total amount of MSW in place, this is below the usual requirements of LFG developers, but it is still feasible to recover LFG. Actual landfill refuse depth is 15 m, in compliance with the minimum reccomended for LFG recovery.

The specifications for the gas vary by the end user(s), and typically include the following:

- Minimum heating value (400 Btu/scf or higher);
- Delivery pressure, minimum temperature;
- Sulfur limits; and
- Maximum water content (a dry gas is desired)

Ideally, the user will be a single customer with a large demand, preferably 24 hours/day, 7 days/week year-round operation. Otherwise, excess gas not used must be destroyed by flaring. Additionally, the user must be nearby: less than 2 to 5 km is considered desirable. For this project, a 5 km connection pipeline was included.

If the end users' fuel specification is particularly demanding (i.e.: households), then hydrogen sulfide and / or NMOCs removal can be added to the treatment process; however, the addition of such steps is unusual. For safety reasons only minor variations of the Wobbe

index (MJ/Nm³) can be accepted when supplying households. Therefore, backup from natural gas or propane/butane is recommended.

5. Economical Assessment

The NPV of the net benefits without the sale of the CERs has a negative amount of **US $1.1 millions**; if CERs incomes are included, it reaches a positive value of **US $ 135 thousands**. The utilized discount rate is 12% yearly.

The sale of CERs generates an up-to-date income of **US $ 1.2 millions**, which represents 49% of the total benefits.

The Financial Internal Rate of Return is **14%** including the sale of CERs.

These results depend of the level of the CERs prices. The investments and the costs of operation and maintenance are high, and the price of the natural gas is low.

An investor must be located who is willing to take an ownership position in the landfill gas energy project, providing a private equity financing. This will be done through an international open tender bidding process. For the economical analysis, a downpayment of US $ 0.5 millions (65% of the initial investment) was assumed.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The estimated average annual CO2e emissions reduction is **53,197** ton/year.

Before 1008 estimated reduction potential is **190,618** ton CO2e, while during the 2008-2012 period is **359,844** ton CO2e. The project will reduce emissions of **1,063,937** ton CO2e during project lifetime.

See detailed information in Annex 1 and Annex 2.

7. Estimated lifetime and crediting period for project

Project will have duration of 20 years after LFG collection and processing starts. Carbon credits will be produced over the same period.

Current status: About 250,000 tons of MWS have been already disposed in this area.

The project will start its complete activities not before than 2004.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of this project reaches **US $3.43 for ton** of equivalent CO2; this value is low and its level is similar to the CER prices.

9. Documentation on environmental impacts

Besides CO2 equivalent emissions reduction through methane combustion, the substitution of a fossil fuel by a renewable one contributes to the reduction of GHG emissions. The project will also have a positive local environmental impact through the control of flammable gas migration and NMOCs emissions, which can cause other local and global environmental effects such as odour nuisances, stratospheric ozone layer depletion, and ground-level

ozone creation. Other main landfill environmental aspects (i.e.: groundwater contamination) are already considered in the baseline scenario.

Jobs will be created on the landfill site to operate the LFG collection and proccessing units, and will be covered by local staff. Local staff will be trained on various fields to guarantee proper operation of the system.

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with potential environmental and socioeconomic impacts.

10. Monitoring plan

Methane content of Medium Btu gas produced in the landfill will be continuosly monitored in order to assure the stringent specifications required for pipeline quality gas. Therefore, implementing a CER monitoring plan could be a relatively straightforward process, and will be made according to accepted procedures for CDM projects.

11. Estimated investor risk

The main risks of this project for the external investor are:

- Changes in the prices of natural gas, because of modifications in the regulatory systems of energy (relative prices, supply, differential taxes, etc.).
- The natural gas price payed by Gaseba.
- The CERs prices and transaction costs, because of its importance in the project's revenues.
- Unachievable LFG production estimates. Lack of sufficient quantities of LFG is the most common impediment to successful projects. Hence, conservative values have been used for the estimation. Uncertainties of mehtane generation models are considered in § 6.2.5 of the IPCC Guidelines for National GHG Inventories Reference Manual
- Lack of experience of the LFG generator. In order to reduce this risk, proven technology has been choosen. Entering a partnering relationship with a developer with proven track record should be considered.
- Poor operation and maintenance of wellfield, landfill lecheate collection and final cover systems. Groundwater pollution protection and landfill leachate collection are critical issues for this landfill. Training of landfill operations personnel and material resources are needed to limit this problem.
- Uncertainties about potential end users future gas demand. The developer must evaluate the reliability of customers as long-term LFG purchasers (10+ years).

12. Potential reproduction

LFG recovery systems to produce medium-Btu gas could be reproduced in several landfills of Uruguay, as long as there is an identification of a fairly large, year round user of fossil fuel which is not too distant from the landfill.

13. Technical summary of the technology used

a) LFG collection and flaring system

Includes vertical wells and wellheads, blowers, blower station condensation knockout, monitoring system, pipelines and enclosed flare.

Total investment: US $ 638,386

b) LFG cleanup system

Includes gas drying and filtering; hydrogen sulfide and NMOCs removal units may be needed

Total investment: US $ 240,753

c) Compression and external pipeline connection to potential user

Total investment: US $ 574,000

TOTAL INVESTMENT: US $ 1,453,140

Medium-Btu gas has been successfully used at more than 50 locations in the United States. The applications include:

- Firing in commercial, institutional and industrial boilers at colleges, hospitals, and several type of industries;
- Firing in industrial furnaces, including cement kilns, aggregate dryers, ovens and waste incinerators; and
- Firing in conventional electric power plants with coal or natural gas

14. Contextual information including:

Assessment of project sustainability

As stated above, the project will have positive environmental and socioeconomic impacts, besides climate change mitigation. It is an opportunity to promote best practices to improve landfill management standards, and contribute towards global sustainable development.

Local viability

The 2000 GEF “Uruguay Landfill Methane Recovery Demostration Project” UY-GM-58303 implemented by World Bank has created the basis of local capacity for properly managing a LFG recovery project. In this case the recovered LFG will be used for producing medium-Btu gas rather than for generating elictricity, but the application may be simpler. Furthermore, there is a good level of technical competence on which the project can be build the experience.

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM

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Annex 1: i

GHG emmissions calculations

US EPA E-PLUS (**E**nergy **P**roject **L**andfill **G**as **U**tilization **S**oftware) was used for the GHG emissions calculations. E-PLUS is a decision support system designed to analyze the opportunities for installation of a gas recovery system in landfills. The selected methane production estimate method in E-PLUS was the IPCC aproved[1] First Order Decay Model:

$$Q^T = 3\ Q^{T,x} \quad \text{for x = initial year to T}$$

$$Q^{T,x} = L_O\ R_x\ e^{-k\ (T\ -\ x)}$$

where:

Q^T	=	total methane generated to the year (T) by the waste Rx
$Q^{T,x}$	=	methane generated in current year (T) by the waste Rx
L_O	=	methane generation potential (m^3/Mg of refuse)
R_x	=	the amount of waste disposed in year x (Mg)
k	=	methane generation rate constant (1/yr)
x	=	the year of waste input
T	=	current year

Based on previous studies[2, 3] the adopted value for k was 0.20 1/yr. L_O was calculated with Montevideo's municipality MSW composition data and IPCC's default degradable organic carbon (DOCs) factors for major waste streams, resulting in 1.310 cf/lb CH_4 or 82 m^3/Mg CH_4. This is a conservative value, since L_O values may range from less than 100 to over 200 m^3/Mg. It is assumed that the MSW composition of Canelones and Montevideo municipalities are the same. Actually, Canelones may have greater fraction of degradable organic carbon for its garden and park wastes, so this is a conservative assumtion.

Modern LFG recovery systems can reach collection efficencies of more than 85%, so a 70% value was adopted as an achievable goal.

The amount of waste disposed by year was assumed to be fixed in 220 Mg/day, which is a also a conservative approach according to considerations discussed for baseline methodology.

1. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual - Methodologies to estimate methane emissions from solid waste disposal sites

2. Borzacconi, L.; López, I.; Gazzola, A.; Anido, A. (1998). Estimación de la producción de biogás en un relleno sanitario.

3. Horta, M. (1999) Proyecto demostrativo de recuperación y aprovechamiento energético del biogás de un relleno sanitario. Descripción de las actividades de campo. Unidad de Cambio Climático

Annex 1: ii

Emission Reductions in 1000 Mg/year				
Year	**CH_4 reduction**	**CO_2 equivalent reduction**	**CO_2 avoided by gas sale**	**Total CO_2e Reduction**
2004	1.76	36.88	4.54	41.41
2005	1.96	41.07	5.44	46.51
2006	2.12	44.50	5.44	49.94
2007	2.25	47.31	5.44	52.75
2008	2.36	49.60	6.35	55.96
2009	2.45	51.49	6.35	57.84
2010	2.52	53.03	6.35	59.38
2011	2.59	54.30	6.35	60.65
2012	2.63	55.33	7.26	62.59
2013	2.68	56.17	7.26	63.43
2014	2.70	56.86	7.26	64.12
2015	2.73	57.43	7.26	64.69
2016	2.76	57.90	7.26	65.15
2017	2.78	58.28	7.26	65.54
2018	2.79	58.59	7.26	65.84
2019	2.29	47.96	6.35	54.31
2020	1.87	39.27	4.54	43.81
2021	1.53	32.15	3.63	35.78
2022	1.25	26.33	3.63	29.96
2023	1.03	21.55	2.72	24.28
TOTAL	**45.04**	**946.00**	**117.93**	**1063.94**
Average	**2.25**	**47.30**	**5.90**	**53.20**

Methane emission reduction (1000 tons/yr) = Methane generated (mmcf/yr) x Collection efficiency x 21.12 tons/mmcf x 21 ton CO_2/ton CH_4 x 1/1000

CO_2 equivalent of Methane emission reduction (1000 tons/yr) = methane emission reduction (mmcf/y) x 21.12 tons/mmcf x 21 ton CO_2/ton CH_4 x 1/1000

CO_2 equivalent avoided by gas sale (1000 tons/yr) = methane sold (mmcf/yr) x 21.12 tons/mmcf x 44/16 (CO_2/CH_4)

1 ton = 0.9072 Mg

1 mmcf = 28,32 1000 m³

Annex 2

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	1.453.140	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609
Investments	1.453.140	0	0	0	0	0	0	0	0	0
Operation and Maintenance	0	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609
Residual value of the investments										
Benefits		254.852	284.986	307.422	325.806	343.556	355.885	365.970	374.222	383.706
Natural gas sales	0	130.613	145.452	157.601	167.547	175.691	182.358	187.817	192.287	195.946
Net CER sales	0	124.239	139.534	149.822	158.258	167.865	173.526	178.153	181.936	187.760
Net benefits	-1.453.140	194.243	224.377	246.813	265.197	282.948	295.276	305.361	313.614	323.097
Net benefits without sale of CERs	-1.453.140	70.004	84.843	96.992	106.938	115.082	121.750	127.208	131.678	135.337
Reduced emissions in tons of CO2		41.413	46.511	49.941	52.753	55.955	57.842	59.384	60.645	62.587

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	60.609	1.513.748	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609
Investments	0	1.453.140	0	0	0	0	0	0	0	0	0
Operation and Maintenance	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609	60.609
Residual value of the investments											0
Benefits	389.233	393.754	397.477	400.509	402.998	405.025	332.822	270.512	221.214	183.099	149.162
Natural gas sales	198.942	201.394	203.403	205.047	206.393	207.495	169.883	139.088	113.876	93.234	76.333
Net CER sales	190.291	192.359	194.074	195.462	196.605	197.530	162.939	131.424	107.338	89.866	72.829
Net benefits	328.624	-1.119.995	336.868	339.900	342.389	344.417	272.213	209.903	160.605	122.490	88.553
Net benefits without sale of CERs	138.333	-1.312.354	142.794	144.438	145.784	146.886	109.274	78.479	53.267	32.625	15.724
Reduced emissions in tons of CO2	63.430	64.120	64.691	65.154	65.535	65.843	54.313	43.808	35.779	29.955	24.276

NPV (12%) of the net benefits without CERs US$	**-1.064.202**
FIRR of the net benefits without CERs	
NPV (12%) of the net benefits incl. CERs US$	**135.274**
FIRR of the net benefits without CERs	**14%**

Price of CER without transaction costs: 3 US$/CO2 t eq

VIII. Small Plant for Electricity Generation from Rice Husks

1. Executive Summary

Electricity consumption shows an increasing trend in Uruguay (4.7% per year during the last 35 years), particularly in the residential and services sectors. More than 80% of consumption is generated in four hydroelectric centrals, the rest being produced by two thermal plants, or imported from Argentina. Greenhouse gas emissions associated with electricity use are currently very low (1 Mt CO2/year). However, capacity for hydroelectric generation is nearing saturation, and future growth would likely be based on natural gas imported from Argentina through two newly built pipelines. This woill bring about increased greenhouse gas emissions from the electricity sector. Biomass (wood residues, rice husks) appears as an alternative source of electricity, with potential for reducing greenhouse gas emissions and foreign-energy dependance of the country, and promoting sustainable development.

The present project idea consists in the development of a small (1 MW) plant to produce electricity from rice husks. The industrial plant would be located in Tomás Gomensoro, in a rice producing area in NW Uruguay, and will be designed to produce 8,000 MWh/year. A large proportion of electricity produced will be sold to CALAGUA, a farmers' cooperative and one of the project sponsors, for crop irrigation purposes.

The project would result in a climate benefit equivalent to 0.13 Mt CO_2 over 21 years. Assuming a CER price of US$ 3.5/t CO_2 (net of transaction costs), carbon finance would contribute with revenue equivalent to US$ 163,000 (net present value discounted at 12% annual rate).

Initial investment would be US$ 1.3 million. This would be financed by an already agreed government subsidy of 50% and by an also agreed soft credit (20 year repayment) for the other 50%.

If CER revenue is not considered, NPV (12% per year) of net benefits would be a negative amount of -US$ 119,000 and FIRR would be 10%. The sale of CER would slightly improve economic performance: NPV would become US$ 45,000 and FIRR 13%.

The cost of CERs was estimated as -US$ 4.3/t CO2, which indicates a very good marginal benefit of carbon. However, there are some risk factors intrinsic to this project (lower electricity sale prices than projected, or lower production than projected) that can potentially offset this benefit. Also, the project is highly dependant on availability of enough quantities of raw material free of charge, and this is a factor of vulnerability.

The project would make a significant contribution to Uruguay's sustainable development through promotion of rural development, reducing foreign-energy dependance, improving farm economy and improving local environmental quality.

2. Project description

A small (1 MW) electricity generation plant will be installed in the NW corner of Uruguay. The plant will be fueled by rice husks, otherwise not useable, obtained as a waste from a rice mill operation. Most of the electricity to be produced (8,300 MWh/year) will be sold to a cooperative of small farmers, for powering crop irrigation systems. Any excess of electricity will be sold to the public grid or directly to a large consumer.

The plant will be located on a site adjacent to the rice mill that produces ca. 12,500 t of rice husks per year. Rice husks from the mill will be delivered directly to the storage bin feeding the boiler. Additional required consumption of 2,000 t of rice husks will be obtained from nearby small rice mills.

The project will contribute to climate change mitigation by a combination of abatement of methane emissions from decomposing piles of rice husks, and displacement of fossil fuels by a renewable source of energy. Over total project life (21 years), methane emissions reductions will amount to 16,876 t CO_2 equivalent, whereas displacement of fossil fuels will reduce emissions by 114,897 t CO_2. Total climate benefit would be in the order of 6 kt t CO_2 equivalent per year.

The project will be jointly implemented by CALAGUA (farmers cooperative, electricity consumer) and SAMAN SA (a rice products company).

Objectives

- to reduce methane emissions from decomposing rice husks piled at the side of the rice mill

- to reduce emissions from burning of fossil fuels (natural gas, fuel oil) by their substitution by a renewable source of energy (rice husks).

- to reduce emissions from burning of fossil fuels (natural gas, fuel oil) by reducing electricity losses from transmission lines (due to reduced distance from site of generation to site of consumption).

Project Boundaries

Geographically, all greenhouse gas monitoring activities will take place within the electrical plant, to be located in Tomás Gomensoro, Artigas, Uruguay.

Time boundary is defined by project lifetime (21 years).

Activities to be monitored include electricity output (both self-consumed and sold), and methane emissions from rice husk storage.

Baseline Scenario

Electricity use in Uruguay is currently more than 7 TWh per year (1.7 MWh per capita per year). This consumption has increased by a cumulative 4.7 % per year during the last 35 years, and projections are to sustain this increase, after the effects of the 2001-2003 economic recession are overcome. Much of this growth was possible due to construction of two large hydroelectric dams, which, along with smaller, older dams, provide between 80 and 90 % of electricity needs. Hydro generation is however nearing its full capacity, and future needs will likely be supplied by new thermal units based on natural gas, to be built. The baseline scenario is thus defined by increasing use of electricity, which will increasingly be generated based on fossil fuels. A baseline emission factor of 0.45 kg CO_2/kW-h

(according to an estimation by Climate Change Unit, Ministry of Environment) was assumed for the purposes of the present PIN. This is considered to be a very conservative assumption.

In the particular case of this project, electricity currently consumed by CALAGUA is generated either in *Salto Grande* dam, located at a distance of 150 km, or in other further away centrals. This causes losses of electricity from transmission lines. It is estimated that losses in the 150 kV transmission line segment from Salto Grande to Tomás Gomensoro, that will be avoided by the present project, amount to 2%.

Rice husks are considered to be a waste. Their disposal causes environmental problems such as greenhouse gas emissions (methane), local air contamination (particulate matter), and soil and groundwater contamination (leachates). There are currently not economically feasible alternatives for their clean disposal.

Proposed Activities

Activity is electricity generation from rice husks, to be sold to CALAGUA and other 'large' consumers, or to the public utility.

3. Proposed baseline methodology

Selected baseline methodology is "*Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment*". The economically attractive course of action is to base additional electricity generation capacity on thermal units fueled by a mix of natural gas and fuel oil. There are other possible sources of energy available, which are both local and renewable, rice husks being one of them. A major barrier for investing in these alternative sources is their relatively high cost as compared with natural gas.

4. Technical Assessment

A preliminar feasibility study was performed by M.A. Arimon and R.P. Mutarelli Industrial Engineers (2002), and all figures and assumptions related non-CER aspects that are used in the present document were drawn from such study.

The 1 MW central will operate continuously during 11 months per year, demanding 1.8 t/h of rice husks. A 15 m^3 silo will store enough raw material for feeding the boiler continuously. The boiler will produce 6.8 t/h of steam at temperature of 320^oC and pressure of 22 kg/cm^2 . Boiler will be specifically designed for burning rice husks, and to produce a maximum of 8 t/h of steam. A multiple stage condensation turbine (1,500 and 6,000 rpm) with condensation temperature of 58 ^oC and discharge pressure of 0.12 kg/cm^2 will be installed. Cooling towers of 4,800,000 kcal/h capacity will be employed. A water supply of 6,500 L/h, available on site, will be required for cooling system.

The project is based on well-known, relatively simple technology, and is considered to be technically feasible.

5. Economical Assessment

NPV (12% annual rate) of net benefits was estimated as a negative amount of US$ 119,000 (without considering sale of CERs) and US$ 45,000 (including CERs).

The sale of CERs, discounted at a rate of 12% per year, generates a present income of US$ 163,000, which represents 7% of the total benefits.

The Financial Internal Rate of Return of project was estimated as 13 % (including CERs) and 10 % (without CERs).

In relation to the project financing, an agreed government subsidy will provide 50% of required capital. The rest will be financed by an already agreed soft credit, to be repaid during 20 years at a promotional interest rate (Libor + 2%).

These results respond to an assumed high electricity price to be paid for by customers. This generates enough revenues for initial investments and costs of operation and maintenance . The CER net revenue is expected to be of minor importance in these results.

See Annex 1 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

Project will result in a climate change mitigation benefit equivalent to reducing emissions by 132 kt CO2 (over 21 years). This figure results from:

- Reduction of methane emissions by rice husk piles of 16,876 t CO2 equivalent (804 t CO2 equivalent/year).

- Reduction of carbon dioxide emissions by fossil fuel substitution of 112,644 t CO2 equivalent (5,364 t CO2 equivalent/year).

- Reduction of carbon dioxide emissions by suppression of energy losses of 2,253 t CO2 equivalent (107 t CO2 equivalent/year).

Assuming that project begins in 2005, production of CERs for specific periods would be as follows:

2005-2007: 18.8 kt CO2-equivalent

2008-2012: 31.4 ktCO2-equivalent

2013-2017: 31.4 ktCO2-equivalent

2018-2025: 50.2 ktCO2-equivalent

7. Estimated lifetime and crediting period for project

Project lifetime is 30 years. Crediting period will be 21 years. Project is expected to start in 2005 (construction to start in 2004). A project sponsor is required.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of CERs will be a negative value: - US$ 4.26/t CO_2 equivalent, representing a good marginal benefit.

9. Documentation on environmental impacts

An environmental impact assessment of this projects will be performed, as required by Uruguayan law. Documentation on environmental and also social impacts will be defined at a later stage.

10. Monitoring plan

A monitoring plan will be implemented since the start date of the project. This plan will include measurement of methane emissions from rice husk stockpiles, and electricity production.

11. Estimated investor risk

Possible sources of risk include:

- difficulties for receiving financial assistance

- high dependance on supply of rice husks, and lack of alternative fuels in case of failures in rice production and rice processing.

- electricity production lower than expected (project assumed no time losses, other than 20 days in February of every year for maintenance).

- decrease in market prices of electricity, especially for large consumers. Assumed sale price (US$ 36/MWh) is actually below average price for the period 1996-2003 (US$ 45/MWh). However, project designers assumed no transmission costs, which does not reflect reality (State utility company holds a monopoly for transmission and will charge a fee for this).

- low CER prices and/or high CDM-project transaction costs. CER finance is important for project's returns.

12. Potential reproduction

The concept underlying this project (clean, decentralized generation of electricity in small-scale units located near renewable energy sources) offers very promising prospects for development in the near future, not only in Uruguay, but also worldwide. Full economic feasibility of this idea would require some improvements with respect to this specific project. Ideally, similar projects should be of a somewhat larger scale (from 2 to 10 MW), and make a more efficient use of the source of energy by combined heat and power generation. Also, planning for obtaining commercially valuable byproducts such as amorphous silica would greatly improve economic feasibility.

13. Technical summary of the technology used

Proposed technology to be supplied by *Koblitz* (Brazil). This company has installed more than 200 thermal centrals in Brazil, and at least five of them, located in neighboring *Rio Grande do Sul* State, are based on rice husks.

Specifications:

- Boiler specifically designed for processing rice husks (2.9 Mcal/kg) at 1.8 t/h, with capacity for generating 6.8 t/h of steam (max. 8 t/h) at 22 kg/cm^2 pressure and 320 ^{o}C temperature.

- Multiple stage condensation turbine (1,500 and 6,000 rpm) with condensation temperature of 58 ^{o}C and discharge pressure of 0.12 kg/cm^2.

- Synchronic generator: Net power: 1,000 kW. Tension: 400 V. Frequency: 50 Hz

- Condenser: 7 t/h of steam at 0.12 bar and 58 ^{o}C. Cooling towers with capacity for 4,800,000 kcal/h.

- Transforming Station: medium tension: 31.5 kV; low tension: 0.4 kV; power: 1,250 kVA

14. Contextual information

Assessment of Project Sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

- contribution to development of a rural area by adding value to local production

- contribution to reducing Uruguay's energy foreign dependance

- improvement of farm economy by reduction of electricity costs for irrigation.

- improved local environment (reduced pollution caused by rice husks).

Local viability

This particular project will be located in a low-populated area, and its scale is necessarily very small, limited by supply of raw material and low regional electricity demand. This reduced scale may impair commercial viability of project, which may determine the need for external assistance in the form of soft credits and/or subsidized electricity transmission fees. The project is also based on supply of raw material free of charge, which is an additional factor of vulnerability.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM double goal of contributing to climate change mitigation and promoting sustainable development of host country. Substitution of fossil fuels is one of the activities eligible for CDM.

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Annex 1:

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	1,284,000	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500
Investments	1,184,000	0	0	0	0	0	0	0	0	0
Operation and Maintenance	0	84,500	84,500	84,500	84,500	84,500	84,500	84,500	84,500	84,500
CERS transaction costs	100,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Residual value of the investments										
Benefits		289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800
Electricity sales	0	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800
Net CER sales	0	0	0	0	0	0	0	0	0	0
Net benefits	-1,284,000	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300
Net benefits without sale of CERs	-1,284,000	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300
Reduced emissions in tons of CO2		6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	89,500	1,273,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500	5,000
Investments	0	1,184,000	0	0	0	0	0	0	0	0	0
Operation and Maintenance	84,500	84,500	84,500	84,500	84,500	84,500	84,500	84,500	84,500	84,500	0
CERS transaction costs	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Residual value of the investments											0
Benefits	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800
Electricity sales	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800	289,800
Net CER sales	0	0	0	0	0	0	0	0	0	0	0
Net benefits	200,300	-983,700	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300	284,800
Net benefits without sale of CERs	200,300	-983,700	200,300	200,300	200,300	200,300	200,300	200,300	200,300	200,300	284,800
Reduced emissions in tons of CO2	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275

NPV (12%) of the net benefits without CERs US$	**-216,752**
FIRR of the net benefits without CERs	**7%**
NPV (12%) of the net benefits incl. CERs US$	**-216,752**
FIRR of the net benefits without CERs	**7%**

Price of CER without transaction costs: 3,5 US$/CO2 eq

IX. Combined Heat and Power Generation from Wood Manufacturing Residues in Rivera

1. Executive Summary

Electricity consumption shows an increasing trend in Uruguay (4.7% per year during the last 35 years), particularly in the residential and services sectors. More than 80% of consumption is generated in four hydroelectric centrals, the rest being produced by two thermal plants, or imported from Argentina. Greenhouse gas emissions associated with electricity use are currently very low (1 Mt CO2/year). However, capacity for hydroelectric generation is nearing saturation, and future growth would likely be based on natural gas imported from Argentina through two newly built pipelines. This will bring about increased greenhouse gas emissions from the electricity sector. Biomass (wood residues, rice husks) appears as an alternative source of electricity, with potential for reducing greenhouse gas emissions and foreign-energy dependance of the country, and promoting sustainable development.

The present project idea consists in the development of a 5 MW cogeneration plant to produce heat and electricity from wood manufacturing residues. The plant will be located in Rivera, in a forest producing area in N Uruguay, in the site where Urufor, a wood products company, operates a large sawmill. Cogeneration facility will be designed to generate 85 kt steam/year and up to 30,000 MWh/year. Total steam production, as well as one third of the electricity will be used by Urufor for drying lumber. The remainder electricity will be sold to the public grid.

The project would result in a climate benefit equivalent to 0.23 Mt CO_2 over 20 years. Assuming a CER price of US$ 3.5/t CO_2, carbon finance would contribute with revenue equivalent to US$ 239,000 (net present value discounted at 12% annual rate).

Initial investment would be US$ 5 million, to be provided by project sponsors (at least 60%) and the banking system. If CER revenue is not considered, NPV (12% per year) of net benefits would be US$ 772,000 and FIRR would be 13.7%. The sale of CER would slightly improve economic performance: NPV would become US$ 1,000,000 and FIRR 14.3%. The cost of CERs was estimated as a negative value of -US$ 3.5/t CO2, which indicates a very good marginal benefit of carbon.

The project would make a significant contribution to Uruguay's sustainable development through promotion of rural development, reducing foreign-energy dependance, and improving sawmill economy.

2. Project description

A 5 MW combined heat and power generation plant will be installed in Rivera in Northern Uruguay. The plant will be fueled by Urufor sawmill residues (75,000 m^3/year), otherwise not useable. Part of the steam produced (85 kt/year) will be used by Urufor for drying lumber, and about one third of the electricity generated (28,000 MWh in total) will be used to meet the sawmill power needs. About two thirds of electricity produced will be sold to the public grid or directly to a large consumer, as allowed by Uruguayan regulations.

The central will be located on the same site where the sawmill operates and produces ca. 75,000 m^3 of solid wood residues per year. Additional required consumption of 14,000 m^3 of firewood will be obtained from nearby forest harvest sites.

The project will contribute to climate change mitigation by displacement of fossil fuels by a renewable source of energy. Over total project life (20 years), displacement of fossil fuels will reduce emissions by 229,500 t CO_2. Total climate benefit would be in the order of 13 kt t CO_2 equivalent per year.

The project will be implemented by Enerfor, a private company formed by three Uruguayan forestry firms.

Objectives

- to reduce emissions from burning of fossil fuels (natural gas, fuel oil) by their substitution by a renewable source of energy (wood residues).

- to reduce emissions from burning of fossil fuels (natural gas, fuel oil) by reducing electricity losses from transmission lines (due to reduced distance from site of generation to site of consumption).

- to add value to wood residues in sawmilling industries, which encompass more than 50% of the volume of processed logs, and to make full use of harvested biomass.

- to introduce renewable energy from forest biomass as a new product in the newly created electricity market in Uruguay.

- to allow for the production of high value, long-lived wood products which, besides improving the economic performance of the wood processing business, would result in prolonged storage of carbon sequestered by forest.

Project Boundaries

Geographically, all greenhouse gas monitoring activities will take place within the electrical plant, to be located in Rivera, Uruguay.

Time boundary is defined by project lifetime (20 years).

Activities to be monitored include wood residue consumption, fossil fuels used for firewood transportation from the forest to central, and steam and electricity output (both self-consumed and sold).

Baseline Scenario

Electricity use in Uruguay is currently more than 7 TWh per year (1.7 MWh per capita per year). This consumption has increased by a cumulative 4.7 % per year during the last 35

years, and projections are to sustain this increase, after the effects of the 2001-2003 economic recession are overcome. Much of this growth was possible due to construction of two large hydroelectric dams, which, along with smaller, older dams, provide between 80 and 90 % of electricity needs. Hydro generation is however nearing its full capacity, and future needs will likely be supplied by new thermal units based on natural gas, to be built. The baseline scenario is thus defined by increasing use of electricity, which will increasingly be generated based on fossil fuels. A baseline emission factor of 0.45 kg CO_2/kW-h (according to an estimation by Climate Change Unit, Ministry of Environment) was assumed for the purposes of the present PIN. This is considered to be a very conservative assumption.

In the particular case of this project, electricity currently consumed by Urufor is generated either in *Salto Grande* dam, located at a distance of 250 km, or in other further away centrals. This causes losses of electricity from transmission lines. It is estimated that losses in the 150 kV transmission lines to Rivera, that will be avoided by the present project, amount to 5%.

Wood residues are considered to be a waste. Their disposal causes environmental problems such as greenhouse gas emissions (carbon dioxide, methane), local air contamination (particulate matter), and soil and groundwater contamination (leachates). There are currently not economically feasible alternatives for their clean disposal. Also, there are no possibilities for selling these residues to pulp or secondary wood processing (boards) industries, due to long freight distances.

Proposed Activities

Activity is steam and electricity generation from wood residues, to be used by Urufor and other 'large' consumers, or to be sold to the public utility.

3. Proposed baseline methodology

Selected baseline methodology is "*Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment*". The economically attractive course of action is to base additional electricity generation capacity on thermal units fueled by a mix of natural gas and fuel oil. There are other possible sources of energy available, which are both local and renewable, wood residues being one of them. A major barrier for investing in these alternative sources is their relatively high cost as compared with natural gas.

4. Technical Assessment

The cogeneration central will operate continuously all year round, demanding 12 m^3/h of wood residues with approximately 40% moisture content. The boiler will produce up to 40 t/h of steam at temperature of 425^oC and pressure of 43 bar. A 5 MW condensing-extraction steam turbine with controlled extraction pressure of 4 bar, condensation pressure of 0.1 bar and condensation temperature of 50 ^oC, will be installed.

Cogeneration allows for higher energy conversion efficiencies (from 50 to more than 80%) than simple generation systems, which recover less than 20% of fuel energy content. Worldwide, cogeneration has only been used at large scale generation, and only recently it has started to be implemented in low and medium scale industries. In the case of wood manufacturing industry, use of cogeneration has been very limited, due to high availability of cheap energy from fossil fuels, and to the existence of a demand for wood residues from pulp and board industries.

5. Economical Assessment

NPV (12% annual rate) of net benefits was estimated as US$ 772,000 (without considering sale of CERs) and US$ 1,000,000 (including CERs).

The sale of CERs, discounted at a rate of 12% per year, generates a present income of US$ 239,000, which represents 3% of the total benefits. The relatively low impact of CERs on project finance obey to the fact that steam production, a important component of project's revenues, does not result in displacement of greenhouse gas emissions as electricity production does. It must be pointed out, however, that the wood drying component would be the easiest to implement, whereas the electricity generation component is the one facing most economic barriers, due to the need for high investments. It is in the removal of these barriers where CER finance would become highly important.

The Financial Internal Rate of Return of project was estimated as 14.3 % (including CERs) and 13.7 % (without CERs).

In relation to the project financing, project sponsors and additional investors would contribute with a fraction of initial investment (at least 60% of total by equities), and the rest will be financed by the banking system.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

Project will result in a climate change mitigation benefit equivalent to reducing emissions by 229 kt CO2 (over 20 years). This figure results from generation of 0.51 Twh of electricity during project's lifetime.

Assuming that project begins in 2004, production of CERs for specific periods would be as follows:

2005-2007: 13.5 kt CO2-equivalent

2008-2012: 67.5 ktCO2-equivalent

2013-2017: 67.5 ktCO2-equivalent

2018-2025: 108.0 ktCO2-equivalent

7. Estimated lifetime and crediting period for project

Project lifetime is 20 years. Crediting period will be 20 years. Project is expected to start in 2004 (construction to start in 2003).

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of CERs will be a negative value: - US$ 3.50/t CO_2 equivalent, representing a good marginal benefit.

9. Documentation on environmental impacts

An environmental impact assessment of this projects will be performed, as required by Uruguayan law. Documentation on environmental and also social impacts will be defined at a later stage.

10. Monitoring plan

A monitoring plan will be implemented since the start date of the project. This plan will include measurement of wood residues consumed, fossil fuels used for firewood transportation from harvest site to cogeneration central, and steam and electricity production.

11. Estimated investor risk

Possible sources of risk include:

- electricity production lower than expected, due to either reduced sawmill activity, or to reduced market price of electricity, or to high transmission fees applied by State utility company.

- appearance of economically attractive alternative uses for wood residues (ie. installation of nearby secondary wood industries).

- low CER prices and/or high CDM-project transaction costs.

12. Potential reproduction

The concept underlying this project (clean, decentralized generation of electricity in small-scale units located near renewable energy sources) offers very promising prospects for development in the near future, not only in Uruguay, but also worldwide. The rapid development of forestry and wood products industry in Uruguay will offer possibilities for development of several facilities like the one proposed in this project idea note in coming years.

13. Technical summary of the technology used

Proposed technology to be supplied by consortium *HPB-TGM-WEG* (Brazil).

Specifications:

- Boiler designed for producing up to 20 t/h of steam (max. 40 t/h) at 43 bar absolute pressure and 425 ^{o}C overheating temperature.

- Condensing-extraction steam turbine with controlled extraction, operating at extraction pressure of 4 bar, condensation pressure of 0.1 bar and condensation temperature of 50 ^{o}C.

14. Contextual information

Assessment of Project Sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

- contribution to development of a rural area by adding value to local production

- contribution to reducing Uruguay's energy foreign dependance

- improvement of sawmill operation economic results by adding value to industrial residues and reducing costs for their disposal.

- environmental benefits (lower sulfur and particulate matter emissions).

Local viability

The project will make good use of a locally abundant resource (wood residues), reinforcing the positive socio-economic impacts that development of forestry industry has had in the Rivera region. The project is also well positioned to supply electricity to the southern region of Brazil, where shortages are expected in coming years. The facility for power conversion from Uruguayan to Brazilian grid is located just meters away from the proposed site for the cogeneration plant.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM double goal of contributing to climate change mitigation and promoting sustainable development of host country. Substitution of fossil fuels is one of the activities eligible for CDM.

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Annex 1

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	5,100,000	292,000	393,000	471,000	516,217	499,700	492,283	492,283	492,283	492,283
Investments	5,000,000	0	0	0	0	0	0	0	0	0
Materia prima	0	0	0	0	180,217	159,700	142,283	142,283	142,283	142,283
Operation and Maintenance	0	287,000	388,000	466,000	331,000	335,000	345,000	345,000	345,000	345,000
CERS transaction costs	100,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Residual value of the investments										
Benefits		375,000	540,750	684,750	1,405,010	1,505,140	1,690,740	1,690,740	1,690,740	1,690,740
Electricity sales	0	0	0	0	594,260	573,640	493,740	493,740	493,740	493,740
Value of self-consumed energy	0	375,000	540,750	684,750	763,500	884,250	1,149,750	1,149,750	1,149,750	1,149,750
CER sales	0	0	0	0	47,250	47,250	47,250	47,250	47,250	47,250
Net benefits	-5,100,000	83,000	147,750	213,750	888,793	1,005,440	1,198,457	1,198,457	1,198,457	1,198,457
Net benefits without sale of CERs	-5,100,000	83,000	147,750	213,750	841,543	958,190	1,151,207	1,151,207	1,151,207	1,151,207
Reduced emissions in tons of CO2		0	0	0	13,500	13,500	13,500	13,500	13,500	13,500

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	492,283	492,283	492,283	492,283	492,283	492,283	492,283	492,283	492,283	492,283	492,283
Investments	0	0	0	0	0	0	0	0	0	0	0
Materia prima	142,283	142,283	142,283	142,283	142,283	142,283	142,283	142,283	142,283	142,283	142,283
Operation and Maintenance	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000
CERS transaction costs	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Residual value of the investments											0
Benefits	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740	1,690,740
Electricity sales	493,740	493,740	493,740	493,740	493,740	493,740	493,740	493,740	493,740	493,740	493,740
Value of self-consumed energy	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750	1,149,750
CER sales	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250
Net benefits	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457	1,198,457
Net benefits without sale of CERs	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207	1,151,207
Reduced emissions in tons of CO2	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500

NPV (12%) of the net benefits without CERs US$	**771.685**
FIRR of the net benefits without CERs	**13,7**
NPV (12%) of the net benefits incl. CERs US$	**1.011.030**
FIRR of the net benefits incl. CERs	14,3

Price of CER without transaction costs: 3.5 US$/T CO2

X. Afforestation for Obtaining Long-Lived Wood Products and Bioenergy

1. Executive Summary

There is large potential for carbon sequestration by afforestation in Uruguay. A forest policy developed in 1987 has resulted in plantation of more tan 500,000 ha during the last 15 years. That policy promotes afforestation of soils declared of forest priority, based on their low agricultural productivity, high risk of erosion or degradation due to previous use. There are still some 3 million ha of such soils available for new plantations. Wet, temperate climate provides an excellent environment for achieving high growth rates of trees (in the order of 30 m^3/ha/year of commercial wood), and high rates of carbon sequestration (in the order of 300 to 400 t CO_2/ha over 20 years).

Electricity consumption shows an increasing trend in Uruguay (4.7% per year during the last 35 years), particularly in the residential and services sectors. More than 80% of consumption is generated in four hydroelectric centrals, the rest being produced by two thermal plants, or imported from Argentina. Greenhouse gas emissions associated with electricity use are currently very low (1 Mt CO2/year). However, capacity for hydroelectric generation is nearing saturation, and future growth would likely be based on natural gas imported from Argentina through two newly built pipelines. This will bring about increased greenhouse gas emissions from the electricity sector. Reducing electricity consumption can help reducing greenhouse gas emissions.

The present project combines afforestation with wood manufacturing and bioenergy production. One concern related with development of forest carbon sinks is the risk of non-permanence of the forest in the long term. Managing plantations for maximizing the proportion of long-lived wood products, and using residues as substitutes of fossil fuels, are two ways of addressing the non-permanence issue and ensuring maximal environmental benefit of forests. This is the aim of this project, which proposes planting 15,000 ha of new forests, and the establishment of a sawmill and a cogeneration plant in the city of Young, Río Negro, Uruguay, on a site owned by Intendencia Municipal de Río Negro (IMRN, Río Negro Municipality), where a Wood Logistics Terminal and a Wood Industrial Park are being established.

Forest plantation will remove large amounts of carbon dioxide from the atmosphere, storing carbon in its biomass, soil, litter and harvested wood products. Cogeneration of heat and electricity would reduce carbon dioxide emissions by displacement of fossil fuels. The expected total contribution of this project to climate change mitigation is equivalent to 6.6 Mt CO_2 over 24 years.

Required capital investment is US$ 26.4 million (estimated as the net present value of projected cash flow until the last year with negative balance). Investment will be mostly financed by project owners, and to a lesser extent by loans from financial institutions If CER revenue is not considered, NPV (12% per year) of net benefits would be US$ 1.9 million and FIRR would be 12.5%. The sale of CER would markedly improve economic performance: NPV would become US$ 5.8 million and FIRR 13.5%. The project is promoted by IMRN, that is currently seeking for one or more investors. Project was designed by EGC, a Uruguayan consulting firm.

Assuming a CER price of US$ 3.5/t CO_2, carbon finance would contribute with revenue equivalent to US$ 3.9 million (net present value discounted at 12% annual rate), which represent a highly significant contribution to project finance. The cost of CERs was estimated as a negative value of -US$ 2.9/t CO_2, which indicates a very good marginal benefit of carbon.

Besides mitigating climate change at a negative cost, the project will have significant positive impacts on socio-economic and environmental aspects: creation of a significant number of new jobs, contribution to development of a rural area, improved economy of forest producers in the region, decreased dependance on foreign energy, protection of soil and biodiversity, and improved landscape beauty, among others.

2. Project description

Forest component of the project will be based on approximately 21,000 ha of land located within 200 km around Young, Río Negro. A total of 15,000 of forests will be established, for obtaining s large proportion of solid wood products of *Eucalyptus grandis* and related tree species. A fraction of about 10 % of total area will be used for biodiversity preservation purposes. Land to be acquired is expected to have a biodiversity-rich area of natural forests along water streams. Plantations will established over a five-year period (10% of the area in the first year, 20 % in second and third years, and 25% in each of the fourth and fifth years) and will be grown for 20 years. Commercial thinnings will be performed at ages 7-8, 10-11, and 15-16 years, to allow for the obtention of high diameter logs, suitable for veneering. Trees will be pruned to a height of up to 12 m, to obtain knot-free saw logs.

A sawmill for processing 120,000 m^3 of round wood per year will be built right after the beginning of plantation process. There is a large imbalance between saw logs production and demand: installed industrial capacity could process about one third of the timber produced in the region. It is estimated that about one third of this timber is 'clear' (knot-free) wood, highly suitable for medium-to-high-value solid products. Early installation of a sawmill would allow for making a good use of this opportunity. Also, the creation of a new demand for good-quality timber would be an incentive for forest producers in the region currently managing their forests in short rotations, to switch to management systems based on longer rotations. This would result in higher carbon sequestration by these forests, and by increasing the time residence of carbon stored in their wood after forests are harvested.

Sawmill will be designed to produce 30,000 m^3/year of dried lumber, and 30,000 m^3/year of lower-quality structural lumber or pellets. Some 50,000-60,000 m^3/year of residues will be generated. These residues will be processed for combined heat and power generation. A 5 MW cogeneration unit will be installed in IMRN Wood Logistics Terminal, for supplying steam and electricity to the sawmill and to other industries that may become established at the site. Any excess electricity will be sold to the public utility or to large consumers, as allowed by Uruguayan regulations.

Objectives

- To sequester atmospheric carbon dioxide by newly established forests on sites currently under extensive livestock production;

- to maximize the time residence of carbon in wood tissue, by maximizing the proportion of long-lived wood products to be obtained.

- to reduce carbon dioxide emissions by displacement of fossil fuels by biomass in energy generation.

Project Boundaries

The project will comprise a total of 21,000 ha of land and the site of manufacturing and energy generation facilities.

Time boundary is defined by project lifetime: 24 years

Activities to be monitored include use of fossil fuels for forest and sawmill operations, changes in carbon stocks in relevant carbon pools, volume of residues and firewood consumed for energy generation, and steam and electricity output.

Baseline Scenario

Land is, and is expected to continue being used for extensive livestock production on soils covered by grass-dominated vegetation that has been subjected to 300 years of grazing, which have caused changes in plant species and soil erosion and compaction. Ranch farms are typically of large sizes (from 1,000 to more than 5,000 ha).These extensive systems are of low productivity (50-60 kg meat equivalent/ha/year), cover more than 70% of Uruguay's surface area, and provide direct employment to only 2.1 people/1,000 ha. Livestock production systems are very inefficient in terms of energy use (due to relatively poor pasture quality and low productivity) and, as a result, very large amounts of methane and nitrous oxide are released to the atmosphere. Project baseline emissions are estimated to be 22,000 t CO2 equivalent per year (68% as methane from ruminal fermentation, 2% as methane from manure and 30% as nitrous oxide from soil). Carbon dioxide emissions are negligible.

Regarding energy, baseline scenario is defined by an rising use of electricity in the country, which will increasingly be generated from fossil fuels. A baseline emission factor of 0.45 kg CO_2/kW-h (according to an estimation by Climate Change Unit, Ministry of Environment) was assumed for the purposes of the present PIN. This is considered to be a very conservative assumption.

3. Proposed baseline methodology

Selected baseline methodology is "*Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment*". The economically attractive course of action is continuing using the land with extensive livestock, as it has been during the last 300 years, and to continue using electricity produced by burning fossil fuels.

4. Technical Assessment

Forests will be established by using best-available technology for site preparation, weed and pest control, genetic materials, and planting method. Preferably, plantations will be established on soils with lowest agriculture production potential or with highest risk of erosion or degradation. A large proportion of the area will be planted with *Eucalyptus grandis*, although other species will be planted as well, according to site-specific conditions.

E. grandis plantations will have 20+ year rotations, and will be managed with the objective of maximizing the production of high quality timber for solid wood products. Initial stands will be of approximately 1,100 plants/ha. Pruning will start at age 2-3. First pruning will be to 3 m height, on all trees. Successive prunings (up to 12 m height) will be made on selected trees. A first thinning will be performed at age 7-8, leaving a stand of 400-500 plants/ha. Second thinning will be at age 10-11, with a remaining stand of 300 plants/ha. A third thinning at age 15 will leave 150 plants/ha for clearcutting at age 20-22. All thinnings will yield commercial wood, with total production of at least 600 m^3/ha (mean annual increment of 30 m^3/ha/year).

A fraction of the total area will be closed, allowing vegetation to evolve naturally. Protected areas will preferably be located near water streams, and will be interconnected, thus allowing for free movement of native animals through biological corridors. The aim will be to protect 5 to 10% of total project area, although the exact proportion will be determined according to site-specific conditions.

The sawmill will be specially designed for processing *Eucalyptus* saw logs. Sawmilling technology will be based on double simultaneous cutting by circular saws. Processed logs

will be at least 3.4 m long, with diameters from 18 to 80 cm. Processing capacity will be 240 m^3 roundwood per shift, and expected recovery ratio is 42%.

The 5-MW cogeneration central will operate continuously all year round, demanding up to 15 m^3/h of wood residues with approximately 50% moisture content. Specific features of the system still have to be determined.

There are no major restrictions of technical nature for implementation of this project.

5. Economical Assessment

NPV (12%) of project net benefits was estimated as US$ 5.8 million (including sale of CERs) and US$ 1.9 million (without considering CERs). Project overall IRR was estimated as 13.5 % (with carbon finance) and 12.5 % (without carbon finance).

Sale of CERs would generate a present income (discounted at 12 % annual rate) of US$ 3.9 million, equivalent to 19% of total benefits.

In relation to project financing, project sponsors and additional investors would contribute with a fraction (60%) of initial investment, and the rest will be obtained from financial institutions. This may change once the investmen has been decided

See Annex 1 for detailed calculations

6. Estimated GHG emissions reduction potential (annual and lifetime)

Project will result in a climate change mitigation benefit equivalent to reducing emissions by 6.6 Mt CO2 (over 24 years). This figure results from:

- Reduction of GHG emissions by electricity generation of 0.3 Mt CO2 equivalent (53 kt CO2 equivalent/year).

- Carbon sequestration by forest plantations of 6.3 Mt CO2 equivalent (260 kt CO2 equivalent/year).

Annual flow of emissions reductions will vary according to stage of project development. Assuming that project begins in 2005, production of CERs for specific periods would be as follows:

2005-2007: 15 kt CO2-equivalent

2008-2012: 573 ktCO2-equivalent

2013-2017: 2,603 ktCO2-equivalent

2018-2028: 3,438 ktCO2-equivalent

7. Estimated lifetime and crediting period for project

Project lifetime is 24 years. Crediting period will be 21 years for the emissions reduction component, and at least 24 years for the sequestration component. Project is expected to start in 2005. A project sponsor is required.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of CERs is expected to be negative: - US$ 2.9/t CO_2 equivalent. This represents a very good marginal benefit.

9. Documentation on environmental impacts

An environmental impact assessment of the whole project will be performed, despite the fact that this is not required in Uruguay for the forestry component. An environmental management system, compatible with ISO 14,000 or FSC standards will be implemented. This system will also comprise monitoring and documenting of social impacts.

10. Monitoring plan

A monitoring plan will be implemented since the start date of the project. This plan will include measurement of use of fossil fuels for forest and sawmill operations, changes in carbon stocks in relevant carbon pools, volume of residues and firewood consumed for energy generation, and steam and electricity output.

11. Estimated investor risk

Possible sources of risk include:

- lack of financial resources.

- adverse climatic factors causing failures in forest establishment.

- destruction of forest by fire or pest outbreaks.

- non-permanence of forest after end of crediting period

- decrease in timber prices

- electricity production lower than expected, due to either reduced sawmill activity, or to reduced market price of electricity, or to high transmission fees applied by State utility company.

- appearance of economically attractive alternative uses for wood residues (ie. installation of nearby secondary wood industries).

- level of CER prices and CDM-project transaction costs. CER sales are important for project returns.

12. Potential reproduction

This project's central idea (afforestation and maximization of time residence of sequestered carbon, plus making full use of biomass) could potentially be replicated in Uruguay and neighboring countries.

13. Technical summary of the technology used

Afforestation with *E. grandis* and other related species: Site will be prepared by a sequence of non-selective herbicide treatments and tillage operations, mainly performed on 1-m strips where trees will be planted. Ant control is to be performed by environmentally friendly insecticides (ie. *fipronil*), since first tilling of soil until a few months after plantation. Seedlings will be planted by means of hand planters or planting machines. Both non selective and

residual herbicides will be applied as needed. Fertilizer will be applied at the sides of every plant, also as required. Weed control practices, either chemical or mechanical will be applied during the first months after plantation. In general all procedures will follow the Code of Good Practices currently being developed by the Society of Uruguayan Foresters. Silvicultural technology to be employed in this project is widely applied in Uruguay. During the last 15 years, several hundreds of thousands of hectares were planted in a similar way.

Sawmill and cogeneration: specifications are still to be defined.

14. Contextual information

Assessment of Project Sustainability

Sustainability of this project is supported by a rational, conservative use of natural resources (land, water), combined with positive environmental and socio-economic impacts.

It is expected that project will result in various environmental benefits:

- Improved preservation of biodiversity by the protection to be provided by newly established tree vegetation and by establishment of protected areas.

- Soil protection by planting forests on areas most susceptible to soil erosion.

- Creation of a renewable energy resource (biomass).

- Reduced noxious emissions (sulfur, fine particles, etc.)

- Improved landscape beauty.

Also, project would result in improved economies of forest producers in the region, by creating an industrial demand for the abundant, good-quality timber they currently produce, with only scarce attractive commercial options.

Forestry component would have a very large socio-economic impact in project's area by creation of a high-value new resource, with potential to create a significant number of new jobs. This has already been demonstrated by past experience with forestry development in the country.

Local Viability

Two components of this project (afforestation and wood processing industry) are based on proven, locally adapted technologies. Cogeneration has not been widely used for small-scale centrals like the one proposed for this project. However, it is anticipated that there will be no problems in operating with this technology with locally available resources.

Conformity to Overall CDM Criteria and Goals

This project is in line with the double goal of CDM: climate change mitigation and sustainable development of host country. Project is consistent with current development policies in Uruguay.

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Annex 1

Cash flow

(2003 US$ thousands)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total costs	12400	12315,53	3.033	3.496	5.121	6.454	7.640	12.812	12.520	12.827
Sawmill investment	1000	7000								
Land purchase	11000									
Cogeneration investment		4500								
Forest expenses	200	805,53	1.823	2.086	2.991	3.324	2.010	2.017	1.725	2.032
Sawmill expenses	0	0	1.000	1.000	1.500	2.500	5.000	10.165	10.165	10.165
Cogeneration expenses	200	10	210	410	630	630	630	630	630	630
Revenues	0	0	467	935	1.829	6.041	9.538	16.279	15.316	18.553
Lumber sales	0	0	0	0	250	4.000	8.000	13.500	13.500	13.500
Forest revenues	0	0	0	0	124	585	83	1.323	360	3.597
Energy revenues	0	0	467	935	1.456	1.456	1.456	1.456	1.456	1.456
Net Benefits	-12400	-12315,53	-2.566	-2.561	-3.292	-414	1.898	3.467	2.796	5.725
Reduced emissions in kt CO2		0	5	10	15	135	15	393	15	837

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total costs	12.551	12.260	12.273	12.287	12.300	12.321	12.344	12.365	12.382	13.808
Sawmill investment										
Land purchase										
Cogeneration investment										
Forest expenses	1.757	1465,41	1478,46	1492,5	1505,64	1526,16	1549,02	1569,72	1587	3013,64
Sawmill expenses	10.165	10164,84	10164,84	10164,84	10164,84	10164,84	10164,84	10164,84	10164,84	10164,84
Cogeneration expenses	630	630	630	630	630	630	630	630	630	630
Revenues	17.506	21340,75	18255,5	22367	23160,5	25926	23115,5	27549,0625	38655,5	41955,5
Lumber sales	13.500	13500	13500	13500	13500	13500	13500	13500	13500	13500
Forest revenues	2.550	6385,25	3300	7411,5	8205	10970,5	8160	12593,5625	23700	27000
Energy revenues	1455,5	1455,5	1455,5	1455,5	1455,5	1455,5	1455,5	1455,5	1455,5	1455,5
Net Benefits	4.954	9.081	5.982	10.080	10.860	13.605	10.772	15.185	26.274	28.147
Reduced emissions in kt CO2	15	897	15	954	15	818	15	699	15	15

NPV (12%) of net benefits without CERs US$ thousands	1862
FIRR of net benefits without CERs	12,50%
NPV (12%) of net benefits incl. CERs US$	5782
FIRR of net benefits incl. CERs	13,50%

XI. Production of Biodiesel from Oil Grains and Animal Fat

1. Executive Summary

Diesel oil consumption shows an increasing trend in Uruguay, particularly in the transport sector. This fuel is partly produced by a State-owned refinery from imported oil, and partly imported directly. Greenhouse gas emissions associated with diesel oil use amount to 1.9 Mt CO_2/year. Biodiesel appears as an alternative fuel to diesel oil, either pure or mixtured, with potential for reducing greenhouse gas emissions and foreign-energy dependance of the country.

The present project idea consists in the development of a manufacturing plant to produce biodiesel from vegetal oil and animal fats, as a substitute of diesel oil. The industrial plant would produce 45 million liters of biodiesel per year after full-scale operation, and preferrably be located near a source of vegetal oil, in order to minimize freight costs.

The project would result in a climate benefit equivalent to 2.16 Mt CO_2 over 20 years. Assuming a CER price of US$ 3/t CO_2 (net of transaction costs), carbon finance would contribute with revenue equivalent to US$ 2.3 million (net present value discounted at 10% annual rate).

Expected cost of production is US$ 0.56/L (after deducting benefits from sale of byproducts), which is higher than market value of diesel oil. A government subsidy that recognizes positive externalities of biodiesel production in Uruguay would therefore be required for ensuring economic viability. This subsidy was estimated for current market conditions as US$ 0.09/L.

Initial investment would be US$ 5 million. Project sponsor will contribute with at least 60% of the capital required. If CER revenue is not considered, NPV (12% per year) of net benefits would be negative (-US$ 1.7 million) and FIRR would be 6%. The sale of CER would greatly improve economic performance: NPV would become US$ 641,000 and FIRR 14%.

The cost of CERs was estimated as US$ 39/t CO2. For this calculation, it was assumed that government subsidy is entirely attributable to project's climate benefits. The need for this subsidy constitutes the most important risk factor of this project.

The project would make a significant contribution to Uruguay's sustainable development through creation of new jobs, promoting rural development, reducing foreign-oil dependance, improving farm economy and improving urban air quality.

2. Project description

One biodiesel plant will be installed on a location to be decided. The fuel produced will be traded in the market, either pure or mixed with diesel oil. The project will be implemented by 'Central Cooperativa de Granos' (CCG), a not-for-profit association of cooperatives.

Objectives

- To reduce greenhouse gas emissions by substitution of a fossil fuel by a renewable source of energy.
- To diversify market options for, and to add local value to oil grains (soybean, sunflower or canola) produced by cooperative members. Added value will be based on both biodiesel and its byproducts (oilseed meals and glicerine).
- To decrease farmers' risks due to fluctuations in international oil prices.

Project boundaries

Space boundaries will be defined by the space occupied by biodiesel manufacturing plant, including storage facilities. It is assumed that every litre of biodiesel leaving the premises will substitute the burning of one litre of diesel fuel.

Time boundary is defined by project lifetime: 20 years (see below)

Activities to be monitored include biodiesel output and estimated emissions by manufacturing process.

Baseline scenario

Diesel oil is the preferred fuel used in transport and agriculture sectors in Uruguay. Annual consumption in the country is approximately 750 million litres, causing an emission of 1.9 Mt CO2 per year. Near one half of the diesel used is imported, whereas the other half is produced locally from imported oil. One hundred percent of fuel consumed in the country is therefore obtained from foreign sources. This determines a high vulnerability of national economy to fluctuations in international oil prices.

Oil crops have traditionally been seeded in the Western region of Uruguay. Sunflower and soybean are currently the main crops, covering an area of 250,000 ha (2002/03 season). Vegetal oil is also obtained from rice industry residues. Other oil crops such as canola may become significant in coming years. Total grain production for 2002/03 season is expected to be 200,000 t of sunflower and 150,000 t of soybean. A fraction of this production (50,000 t of sunflower) is processed by a rather inefficient local oil industry, the rest being exported with little added value.

Farmers affiliated with CCG produce roughly 50% of the national oil crop area. Diesel oil consumption for this activity is in the order of 6.5 million L/year. Delivery to grain elevator demands an additional 1.5 million L/year. Both crop production and freight combined cause the emission of 20 kt CO2/year.

Trucks and farm tractors are designed for using mineral diesel fuel. Biodiesel mixtures of up to 20% could be used without any engine adaptations. The use of higher-grade mixtures or even pure biodiesel would require new engines, or engine modifications in currently used equipment.

Proposed activities

One biodiesel producing plant will be installed. The exact location and dimension of this plant will be determined by feasibility study and project design. Initial proposal is to build the facility nearby a vegetal oil processing industry. The plant will be designed to process soybean, sunflower or canola oil, and/or animal fats..

After full implementation, the project will produce 45 million L of biodiesel per year. This output could be blended with mineral diesel to produce 225 million L of B20 grade biodiesel, which is equivalent to 30% of total national consumption, or about 60% of total annual diesel imports. Part of this production will be used by cooperative members, and most of it will be sold to the market or to ANCAP (State oil company).

3. Proposed baseline methodology

Selected baseline methodology is "*Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment*". The economically attractive course of action is continuing the burning of fossil fuels (diesel) and producing oil grains for domestic and overseas edible oil markets. Major barriers to investment in biodiesel are of economic nature: high international price of oil grains and crude vegetal oil, and relatively low petroleum prices.

4. Technical Assessment

Technology for producing biodiesel from vegetal oil or animal fat is well known, and there are no major risks associated with this issue.

The project has considered the installation of a biodiesel production plant that can use vegetable oil or animal fats. The technology to be used is known world wide and consists of a sterification process in 2 stages, using an alcohol (ethanol or methanol), the oil or fat and sodium or potassium hydroxide as catalyst.

A special processing unit will separate the biodiesel from the glycerin, which is obtained as a by product.

The produced biodiesel will comply with international standards, See annex 1 for more detailed technical information.

5. Economical Assessment

We assumed a government subsidy to biodiesel production equivalent to US$ 0,09/L.

The NPV of the net benefits without the sale of the CERs is a negative amount of US$ 1.7 millions; if CERs incomes are included, NPV becomes a positive value of US $ 641 thousands. The utilized discount rate is 12% yearly.

The sale of CERs, discounted at a rate of 12% per year, generates a present income of US$ 2.3 millions, which represents 1% of the total benefits.

The Financial Internal Rate of Return is 6% without including the sale of CERs and 14% including the sale of CERs.

Total cost of production of biodiesel at market conditions is expected to be higher than the market value of mineral diesel. This is particularly due to expected high cost of raw materials. Therefore, a government subsidy that recognizes non-market values of biodiesel production would be required for economic feasibility of this project.

In relation to the project financing, project sponsor would contribute with a most of the investment, and the rest will be financed by equity from additional investors and/or the banking system.

See Annex 2 for detailed calculations.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The project will reduce emissions by 2.16 Mt CO2 over 20 years (117 kt CO2/year after the fourth year of operation).

7. Estimated lifetime and crediting period for project

Project will have a duration of 20 years after start of operation of the plant. Carbon credits will be produced over the same period.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of this project reaches US$ 39/t CO2 equivalent; this value is very high and this production needs to be subsidized.

9. Documentation on environmental impacts

An environmental management system, compatible with ISO 14,000 standards, will be implemented. This implies monitoring and keeping a record of all possible activities and processes with npotential environmental and socioeconomic impacts.

10. Monitoring plan

A monitoring plan will be designed prior to the start of the project, according to accepted procedures for CDM projects. This plan will include emissions of greenhouse gases that can be attributed to project activity, from all relevant sources. These include:

- reduction of carbon dioxide emissions by substitution of mineral diesel by biodiesel;
- emissions due to electricity and fossil fuel use during biodiesel manufacturing process;
- increases in emissions associated with grain production and transportation, in case the project induces an increase in oil crop area with respect to baseline;
- emissions increases and reductions due to changes in the logistics of fuel distribution.

11. Estimated investor risk

The main risks of this project for the investor are:

- Lack of financial resources.

- The need for a government subsidy to compensate for the difference between biodiesel production cost and substituted diesel oil price.

- Changes in the prices of diesel oil due to modifications in the energy regulatory system (relative prices, supply, differential taxes, etc.) and to changes in international petroleum prices

- Increase in raw material (particularly vegetal oil) prices.

- The level of the CER prices and CDM-project transaction costs. CER sales are very important for project returns.

12. Potential reproduction

This project will result in production of 45 million L of biodiesel per year, which could be used to produce 225 million L/year of B20 grade diesel, equivalent to 30% of annual consumption of diesel fuel in Uruguay. Full adoption of B20 biodiesel in the country is a plausible mid-term objective. Therefore, there is potential for reproducing this project up to three times in Uruguay.

13. Technical summary of the technology used

Standard Process Description

Continuous two stage alkaline reesterification; oil and methoate (methoate is methanol with dissolved catalyst) is heated to process temperature (ca. 55 deg C) and intensively mixed with the oil, resulting in raw methylester and G-phase (glycerol phase); Vacuum distillation of the raw methylester (removal of methanol), washing with water and final drying (by second vacuum distillation) of methyl-esters ensures to meet all relevant norms (as possible from the raw materials).

Preparation of methoate: The solid, granular catalyst is manually put into the catalyst-dissolving-tank. The circulation pump is started, the methanol circulates through the catalyst granulate and dissolves it. The dissolving tank is connected to both of the methoate tanks and serves them alternatively.

2-stage - reesterification: The methoate and the oil is taken from the tanks by a pneumatic proportioning pump system which has a four – fold function: it serves as a general supply pump, a proportioner, a high pressure pump and a volume measuring system together with an (optional) computer control system. The oil – methoate mixture then enters into a heated static mixer-reactor where the reesterification takes place. The resulting emulsion then goes into high-tech coalescers and is split into a hydrophobic phase (methyl ester) and a hydrophilic phase (G – phase No. 1,2,3 – >60% glycerol, water, methanol. catalyst, soaps, methylesters - see point 8) components.

Final Standardisation: the raw methylester out of the second reesterification stage goes into the VACUUM DISTILLATION NO. 1 where excess methanol is removed (to be reused in the process). Washing with small amounts of water results in neutral methyl esters and G-phase Nr. 3. G – phase No. 3 goes to the buffer tank. The methyl ester finally goes into VACUUM DISTILLATION No. 2 for drying in order to meet all relevant norms – as possible from the used raw materials.

The produced biodiesel will comply with international standards, See annex 1 for more detailed technical information.

Provisions will be taken in order to comply with national environmental and personal protection standards.

Quality requirements for raw material for use in biodiesel production

Oils / Fats of animal or vegetable origin, FFA content (free fatty acids) max. 1,5 %, free from suspended solids, max. 300 ppm moisture, free from other substances..
Methanol: clean, pure, max. 0,5 % of water
KOH: technical quality, not carbonated and dry

14. Contextual information including:

Assessment of project sustainability

The project will have positive environmental and socioeconomic impacts, besides climate change mitigation. These include:

- creation of new direct and indirect jobs, with impact in rural areas, contributing to stopping or reversing current migration trends from these areas to large cities.
- reduction of Uruguay's dependance on foreign oil.
- improvement of farm economy through diversification of markets for oil grains.
- extended lifetime of tractor and truck engines by using biodiesel.
- reduced emissions of fine-particulate matter, ozone and sulfur oxides by fuel burning, thus reducing incidence of cardiorespiratory and other diseases, particularly in large cities.

Local viability

The project is well suited to local conditions. There are no restrictions in terms of human or physical resources needed for this project. Uruguay offers an attractive regime for foreign investment, in terms of regulations and institutional framework. There are special incentives provided to industrial investments. In the case of biodiesel, the governmment has made studies in this regard, and has recently passed a law that allows for tax exemptions to nationally produced fuels. Aditionally, in certains regions of the country, local governments promote investments like this.

Conformity to overall CDM criteria and goals

The project is fully compatible with CDM double goal of contributing to climate change mitigation and promoting sustainable development of host country. Substitution of fossil fuels is one of the activities eligible for CDM.

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Annex 1: Technical information

Mass balance for biodiesel production

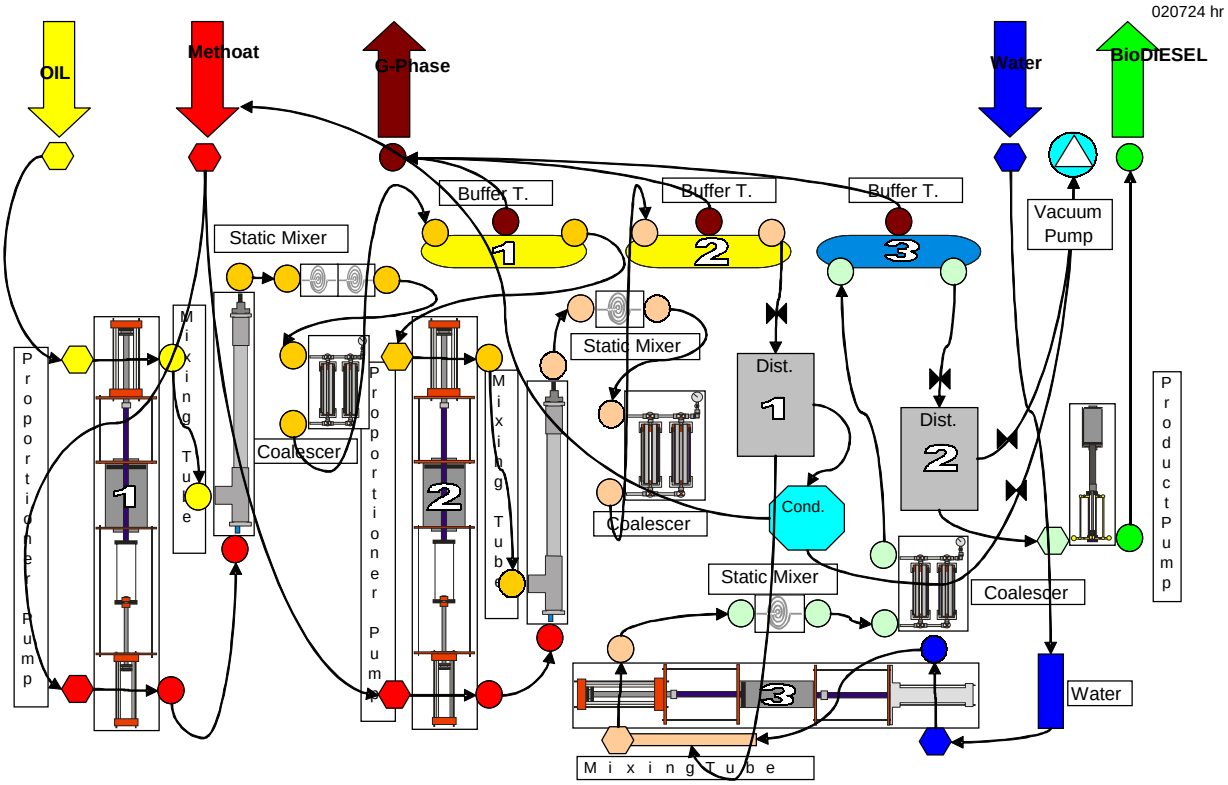
IN	Quantity (kg)	OUT	Quantity (kg)
Triglycerides	1000	Methylester (Biodiesel)	965
Methanol (min. 995 %)	156	Methanol (~ 50 %can be recycled)	23
KOH	10,1	G - Phase	178

Comparison of different national standards for biodiesel

-	Austria (1)	Czech Republic	France	Germany	Italy	Sweden	USA
Standard / Specification	ON C1191	CSN 65 6507	Journal Officiel	DIN V 51606	UNI 10635	SS 155436	ASTM PS121-99
Date	Jul-97	Sep-98	Sep-97	Sep-97	Abr-97	Nov-96	Jul-99
Application	FAME	RME	VOME	FAME	VOME	VOME	FAMAE
Density 15°C g/cm	0.85 - 0.89	0.87 - 0.89	0.87 - 0.90	0.875 - 0.90	0.86 -0.90	0.87 - 0.90	-
Viscos. 40°C mm^2/s	3.5-5.0	3.5-5.0	3.5-5.0	3.5-5.0	3.5-5.0	3.5-5.0	1.9-6.0
Distillat.95% °C	-	-	<360	-	<360	-	-
Flashpoint °C	>100	>110	>100	>110	>100	>100	>100
CFPP °C (°F) summer	max. 0 (32)	-5	-	max. 0 (32)	-	-5	-
CFPP °C (°F) winter	max. -15 (5)			max. -20 (-4)			
Pour point °C	-	-	<-10	-	<0/ <-15	-	-
Sulfur, % mass	<0.02	<0.02	-	<0.01	<0.01	<0.001	<0.05
CCR 100%, % mass	<0.05	<0.05	-	<0.05	-	-	<0.05
10% dist. resid., % mass	-	-	<0.3	-	<0.5	-	-
Sulfated ash, % mass	<0.02	<0.02	-	<0.03	-	-	<0.02
% mass							
(Oxid) Ash, % mass	-	-	-	-	<0.01	<0.01	-
Water mg / kg	-	<500	<200	<300	<700	<300	<0.05%
Total contam. mg / kg	-	<24	-	<20	-	<20	-
Cu-Corros. 3h/50°C	-	1	-	1	-	-	<No.3
Cetane No.	>49	>48	>49	>49	-	>48	>40
Neutral. No./ mg KOH/g	<0.8	<0.5	<0.5	<0.5	<0.5	<0.6	<0.8
Methanol, % mass	<0.20	-	<0.1	<0.3	<0.2	<0.2	-
Ester content, % mass	-	-	>96.5	-	>98	>98	-
Monoglyceride., % mass	-	-	<0.8	<0.8	<0.8	<0.8	-
Diglyceride, % mass	-	-	<0.2	<0.4	<0.2	<0.1	-
Triglyceride, % mass	-	-	<0.2	<0.4	<0.1	<0.1	-
Free glycerol, % mass	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
Total glycerol, % mass	<0.24	<0.24	<0.25	<0.25	-	-	<0.24
Iodine No.	<120	-	<115	<115	-	<125	-
C18:3 and high. unsat.acids % mass	<15	-	-	-	-	-	-
Phosphor, mg / kg	<20	<20	<10	<10	<10	<10	-
Alkalinity mg/kg	-	<10	<5	<5	-	<10	-

RME: Rapeseed oil methyl ester
FAME: Fatty acid methyl ester
VOME: Vegetable oil methyl ester
FAMAE: Fatty acid mono alkyl ester

Biodiesel production scheme



Annex 2

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total costs	5,000,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000
Investments	5,000,000	0	0	0	0	0	0	0	0	0	0
Biodiesel production costs	0	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000
Residual value of the investments											
Benefits	0	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494
Biodiesel sales	0	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714
Subsidies	0	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780
Net CER sales	0	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000
Net benefits	-5,000,000	0	869,494	869,494	869,494	869,494	869,494	869,494	869,494	869,494	869,494
Net benefits without sale of CERs	-5,000,000	-351,000	518,494	518,494	518,494	518,494	518,494	518,494	518,494	518,494	518,494
Reduced emissions in tons of CO2	0	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total costs	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000
Investments	0	0	0	0	0	0	0	0	0	5,000,000
Biodiesel production costs	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000	25,290,000
Residual value of the investments										-5,000,000
Benefits	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494	26,159,494
Biodiesel sales	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714	21,535,714
Subsidies	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780	4,272,780
Net CER sales	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000
Net benefits	869,494	869,494	869,494	869,494	869,494	869,494	869,494	869,494	869,494	869,494
Net benefits without sale of CERs	518,494	518,494	518,494	518,494	518,494	518,494	518,494	518,494	518,494	518,494
Reduced emissions in tons of CO2	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000

NPV (12%) of the net benefits without CERs US$	**-1,699,528**
FIRR of the net benefits without CERs	**6%**
NPV (12%) of the net benefits incl. CERs US$	**641,342**
FIRR of the net benefits without CERs	**14%**

Price of CERs net of transaction costs: 3 US$/t CO_2
Price of biodiesel: US$ 0, 48/L
Biodiesel subsidy:S$ 0,09/L

XII. Intensification of Livestock Production Combined with Afforestation

1. Executive Summary

Agriculture sector is responsible for more than 80% of Uruguay's contribution to climate change, largely due to livestock production, which emits 24 Mt CO_2 equivalent per year, or nearly 25 kg CO_2 equivalent per kg of meat equivalent produced. There is great potential for reducing these emissions per unit product, but it is necessary to find ways of doing it without imposing barriers to economic development of this important sector for National economy.

The present project combines intensification of livestock production by seeding improved pastures with afforestation based on fast growing tree species. Improved pastures result both in reduction of methane emissions by cattle, and in storage of carbon in soil, whereas forest plantation will remove large amounts of carbon dioxide from the atmosphere, storing carbon in its biomass, soil, litter and harvested wood products. The expected total contribution of this project to climate change mitigation is equivalent to ***4.7 Mt CO_2 over 24 years****, with respect to 0.5 Mt CO_2 equivalent that would be expected to occur in the baseline scenario over the same period.*

Several farms currently under extensive cattle production systems, and covering an area of approximately 19,000 ha, will be grouped for adopting a common production system that will be based on a mix of improved pastures and native grassland. The same amount of animal products is expected to be maintained in the project case, although these products will be obtained from a land area of approximately 40 % that of the baseline scenario. The released area will be used for developing a forestry project (10,000 ha) for obtaining s large proportion of solid wood products of Eucalyptus grandis and related tree species. A fraction of about 5 % of total area will be used for biodiversity preservation purposes.

Required capital investment is US$ 7.8 million (estimated as the net present value of projected cash flow until the last year with negative balance). At least 60% of this amount will be the project sponsor 's contribution. The rest will be obtained as loans from financial institutions. If CER revenue is not considered, NPV (12% per year) of net benefits would be US$ 2.1 million and FIRR would be 14%. The sale of CER would markedly improve economic performance: NPV would become US$ 5.4 million and FIRR 16%.

Assuming a CER price of US$ 3.5/t CO_2, carbon finance would contribute with revenue equivalent to US$ 3.3 million (net present value discounted at 12% annual rate), which represent a highly significant contribution to project finance. The cost of CERs was estimated as -US$ 2.4/t CO_2, which indicates a very good marginal benefit of carbon

Besides mitigating climate change at a negative cost, the project will have significant positive impacts on socio-economic and environmental aspects. A total of 290 new jobs will be created, which represents a 6.7-fold increase with respect to the baseline scenario. Other expected benefits include an improved economy of cattle growers, rural area development, protection of soil and biodiversity, and improved landscape beauty, among others.

2. Project description

A number of farms currently under extensive livestock production on soils of relatively low productivity will be grouped to implement a more intensive, pasture-based system of production. Total output of animal products will remain the same as in the baseline scenario. However, the area to be devoted to cattle production will be less than one half that of the baseline. The remaining area will be used for establishing plantation forests and biodiversity-rich protected areas.

The forestry component is essential for the project, for two reasons: a) since monitoring costs for methane and nitrous oxide emissions are expected to be high in comparison with expected revenues from certified emissions reductions (CERs) obtained by reducing emissions of these two gases, the large amounts of projected C sequestration by forests will help reducing the overall cost of producing CERs; and b) forestry appears as the most suitable alternative use for the land released from livestock both in terms of adaptability to low fertility soils and of the ability to contribute financially to the project.

The project will be implemented by Carbosur, a private firm specialized in climate change, with expertise in forestry and livestock projects.

Objectives

- To reduce greenhouse gas (GHG) emissions from livestock production under grazing by improving pasture quality and reducing the area required to obtain the same amount of animal products as compared to the reference scenario; and

- to sequester atmospheric CO2 by both seeding legume forages on native grassland and afforestation of areas released from livestock production.

Project Boundaries

The project will comprise a total of 19,000 ha of land from 5-10 extensive livestock farms, currently producing a total of less than 900 t of meat or its equivalent per year. Baseline GHG emissions due to animal production in project's area are estimated to be of more than 20 kt CO_2 equivalent per year (70% as methane and 30% as nitrous oxide). Under this project, a fraction of the land, including the most fertile soils, will be used to implement a semi-intensive animal production system, which would result in a reduction of GHG emissions per unit of animal product (from 23.5 to 12.8 kg CO2 eq/kg meat). In order to avoid leakage, a restriction to maintain the same level of production as in the baseline scenario will be imposed. This would also ensure the achievement of emissions reductions (otherwise, increase in production could offset the reduction of emissions per unit of meat).The land released from livestock production will be used to establish forest plantations for obtaining high-value, long-lived timber products and for sequestering large amounts of carbon dioxide from the atmosphere.

Time boundary is defined by project lifetime: 24 years

Activities to be monitored include methane emissions from rumen, methane emissions from soil, nitrous oxide emissions from soil, use of fossil fuels for forest operations, and changes in carbon stocks in soil, aboveground and belowground biomass, litter, and dead wood.

Baseline Scenario

Land is, and is expected to continue being used for extensive livestock production on soils covered by grass-dominated vegetation that has been subjected to 300 years of grazing,

which have caused changes in plant species and soil erosion and compaction. Ranch farms are typically of large sizes (from 1,000 to more than 5,000 ha).These extensive systems are of low productivity (50-60 kg meat equivalent/ha/year), cover more than 70% of Uruguay's surface area, and provide direct employment to only 2.1 people/1,000 ha (project area currently holds an estimated 40 permanent jobs). Rural areas, particularly in the Northern regions of the country are very sparsely populated (less than 1 inhabitant/km2), and quality of life of rural workers is impaired by the long distances to populated areas. Livestock production systems are very inefficient in terms of energy use (due to relatively poor pasture quality and low productivity) and, as a result, very large amounts of methane and nitrous oxide are released to the atmosphere. It is estimated that beef cattle emits 1.2 kg CH4/kg meat produced. Project baseline emissions are estimated to be 21,155 t CO2 equivalent per year (68% as methane from ruminal fermentation, 2% as methane from manure and 30% as nitrous oxide from soil). Carbon dioxide emissions are negligible.

Proposed Activities

Projected use of land will be as follows (figures subject to site-specific adjustments):

- Forest plantation: 10,000 ha
- Improved pastures: 4,100 ha
- Native grassland (grazed): 2,700 ha
- 'Unproductive' (native forest, firebreaks, etc.): 2,100 ha

Forest component will be based on *Eucalyptus grandis* plantations in rotations of 20+ years, managed with prunings (to a minimum height of 12 m) and 3-4 thinnings, to obtain knot-free, high-diameter logs suitable for sawmilling and veneering. Plantation will be completed by year 5 of project. An Environmental Management System will be implemented, and practices will be compatible with FSC (or similar) standard.

3. Proposed baseline methodology

Selected baseline methodology is "*Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment*". The economically attractive course of action is continuing using the land with extensive livestock, as it has been during the last 300 years. It is well known that pastures can be improved by introducing legume forages with addition of phosphate fertilizers, and this technology has been promoted by several agencies since the 1960's. However, adoption of this technique has been very slow, and after 40 years, more than 80% of the area under grazing is still 'natural' grassland. One possible reason for this is lack of finance and an attitude of risk aversion from farmers. Baseline study will address this and other possible reasons for the slow adoption of improved practices.

4. Technical Assessment

Pasture improvement will be achieved by introducing forage legumes or a mix of grass and forage legumes into native grass sod, with addition of phosphate fertilizer. This would improve both quantity and quality of available forage, with positive impacts on daily weight gain and reproductive indicators. As a result, a three-fold increase in animal productivity per unit area is to be expected, simultaneous to reduction in methane and nitrous oxide emissions from animal sources per unit product. Increased soil fertility associated with biological nitrogen fixation by legumes and phosphate fertilizers would also cause a

progressive increase in soil organic carbon content, and this constitutes another component of project's contribution to climate change mitigation.

Pastures will be seeded preferably by using no-tillage techniques on low-lying areas, where risk of implantation failure due to lack of soil moisture is minimized. Legume seeds will be inoculated with proper *Rhizobium* bacteria strains, to ensure their nitrogen fixation capability. This technology has been used for several decades in Uruguay and elsewhere, and there is sufficient local availability of human resources and equipment to implement this component of the project.

Forests will be established by using best-available technology for site preparation, weed and pest control, genetic materials, and planting method. Preferably, plantations will be established on soils with lowest agriculture production potential or with highest risk of erosion or degradation. Land to be forested will be rented from cattle growers. A large proportion of the area will be planted with *Eucalyptus grandis*, although other species will be planted as well, according to site-specific conditions.

E. grandis plantations will have 20+ year rotations, and will be managed with the objective of maximizing the production of high quality timber for solid wood products. Initial stands will be of approximately 1,100 plants/ha. Pruning will start at age 2-3. First pruning will be to 3 m height, on all trees. Successive prunings (up to 12 m height) will be made on selected trees. A first thinning will be performed at age 7-8, leaving a stand of 400-500 plants/ha. Second thinning will be at age 10-11, with a remaining stand of 300 plants/ha. A third thinning at age 15 will leave 150 plants/ha for clearcutting at age 20-22. All thinnings will yield commercial wood, with total production of at least 600 m^3/ha (mean annual increment of 30 m^3/ha/year).

A fraction of the total area will be closed, allowing vegetation to evolve naturally. Protected areas will preferably be located near water streams, and will be interconnected, thus allowing for free movement of native animals through biological corridors. The aim will be to protect 5% of total project area, although the exact proportion will be determined according to site-specific conditions.

5. Economical Assessment

NPV (12%) of project net benefits was estimated as US$ 5.4 million (including sale of CERs) and US$ 2.1 million (without considering CERs). The internal rate of return (IRR) of livestock component is 49.8 %, whereas forest component would have an IRR of 15.1 %. Project overall IRR was estimated as 15.9 % (with carbon finance) and 13.7 % (without carbon finance).

Sale of CERs would generate a present income (discounted at 12 % annual rate) of US$ 3.3 million, equivalent to 19% of total benefits.

In relation to project financing, project sponsors and additional investors would contribute with a fraction (60%) of initial investment, and the rest will be obtained from financial institutions. CER sales can potentially contribute with nearly 40% of capital needed.

See Annex 1 for detailed calculations

6. Estimated GHG emissions reduction potential (annual and lifetime)

Project will result in a climate change mitigation benefit equivalent to reducing emissions by 4.7 Mt CO2 (over 21 years). This figure results from:

- Reduction of GHG emissions by ruminants of 202,860 t CO2 equivalent (9,660 t CO2 equivalent/year).

- Net carbon sequestration in soil by pastures of 301,220 t CO2 equivalent (14,300 t CO2 equivalent/year).

- Carbon sequestration by forest plantations of 4,200,000 t CO2 equivalent (200,000 t CO2 equivalent/year).

Annual flow of emissions reductions will vary according to stage of project development. Assuming that project begins in 2004, production of CERs for specific periods would be as follows:

2004-2007: 0.2 Mt CO2-equivalent

2008-2012: 0.9 MtCO2-equivalent

2013-2017: 1.6 MtCO2-equivalent

2018-2025: 2.1 MtCO2-equivalent

7. Estimated lifetime and crediting period for project

Project lifetime is 24 years. Crediting period will be 21 years for the emissions reduction component, and at least 24 years for the sequestration component. Project is expected to start in 2004. Currently, potential sites for project are been looked for. A project sponsor is required.

8. Estimated cost per tonne of CO2 equivalent

The marginal cost of CERs is expected to be negative: - US$ 2.38/t CO_2 equivalent. This represents a low marginal benefit.

9. Documentation on environmental impacts

An environmental impact assessment of this projects will be performed, despite the fact that this is not required in Uruguay for this type of project. An environmental management system, compatible with ISO 14,000 or FSC standards will be implemented. This system will also comprise monitoring and documenting of social impacts.

10. Monitoring plan

A monitoring plan will be implemented since the start date of the project. This plan will include measurement of methane emissions from rumen, methane emissions from soil, nitrous oxide emissions from soil, use of fossil fuels for forest operations, and changes in carbon stocks in soil, aboveground and belowground biomass, litter, and dead wood.

11. Estimated investor risk

Possible sources of risk include:

- lack of financial resources

- adverse climatic factors causing failures in forage and forest establishment.

- destruction of forest by fire or pest outbreaks.

- non-permanence of forest after end of crediting period

- non compliance of agreed agricultural practices between project developer and land owners.

- decrease in timber prices

- level of CER prices and CDM-project transaction costs. CER sales are important for project returns.

12. Potential reproduction

This project's central idea (improvement of livestock production by combination with forestry and introduction of environmental services as a new source of income for farmers) could potentially be implemented over millions of hectares in remote, low populated areas of Uruguay and neighboring countries.

13. Technical summary of the technology used

Introduction of legume forages (*Lotus sp*. and others) into native sod: this technology is based on the use of non-selective herbicides (*glyphosate*) to control native vegetation, and seeding with no tillage. Seeds are to be treated with *Rhizobium* inoculant in a suitable vehicle, and either broadcast on soil surface or seeded in rows by means of a no-till seeder. Phosphate fertilizer will be applied at seeding and broadcast every other year. Pasture renewal is to be performed as needed after two years of initial establishment. This technology has been used in hundreds of farms in Uruguay during the last 40 years.

Afforestation with *E. grandis* and other related species: Site will be prepared by a sequence of non-selective herbicide treatments and tillage operations, mainly performed on 1-m strips where trees will be planted. Ant control is to be performed by environmentally friendly insecticides (ie. *fipronil*), since first tilling of soil until a few months after plantation. Seedlings will be planted by means of hand planters or planting machines. Both non selective and residual herbicides will be applied as needed. Fertilizer will be applied at the sides of every plant, also as required. Weed control practices, either chemical or mechanical will be applied during the first months after plantation. In general all procedures will follow the Code of Good Practices currently being developed by the Society of Uruguayan Foresters. Silvicultural technology to be employed in this project is widely applied in Uruguay. During the last 15 years, several hundreds of thousands of hectares were planted in a similar way.

14. Contextual information

Assessment of Project Sustainability

Sustainability of this project is supported by a rational, conservative use of natural resources (land, water), combined with positive environmental and socio-economic impacts.

It is expected that project will result in environmental benefits at the local level:

- Improved preservation of biodiversity by the protection to be provided by newly established tree vegetation and by establishment of protected areas.

- Soil protection by planting forests on areas most susceptible to soil erosion.

- Creation of a renewable energy resource (biomass).

- Improved landscape beauty.

Also, project would result in improved economies of participating livestock producers:

- Gross benefit of livestock production would increase by ca. US$ 11/ha/year (balance between new income of $18/ha/yr and new expenses of $7/ha/yr). This is twice the benefits obtained by these farmers under baseline scenario.

- These landowners will also benefit by their ownership of a second rotation of forests.

- Intensification of livestock production would help farmers reducing risks due to climatic factors (such as drought) by improved control of feed supply and reserves.

- Livestock farmers would also benefit by diversification of sources of income (besides sales of animal products, they will receive income from forest land rent and from sale of carbon credits).

Forestry component would have a very large socio-economic impact in project's area by creation of a high-value new resource, with potential to create a significant number of new jobs. This has already been demonstrated by past experience with forestry development in the country. The new forest resource would be a factor of attraction for future investments in wood manufacturing and bioenergy production.

This project will have significant effects on employment:

- Livestock component would maintain the same level of production as in the baseline on a reduced land base. Employment will be maintained at 51 permanent jobs (40 direct, and 11 indirect jobs).

- Forestry component would create 286 new jobs (200 direct and 86 indirect). The number of indirect jobs may increase significantly in the future in case of a strong development of wood manufacturing industry.

- Climate change mitigation component would create 5 direct jobs.

- Overall, project is expected to increase employment by 6.7 fold with respect to baseline scenario.

Local Viability

Both components of this project (livestock and afforestation) are based on proven, locally adapted technologies. The business concept of association under a contract imposing land use and agricultural practices is new, and will require a careful selection of parts involved.

Conformity to Overall CDM Criteria and Goals

This project is in line with the double goal of CDM: climate change mitigation and sustainable development of host country. Project is consistent with current development policies in Uruguay.

The livestock component of the project is compatible with CDM criteria approved by COP-7 (Marrakech Accords), with one exception: the storage of carbon in soils due to management of grassland is currently a non-eligible activity under the CDM.

Full Contact Information

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Annex 1:

Cash Flow

In US$ of the year 2003

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total costs	304,500	760,623	1,645,558	1,901,052	2,733,277	3,003,785	1,841,693	1,904,800	1,613,753	1,906,785	1,683,535	1,625,683
Livestock expenses	0	41,980	89,058	117,695	167,322	180,067	113,475	150,357	122,695	159,577	159,577	113,475
CER related expenses	104,500	40,160	29,400	37,100	64,800	44,800	44,800	64,800	44,800	44,800	64,800	44,800
Replanted forest	0	0	0	0	0	0	0	0	0	0	0	0
Forest land rental	0	41,333	108,000	166,667	250,000	333,333	333,333	333,333	333,333	333,333	333,333	333,333
Forest expenses	100,000	593,900	1,372,600	1,529,840	2,198,155	2,392,585	1,297,085	1,303,310	1,059,925	1,316,075	1,072,825	1,081,075
CER related expenses	100,000	43,250	46,500	49,750	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000
Revenues	0	49,719	133,158	208,597	395,395	807,193	472,193	1,299,193	657,193	2,815,193	897,193	2,939,860
Livestock revenues	0	41,333	108,000	166,667	250,000	333,333	333,333	333,333	333,333	333,333	333,333	333,333
CER sales emissions reductions	0	3,381	10,143	16,905	25,358	33,810	33,810	33,810	33,810	33,810	33,810	33,810
CER sales carbon sequestration	0	5,005	15,015	25,025	37,538	50,050	50,050	50,050	50,050	50,050	50,050	50,050
Forest revenues	0	0	0	0	82,500	110,000	55,000	0	240,000	480,000	480,000	600,000
CER sales	0	0	0	0	0	280,000	0	882,000	0	1,918,000	0	1,922,667
Net benefits	-304,500	-710,904	-1,512,400	-1,692,455	-2,337,882	-2,196,592	-1,369,500	-605,607	-956,560	908,408	-786,342	1,314,177
	0	0	0	0	0	0	0	0	0	0	0	0
Net benefits without sale of CERs	-304,500	-710,904	-1,512,400	-1,692,455	-2,337,882	-2,476,592	-1,369,500	-1,487,607	-956,560	-1,009,592	-786,342	-608,490
Reduced emissions in tons of CO2	0	2,396	7,188	11,980	17,970	103,960	23,960	275,960	23,960	571,960	23,960	573,293

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total costs	1,667,740	1,417,503	1,445,260	1,456,960	1,441,808	1,475,790	1,467,178	1,541,310	1,535,710	2,678,475	2,841,490	2,791,662
Livestock expenses	150,357	122,695	159,577	159,577	113,475	150,357	122,695	159,577	159,577	113,475	150,357	122,695
CER related expenses	44,800	64,800	44,800	44,800	64,800	44,800	44,800	64,800	44,800	44,800	64,800	44,800
Replanted forest	0	0	0	0	0	0	0	0	0	0	0	0
Forest land rental	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	300,000	233,333	166,667
Forest expenses	1,086,250	843,675	854,550	866,250	877,200	894,300	913,350	930,600	945,000	2,167,200	2,340,000	2,404,500
CER related expenses	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000
Revenues	2,117,193	4,674,027	2,617,193	5,358,193	5,887,193	7,730,860	5,857,193	8,812,902	16,217,193	18,383,860	20,293,818	22,750,527
Livestock revenues	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	300,000	233,333	166,667
CER sales emissions reductions	33,810	33,810	33,810	33,810	33,810	33,810	33,810	33,810	33,810	33,810	33,810	33,810
CER sales carbon sequestration	50,050	50,050	50,050	50,050	50,050	50,050	50,050	50,050	50,050	50,050	50,050	50,050
Forest revenues	1,700,000	2,200,000	2,200,000	2,750,000	5,470,000	5,440,000	5,440,000	6,800,000	15,800,000	18,000,000	18,000,000	22,500,000
CER sales	0	2,056,833	0	2,191,000	0	1,873,667	0	1,595,708	0	0	1,976,625	0
Net benefits	449,454	3,256,523	1,171,933	3,901,233	4,445,386	6,255,070	4,390,015	7,271,591	14,681,483	15,705,386	17,452,329	19,958,865
	0	0	0	0	0	0	0	0	0	0	0	0
Net benefits without sale of CERs	449,454	1,199,690	1,171,933	1,710,233	4,445,386	4,381,404	4,390,015	5,675,883	14,681,483	15,705,386	15,475,704	19,958,865
Reduced emissions in tons of CO2	23,960	611,627	23,960	649,960	23,960	559,293	23,960	479,877	23,960	23,960	588,710	23,960

NPV (12%) of the net benefits without CERs US$	**2,102,714**
FIRR of the net benefits without CERs	**14%**
NPV (12%) of the net benefits incl. CERs US$	**5,398,112**
FIRR of the net benefits without CERs	**16%**

Price of CER without transaction costs: 3.5 US$/Ton CO2 equivalent

XIII. La Teja Refinery Revamping and Expansion

1. Executive Summary

This project constitutes a significant portion of the Technological Development and Environmental Master Plan for La Teja Refinery, which is located in Montevideo (URUGUAY) and is owned by "Administración Nacional de Combustibles , Alcohol y Portland" (ANCAP). This revamping and expansion project comprises the following activities.

- *Upgrade and capacity expansion of existing units such as Topping (from 37.000 to 50.000 BPSD) and Catalytic Cracking (from 9.000 to 12.000 BPSD).*
- *Construction of a new unleaded gasoline complex constituted by a new Naphta Hydrotreater Unit (18.000 BPSD), a new Isomerizer Unit (6.000 BPSD) and a new Reformer Unit (12.000 BPSD), the latter in substitution of an older one.*
- *Substitution of fuel-oil by fuel-gas produced at the refinery, as self consumption fuel for boilers and furnaces.*
- *Improvement of liquid effluents treatment through the installation of a dissolved air flotation unit.*

The accomplishment of this project will allow ANCAP to keep on operating La Teja Refinery, exhibing a better technological and environmental behaviour while enjoying an improvement in terms of competitiveness.

This project contributes to the reduction of CO2 equivalent emissions in 150.000 tonnes per year, at a cost arising 37 US dollars per tonne. Besides other valuable benefits derive from this project, including the improvement of: a)the environmental behaviour of La Teja Refinery and b)urban air quality in Uruguay, the latter as a consequence of the use of the new gasolines by the car fleet, aspects which altogether contribute to sustainable development.

Revamping and expansion works are being entirely funded by ANCAP, and are almost completed, and the refinery will start operating by mid-2003. Project risks are mostly related with the level of activity of the refinery in the future, and with the operation of the fuel gas producing system.

2. Project description

Objetives

The main objective of this project consists in the production of three unleaded gasolines (differing in the octane number), with low sulphur content. Such gasolines will meet the needs of vehicles with modern engines in the domestic market and will allow access to international markets.

Simultaneously, the use of heavy fuel-oil for self consumption will be discontinued thus reducing GHG, as well as SOx emissions when compared with the previous emission pattern. Substituting the fuel-oil, fuel-gas to be produced at the refinery, with a high hydrogen content, will constitute the self consumption fuel.

The improvements in the effluent treatment will ensure that the final hydrocarbon content in the liquid effluents won´t exceed 20 ppm, well below the maximum concentration allowed of 50 ppm. Thus the refinery will be prepared for future legislation more stringent in this matter.

Baseline Scenario

In terms of the reduction of GHG emissions, the most important component of this project is the substitution of the self-consumption fuel at the refinery. Taking into account the fact that the different components of the project interact with each other, the baseline for GHG emissions will be determined by the addition to the emissions derived from the self consumption fuel before the project, plus the emissions which would have produced fuel-oil if it had been the self consumption fuel, for the additional capacity of the units expanded.

3. Proposed baseline methodology

ANCAP has the required data and information for the determination of the baseline scenario, allowing the application of the selected methodology which consists to correlate production with GHG emissions.

4. Technical Assessment

The “Institute Français du Petrole” (IFP) was the main advisor for the project and suggested to apply well known and widespread proven modern technologies.

The environmental aspects of the project including its adjustment as a CDM project, were performed by the environmental staff group which belongs to the Environmental, Safety and Quality Division of ANCAP.

The project complies with local environmental legislation and the Previous Environmental Authorization was granted as required by law 16.466 and derived regulations. An Environmental Impact Assessment (EIA) was performed by an independent consultant (COTEC SRL) and thus in April 2000 the “Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente” granted said Authorization.

From an environmental standpoint the accomplishment of the project significantly contributes to the long time operating life of the refinery at its present site, since it improves its environmental behaviour. GHG emissions, particulate matter and SOX emissions are reduced whereas the quality of liquid effluents is improved in terms of the most relevant parameters.

On the other hand, the technical specifications of new gasolines will allow an important reduction in the negative impacts derived from the use of liquid fuels of fossil origin by the car fleet: SOX emissions will decrease, lead components will be supressed, all vehicles with catalytic converters will be fed with unleaded gasolines and higher levels of combustion efficiency will be achieved by cars with modern engines since a high octane gasoline will be available (97.5 RON).

5. Economical Assessment

Total investment required-140 million US dollars approximately-is wholly financed by ANCAP. The accomplishment of the project implies both an expansion of the production capacity of La Teja Refinery and an improvement in its economical competitiveness due to the production of higher value gasolines.

6. Estimated GHG emissions reduction potential (annual and lifetime)

The reduction of GHG emissions, due to the substitution of self consumption fuel at the refinery, is considered as follows

i) Before 2008

Year 2003: 75.000 tonnes of CO2 equivalent

Year 2004 to 2007: 1.050.000 tonnes of CO2 equivalent

ii) During 2008-2012: 1.200.000 tonnes of CO2 equivalent

iii) During entire project lifetime (25 year) : 3.750.000 tonnes of CO2 equivalent

7. Estimated lifetime and crediting period for project

Lifetime for the project is estimated as 25 years. As crediting periods, either 5 or 10 year intervals, renewable, are suggested. All credits will be subject to the required monitoring activities.

8. Estimated cost per tonne of CO2 equivalent

The rate of total investment to GHG emissions reduction arises to 37 US dollars per tonne of CO2 equivalent.

9. Documentation on environmental impacts

The EIA developed by COTEC SRL is available. Copies of “Informe Ambiental Resumen” submitted to MVOTMA and of Previous Environmental Authorization are adjoined.

10. Monitoring plan

Monitoring activities will be carried out following ARPEL´s Environmental Guidelines. ARPEL is the Regional Association of Oil and Natural Gas Companies in Latin America and the Caribbean and this organization, in the frame of an Environmental Program supported by the Canadian International Development Agency, developed several environmental guidelines for this industry, with the technical assistance of Canadian Consultants. One of such guidelines will be particulary taken into account: “Energy Use Monitoring and Tracking (2002,AEG·# 33).

11. Estimated investor risk

At present the project is 95% accomplished and since GHG reduction credits will be sold once the project becomes fully operational, the estimated investor risks are minimal. Project risks are mostly related with the level of activity of the refinery in the future, and with the operation of the fuel gas producing system.

12. Potential reproduction

Reproduction potential in the immediate future is minimal owing to the fact that ANCAP has a monopoly for oil importing and refining, and because there is only one refinery in Uruguay: La Teja.

13. Technical summary of the technology used.

The technology applied is well known and proved in a worldwide basis by the oil industry. All units and pieces of equipment were purchased through bidding procces, taking into consideration both quality and price.

The main components of the project from a technical stanpoint are the following:

- Construction of a new naphta Hydrotreater Unit (18.000 BPSD),
- Construction of a new CCR Reformer Unit (12.000 BPSD),
- Construction of a new once through Isomerizer Unit (6.000 BPSD),
- Expansion of existing Topping/Vacuum Units Capacity, and
- Expansion of the Fractionation and Vapor Recovery Units of the existing FCC.

14. Contextual information

Assessment of project sustainability

Considering the technological upgrade and the environmental benefits derived from the revamping and expansion activities, project sustainability along its lifespan is attainable because it shows positive impacts in all aspects involved.

Local viability

Local viability is assured based on the environmental improvements included in the project, on the approval obtained by the environmental authorities (Previous Environmental Authorization), on the follow-up activities developed by local and national environmental authorities and on the fact that the project han´t been opposed by either NGOs or the neighbours.

Conformity to overall goals CDM criteria and goals

ANCAP´s environmental staff considers that this proyect complies with CDM criteria and goals because it causes a reduction of GHG emissions and it contributes to the sustainable development of the host country.

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Project Brief Descriptions

I. Montevideo Methane Recovery from Closed Landfill

The project consists of the gas extraction and energy recovery from the Montevideo closed landfill area, either from electric power generation or from pipeline quality gas production. Even when electrical generation is the most usual worldwide landfill gas recovery application, local and regional fluctuating conditions of the electricity market may determine higher levels of uncertainty for this option. Processing to pipeline quality high-BTU gas, and its injection into the natural gas distribution network requires close cooperation with the private natural gas distributor, to whom the enriched LFG will be sold.

The landfill operated by the IMM is located in a 71 hectare site in the limits of Montevideo's urban area. Since 1989, domestic solid wastes, street sweepings, park wastes, demolition debris and some industrial wastes generated by 1.4 million inhabitants have been landfilled here in a controlled way. This should be understood as a landfill with frequent capping of the wastes, compacted low permability clay as bottom, and groundwater monitoring wells. The controlled landfill area of 29.5 hectares and 30+ meters high (Usina 6 and Usina 7) is about to be closed, and its size (about 5,5 millions m^3 of refuse in place) and type of refuse received makes this site attractive for a LFG to energy project. Actually, the original project of this landfill included a LFG recovery system; however, due to landfill operational and mangement problems, only passive venting was implemented.

A rough estimation of the GHG emissions reduction for this project is 1,0 million ton of CO2e in 20 years (average 50,300 ton CO2e/year). However, further sudies are necessary to give more reliable estimations, using actual records of waste disposal and capping. Unfortunately, this records not always have been systematically taken. As in any LFG recovery project, field pumping trials should be done to before the final decision is taken. The investment needed for producing pipeline quality high Btu gas (an average of 3,3 million Nm^3/year CH4 and injecting it in the natural gas grid will be about US $ 5,5 millions.

II. Methane Recovery from Industrial Wastewater Treatment Plants

The project consists of the upgrading of 9 industrial wastewater treatment plants in order to recover and burn the methane generated in the biological treatment. Those 9 industrial facilities have been identified as generating Uruguay's largest amount of GHG in the source category "treatment of liquid wastes". To achieve the methane recovery, anaerobic ponds will be substituted by high-rate anaerobic reactors. Although there are several technologies available for anaerobic reactors, there is some local experience with upflow anaerobic sludge blanket (UASB) reactors, so it will be the first logical choice. However, proper design, operation and maintenance of high rate reactors require greater skills than those needed for anaerobic ponds.Therefore, staff training will be critical to the success of the project, so it was also included in the project budget.

The industrial sectors involved are tannery, wool scouring, slaughterhouses and dairy. Total flow of wastewater treated is about 15,170 m^3/d, with a total organic load of 77,5 tons DBO5/d. The facilities are located far from each other, each one in a different department (except for two facilities in Flores department), which precludes the combined treatment. Investment will include civil works, equipment, pumping units, burners, and land movement for closure of anaerobic ponds.

The expected reduction of GHG emission is about 1,05 million ton of CO2e during the 2003 – 2012 period, with a total estimated cost of US $ 9.8 millions. Due to the strong economic recession, upgrading of the wastewater treatment plant may not seen as a priority by the industry, moreover if there is already compliance with effluent standards. Some of the additional benefits from switching to high rate anaerobic reactors would be improved performance in the organic biodegradable content removal, odour nuisance reduction and space saving for alternative uses. However, electrical generation with low-Btu fuel feeded engines should be considered in each case, in order to render the project more attractive for the investor and to promote sustainable development through the use of renewable fuels.

III. Use of Wind Power to Generate Electric Power[1]

The project consists of building a wind-power facility (Wind Park) of 20 MW, interconnected to UTE's network and made up of 27 wind-driven power generators of 750 kW of power each. The interconnection to the network is done through a 60 kV line of 15 km length and a boosting transformer of 60/150kV, in order to ascertain a reliable and safe connection from the facility to UTE's network. This voltage level would pave the way for potential future expansion of the Wind Park and could also make it possible to start operating in 30 kV.

The project assumes a site location, in line with the only available actual experience in this matter, in the area of Sierra de Caracoles (Department of Maldonado) 10 km away from route 9 (Abra de Perdomo km 129.5); this site was selected due to the results obtained in the study performed under the agreement between UTE and the School of Engineering of the University of the Republic (1991), "Quantification of Large-Scale Wind Power-Generating Potential" and where the first wind-driven generator is currently located and connected to the network (test venture of 150 kW).

The necessary area to install each wind-driven generator is approximately 3.5 ha resulting in an overall area of 100 ha for this Park. If the generators were to be lined up on the top of a hill, they would cover 4 linear km.

Because the generated power enters the UTE network in high voltage and it would only have local effects, no associated waste is considered. The lines, the transformers, the protections and maneuvering sections are assigned to the project as additional necessary facilities. Since the cost is significant, these items must be considered in full for valuation purposes.

Road works involve improving the existing roads in order to enable circulation of vehicles for transportation and mounting of the components in the land plot of the Wind Park. The project also considers the construction of those new branches needed to access each of the wind-driven generators where no road was previously available.

Although the project presents a certain visual impact due to the large display on the top of the Sierra, it is located in the midst of a productive area located to the North of San Carlos with a small use of land in the site and away from the flow of tourists. Besides, the wind-driven generators do not prevent the use of the surrounding land for other purposes.

Greenhouse gases reduction is estimated through quantifying the decline in CO_2 emissions as a result of the substitution of wind-generated power for thermal generation power.

The Wind Park facility is regarded to produce the same amount of energy per year throughout its 20 years of life, estimated in 87.6 GWh/year and represents a reduction of the annual CO_2 output of around 39,683 tons. Therefore, during the period between 2003 and 2012, overall emission reductions would almost be 397 kton of CO_2.

The estimated marginal cost of electric power generation of the Wind Park would be US$ 111.12 / ton of CO2 reduction, at 2002 prices, starting from an overall marginal cost of more than US$ 23 million at current values.

[1] Source: Study conducted by the Investment Planning department of the National Administration of Electric Power Facilities and Transmissions (UTE) in July, 2001. "Economic Assesment of a Wind Power Generation Facility of 20 MW".

IV. Lighting Efficiency Enhancement

In Uruguay, high-efficiency or compact fluorescent lamps (CFL) only have a marginal share of total lamps used for residential lighting. About 90% of imports are incandescent bulbs; only 9% are fluorescent and mostly consist of tubes.

This situation is mainly due to the existence of two barriers: the residential sector lacks enough information concerning the features of the CFL and the cost of fluorescent lamps is several times higher than that of traditional incandescent bulbs.

In Uruguay, the demand for electricity is growing significantly and the generation of electric power by hydraulic means has reached its limit, leading to the need to resort to thermal sources of power. As a result, any effort to increase efficiencies in the use of electric power as well as to soften the daily peak of demand will have beneficial effects.

This program consists of fostering the replacement of incandescent filament lamps commonly used in households for CFL, considering that CFL provide the same luminous flow as incandescent lamps with approximately 5 times less power consumption, by means of an important advertising campaign in the different mass media.

A program of this type should be approached gradually, so we may assume the introduction of 3 CFL in 50% of urban households countrywide over a period of 5 years. With this assumption, and considering an annual rate of growth in the number of households of 0.55% in line with the last national census performed in 1996, we have that, throughout the period between 2003 and 2012, the introduction of CFL will rise to 1,800,000 units.

The application of this program implies electric power generation services of almost 900 GWh in the 2003-2012 period, and this avoids emitting slightly above 400 kton of CO2.

Considering the NPV of annualized investment costs, cost savings from lower electric power consumption and emission reductions, we arrive at a marginal cost of introducing CFL that is actually negative by 4,48 US$/ton of CO2 reduction, so it represents an income instead of an expense.

V. Use of Compressed Natural Gas (CNG) in Automobiles and Taxis

Oncoming availability of natural gas from Argentina and the foreseen expansion of its distribution network open up the chance to use CNG for transportation.

The application of natural gas for transportation is mostly suitable in the case of light gasoline-driven vehicles. It consists generally of a dual system that easily adapts to Otto-cycle engines.

The main disadvantage of CNG is the lesser endurance of the vehicle (170-200 km) and the transportation of the fuel in a network, which limits the use of the vehicle to areas where gas distribution is available. Another disadvantage is the space occupied by fuel storage tanks, smaller in cars and larger in heavy vehicles, where there is the additional issue of the feeding system. Hence, the use of CNG is mainly applicable to captive fleets with a localized range of circulation.

In order to define this measure, it assumes that in 10 years, the area of influence of the distribution network of CNG with this purpose would cover 80% of the country's full automobile fleet. The percentage of penetration of CNG has been calculated in 15% of gasoline and diesel automobiles. For the case of gasoline-driven taxis, we have assumed a penetration of 100% in Montevideo and Canelones, and for the case of diesel taxis the assumption is a CNG penetration of 50%. Likewise, in the base line scenario, the assumption is an annual growth of the taxis and automobile fleet of 1%.

The reduction of emissions in the 2003-2012 period rises to a figure of 458 kton CO2. The investment cost is around 93 million US$ and a negative marginal cost figures of a 133 US$/tonCO2

VI. Use of Compressed Natural Gas (CNG) in Buses and Trucks

In several places in the world (Canada, the U.S.A., Europe) there is growing use of CNG for heavy vehicles. For endurance reasons, its application mainly covers urban buses. Differing from gasoline-driven cars that use a dual CNG/gasoline system, heavy vehicles that use CNG generally come that way out of the factory and use only natural gas.

In this measured, the assumption is that CNG shall reach 50% of current fleet of Montevideo urban buses and 30% of the suburban ones, over a period of 10 years. For the fleet of trucks, the asumption is that the CNG will reach 15% of the fleet in the area of influence of the distribution network mentioned in measure 2.

The reduction of emissions produced by this measure responds to the change in fuel used by the affected fleets. Thus, the emission reduction in the 2003-2012 period amounts to 273 kton eq CO2. The marginal cost for the use of CNG in buses and trucks is a negative value of 184,71 US$/ton CO2 reduction.

VII. Reduction of Electricity Consumption for Water Heating in Homes

Electricity consumption shows an increasing trend in Uruguay (4.7% per year during the last 35 years), particularly in the residential and services sectors. More than 80% of consumption is generated in four hydroelectric centrals, the rest being produced by two thermal plants, or imported from Argentina. Greenhouse gas emissions associated with electricity use are currently very low (1 Mt CO2/year). However, capacity for hydroelectric generation is nearing saturation, and future growth would likely be based on natural gas imported from Argentina through two newly built pipelines. This will bring about increased greenhouse gas emissions from the electricity sector. Reducing electricity consumption can help reducing greenhouse gas emissions.

The present project idea consists in the installation of roof solar water heaters in 50,000 homes in Uruguay. These units would make use of incoming solar radiation to preheat water feeding electric water heaters normally used in Uruguayan homes. This would result in decreased energy bills and at the same time, reduced greenhouse gas emissions.

The baseline scenario is defined by an rising use of electricity in the country, which will increasingly be generated from fossil fuels. A baseline emission factor of 0.45 kg CO2/kW-h (according to an estimation by Climate Change Unit, Ministry of Environment) was assumed for the purposes of the present project description. This is considered to be a very conservative assumption. Home water heating accounts for 15% of electricity consumption in Uruguay, or about 1 TWh per year (1 MWh per home per year).

The project would target 50,000 homes currently consuming 1.75 MWh/year for water heating. Solar pre-heating would reduce electricity consumption by 40%, or 0.7 MWh/home/year. At current electricity prices for residential consumers, electricity bills would be reduced by US$ 70/home/year. Emissions reductions would amount to 15 kt CO2/year, or 0.3 Mt CO2 during project’s lifetime.

A pre-feasibility study should identify a suitable technology for this project, as well as a proper design for monitoring electricity savings. It is anticipated that implementation of this project would be challenged by design of a cost-effective, transparent monitoring system, as well as for the definition of ownership rights for carbon credits.

The project would make a significant contribution to Uruguay's sustainable development through reduction of household budgets, reduction of foreign-energy dependance, and improving local environmental quality.

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VIII. Electricity Generation from Rice Husks in Eastern Uruguay

Electricity consumption shows an increasing trend in Uruguay (4.7% per year during the last 35 years), particularly in the residential and services sectors. More than 80% of consumption is generated in four hydroelectric centrals, the rest being produced by two thermal plants, or imported from Argentina. Greenhouse gas emissions associated with electricity use are currently very low (1 Mt CO2/year). However, capacity for hydroelectric generation is nearing saturation, and future growth would likely be based on natural gas imported from Argentina through two newly built pipelines. This will bring about increased greenhouse gas emissions from the electricity sector. Biomass (wood residues, rice husks) appears as an alternative source of electricity, with potential for reducing greenhouse gas emissions and foreign-energy dependance of the country, and promoting sustainable development.

The present project idea consists in the development of two to four 3-MW plants to produce electricity from rice husks. The plants would be located in strategic sites in Eastern Uruguay, the most important rice producing area in the country. Part of the energy will be self-consumed, and the remainder will be sold to the grid. Every plant will consume 30,000 t of rice husks to produce approximately 16,000 MWh per year. The number of plants, their size and their exact location are to be defined by a feasibility study, with the criteria of optimizing the balance between freight costs and economy of scale. Project would be implemented by Arrozur, an association of the main rice products companies of Uruguay, based in Treinta y Tres.

The baseline scenario is defined by an rising use of electricity in the country, which will increasingly be generated from fossil fuels. A baseline emission factor of 0.45 kg CO2/kW-h (according to an estimation by Climate Change Unit, Ministry of Environment) was assumed for the purposes of the present project description. This is considered to be a very conservative assumption. Rice husks are considered to be a waste. Their disposal causes environmental problems such as greenhouse gas emissions (methane), local air contamination (particulate matter), and soil and groundwater contamination (leachates). There are currently not economically feasible alternatives for their clean disposal.

The project would result in a climate benefit equivalent to 0.4 to 0.8 Mt CO2 (for two to four centrals, respectively) over 21 years. This climate benefit would arise from a combination of reduced methane emissions (by decomposition of rice husks stockpiles) and reduced carbon dioxide emissions (by displacement of fossil fuels in electricity generation). Assuming a CER price of US$ 6/t CO2, carbon finance would contribute with a revenue equivalent to US$ 600,000 to US$ 1,200,000 (net present value discounted at 12% annual rate).

Initial investment would be US$ 5.5 million to US$ 11 million. Assuming an electricity sale price of US$ 35/MWh, NPV (12% per year) of net benefits would be US$ 1.0 million to US$ 2.0 million if CERs are not considered; and US$ 1.7 to US$ 3.4 million if CERs are included. Financial Internal Rate of Return would be 13% and 15%, respectively.

Project commercial viability would strongly depend on adequate electricity market prices (at least US$ 35/MWh) and/or a relatively high CER price (US$ 5/t CO2 or higher). Making a more efficient use of the source of energy by combined heat and power generation, or planning for obtaining commercially valuable byproducts such as amorphous silica, would also be factors improving economic feasibility.

The project would make a significant contribution to Uruguay's sustainable development through promotion of rural development, reducing foreign-energy dependance, improving farm economy and improving local environmental quality.

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Conclusions

Achievements of the Project

The objective of compiling a list of a good number of project descriptions, including detailed Project Idea Notes for thirteen projects, was satisfactorily achieved. This list covers a wide range of climate change mitigation project types, some of them with potential to be reproduced a few times in Uruguay.

Several of the identified projects offer the possibility for Canadian potential buyers to acquire CERs at a reduced cost. However, most of these attractive projects are lacking part or all of the investment capital for being implemented. Canadian investors may consider the possibility of becoming project sponsors rather than just purchasers of CERs.

Still another group of described projects, particularly in the area of renewable energy, would need to lift some barriers to become feasible. These projects would require either some form of government subsidies or tax exemptions, or CER prices substantially higher than the one assumed in this study (US$ 3/t CO_2, net of transaction costs).

The wide scope of the themes described should also stimulate the interest of various actors in the Canadian environmental industry for becoming providers of leading technologies in CDM projects to be implemented in Uruguay.

Problems Encountered and Lessons Learned

We had to complete the work in a rather short time period (three months), at a time of the year when most people in Uruguay take their annual vacations. This caused some delays in the arrangement of the meetings with the companies or individuals involved in the projects.

A second problem was related with a general lack of understanding of the issues of climate change and CDM among persons and companies interviewed. This caused delays in the flow of information and difficulties in expressing our needs. Also, this lack of knowledge seems to be an obstacle for development or refinement of project ideas within the different companies.

Finally, we found that confidentiality is an important issue, and this determined certain reluctance from our counterparts to providing us with full access to information. Some projects are undergoing bids or price negotiations, and this makes it difficult for their sponsors to release certain information. This restriction may somewhat have affected the quality of our descriptions of projects.

Recommendations

An effort should be made to raise awareness among the different Uruguayan economic sectors, of the opportunities and also threats related with climate change related issues, and, particularly, with the appearance of new markets for trading environmental services.

Results of this project suggest the existence of excellent business opportunities to be developed by partnerships between Canadian and Uruguayan companies, and therefore, they should be widely disseminated in both countries.

Annex: Sensitivity Analysis of CDM Projects for CERs Prices

Summary

Projects	Investment US $millions	Net Benefits without CERs NPV US $millions	Net Benefits incl. CERS NPV US $millions	Internal Rate of Return without CERs annual %	Internal Rate of Return incl. CERS annual %	CERs sales NPV US $millions	CERs sales partic. % in revenues
Fuel oil replacement by natural gas - Fanapel	1,5	8,9	9,5	87%	91%	0,5	2%
Fuel oil replacement by natural gas - Conaprole	0,3	1,1	1,2	68%	73%	0,1	6%
Fuel oil replacement by natural gas - Gaseba	2,4	0,2	0,6	14%	18%	0,4	2%
Energy Efficiency in the industrial sector	1,3	0,2	0,4	18%	23%	0,2	9%
Electricity generation using natural gas	162,4	-46,6	-42,7	7%	8%	4,3	3%
Landfill gas collection - Montevideo	5,8	-4,2	3,4	- - -	21%	7,5	49%
Landfill gas collection - Canelones	1,5	-1,1	0,1	- - -	14%	1,2	49%
Electricity generation from rice husks	1,3	-0,1	0,0	10%	13%	0,2	7%
Combined heat and power generation from wood manufacturing	5,0	0,8	1,0	14%	14%	0,2	3%
Afforestation for obtaining wood products and bioenergy	26,4	1,9	5,8	13%	14%	3,9	19%
Production of biodiesel from oil grains	5,0	-1,7	0,6	6%	14%	2,3	1%
Livestock combined with afforestation	7,8	2,1	5,4	14%	16%	3,3	19%
Total	**220,5**	**-38,6**	**-14,7**			**24,1**	

Sensitivity analysis for CERs Prices

	CER Price = US$ 3/tonne of CO2e		
Projects	**Net Benefits incl. CERS NPV US $millions**	**Internal Rate of Return incl. CERS annual %**	**CERs sale NPV US $millions**
Fuel oil replacement by natural gas - Fanapel	9,50	91%	0,52
Fuel oil replacement by natural gas - Conaprole	1,20	73%	0,11
Fuel oil replacement by natural gas - Gaseba	0,58	18%	0,41
Energy Efficiency in the industrial sector	0,37	23%	0,15
Electricity generation using natural gas	-42,70	8%	4,31
Landfill gas collection - Montevideo	3,40	21%	7,50
Landfill gas collection - Canelones	0,14	14%	1,20
Electricity generation from rice husks	0,05	13%	0,16
Combined heat and power generation from wood manufacturing	1,01	14%	0,24
Afforestation for obtaining wood products and bioenergy	5,80	14%	3,90
Production of biodiesel from oil grains	0,60	14%	2,30
Livestock combined with afforestation	5,40	16%	3,30
Total	**-14,66**		**24,10**

	CER Price = US$ 8/tonne of CO2e		
Projects	**Net Benefits incl. CERS NPV US $millions**	**Internal Rate of Return incl. CERS annual %**	**CERs sale NPV US $millions**
Fuel oil replacement by natural gas - Fanapel	10,40	98%	1,40
Fuel oil replacement by natural gas - Conaprole	1,30	81%	0,20
Fuel oil replacement by natural gas - Gaseba	1,30	25%	1,40
Energy Efficiency in the industrial sector	0,60	29%	0,40
Electricity generation using natural gas	-36,10	8%	10,50
Landfill gas collection - Montevideo	153,90	44%	20,00
Landfill gas collection - Canelones	2,10	33%	3,20
Electricity generation from rice husks	0,30	16%	0,40
Combined heat and power generation from wood manufacturing	1,30	15%	0,50
Afforestation for obtaining wood products and bioenergy	15,20	15%	10,50
Production of biodiesel from oil grains	5,20	17%	6,20
Livestock combined with afforestation	10,80	20%	9,20
Total	**166,30**		**63,90**

	CER Price = US$ 13/tonne of CO2e		
Projects	**Net Benefits incl. CERS NPV US $millions**	**Internal Rate of Return incl. CERS annual %**	**CERs sale NPV US $millions**
Fuel oil replacement by natural gas - Fanapel	11,20	105%	2,20
Fuel oil replacement by natural gas - Conaprole	1,60	90%	0,40
Fuel oil replacement by natural gas - Gaseba	1,90	31%	12,10
Energy Efficiency in the industrial sector	0,90	36%	0,70
Electricity generation using natural gas	-29,50	9%	17,10
Landfill gas collection - Montevideo	28,40	63%	32,60
Landfill gas collection - Canelones	4,10	49%	5,10
Electricity generation from rice husks	0,50	19%	0,60
Combined heat and power generation from wood manufacturing	1,60	15%	10,80
Afforestation for obtaining wood products and bioenergy	17,40	17%	17,00
Production of biodiesel from oil grains	9,10	41%	10,10
Livestock combined with afforestation	16,20	25%	14,60
Total	**63,40**		**123,30**

Net Benefits included CERs sales - NPV - US$ millions

	Sensitivity annalysis for CERs Prices		
Projects	**US$ 3/t CO2e**	**US$ 8/t CO2e**	**US$ 13/t CO2e**
Fuel oil replacement by natural gas - Fanapel	9,5	10,4	11,2
Fuel oil replacement by natural gas - Conaprole	1,2	1,3	1,6
Fuel oil replacement by natural gas - Gaseba	0,6	1,3	1,9
Energy Efficiency in the industrial sector	0,4	0,6	0,9
Electricity generation using natural gas	-42,7	-36,1	-29,5
Landfill gas collection - Montevideo	3,4	153,9	28,4
Landfill gas collection - Canelones	0,1	2,1	4,1
Electricity generation from rice husks	0,0	0,3	0,5
Combined heat and power generation from wood manufacturing	1,0	1,3	1,6
Afforestation for obtaining wood products and bioenergy	5,8	15,2	17,4
Production of biodiesel from oil grains	0,6	5,2	9,1
Livestock combined with afforestation	5,4	10,8	16,2

Internal Rate of Return included CERs sales - % annual

	Sensitivity annalysis for CERs Prices		
Projects	**US$ 3/t CO2e**	**US$ 8/t CO2e**	**US$ 13/t CO2e**
Fuel oil replacement by natural gas - Fanapel	91%	98%	105%
Fuel oil replacement by natural gas - Conaprole	73%	81%	90%
Fuel oil replacement by natural gas - Gaseba	18%	25%	31%
Energy Efficiency in the industrial sector	23%	29%	36%
Electricity generation using natural gas	8%	8%	9%
Landfill gas collection - Montevideo	21%	44%	63%
Landfill gas collection - Canelones	14%	33%	49%
Electricity generation from rice husks	13%	16%	19%
Combined heat and power generation from wood manufacturing	14%	15%	15%
Afforestation for obtaining wood products and bioenergy	14%	15%	17%
Production of biodiesel from oil grains	14%	17%	41%
Livestock combined with afforestation	16%	20%	25%

CERs sales - Net Present Value- US$ millions

	Sensitivity annalysis for CERs Prices		
Projects	**US$ 3/t CO2e**	**US$ 8/t CO2e**	**US$ 13/t CO2e**
Fuel oil replacement by natural gas - Fanapel	0,5	1,4	2,2
Fuel oil replacement by natural gas - Conaprole	0,1	0,2	0,4
Fuel oil replacement by natural gas - Gaseba	0,4	1,4	12,1
Energy Efficiency in the industrial sector	0,2	0,4	0,7
Electricity generation using natural gas	4,3	10,5	17,1
Landfill gas collection - Montevideo	7,5	20,0	32,6
Landfill gas collection - Canelones	1,2	3,2	5,1
Electricity generation from rice husks	0,2	0,4	0,6
Combined heat and power generation from wood manufacturing	0,2	0,5	10,8
Afforestation for obtaining wood products and bioenergy	3,9	10,5	17,0
Production of biodiesel from oil grains	2,3	6,2	10,1
Livestock combined with afforestation	3,3	9,2	14,6