



PROGRAM OF NATIONAL CDM/JI STRATEGY STUDIES  
NSS PROGRAM

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**NATIONAL STRATEGY STUDY FOR THE CLEAN  
DEVELOPMENT MECHANISM IN PERU**

**EXECUTIVE SUMMARY**

July 2003

**CONSEJO NACIONAL DEL AMBIENTE (CONAM)  
PERU**

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**National Strategy Study for the Clean Development Mechanism in Perú**

**NSS-Perú**

## **Executive Summary**



**World Bank**



**July, 2003**

## **EXECUTIVE SUMMARY**

### **1. The Context**

The purpose of the United Nations Convention on Climate Change is to achieve the stabilization of greenhouse gas concentrations in the air to a level avoiding a hazardous human interference in the climate system.

The Kyoto Protocol is intended to reduce between 2008-2012 the greenhouse gas (GHG) emission from the industrialized countries by 5,2% of its 1990 levels. The Protocol provides the basis for an international market for purchase and selling of reduced GHG emissions through three mechanisms, one of which is the Clean Development Mechanism (CDM).

Like many other countries, Peru has ratified the Kyoto Protocol in late 2002. This National Strategy Study (NSS) on Climate Change funded by the World Bank through resources of the Swiss Government is intended to evaluate Peru's role in the Clean Development Mechanism, identify the potential for investment in greenhouse gas abatement projects as well as financing options for such projects and develop national policies aimed at participating in the CDM.

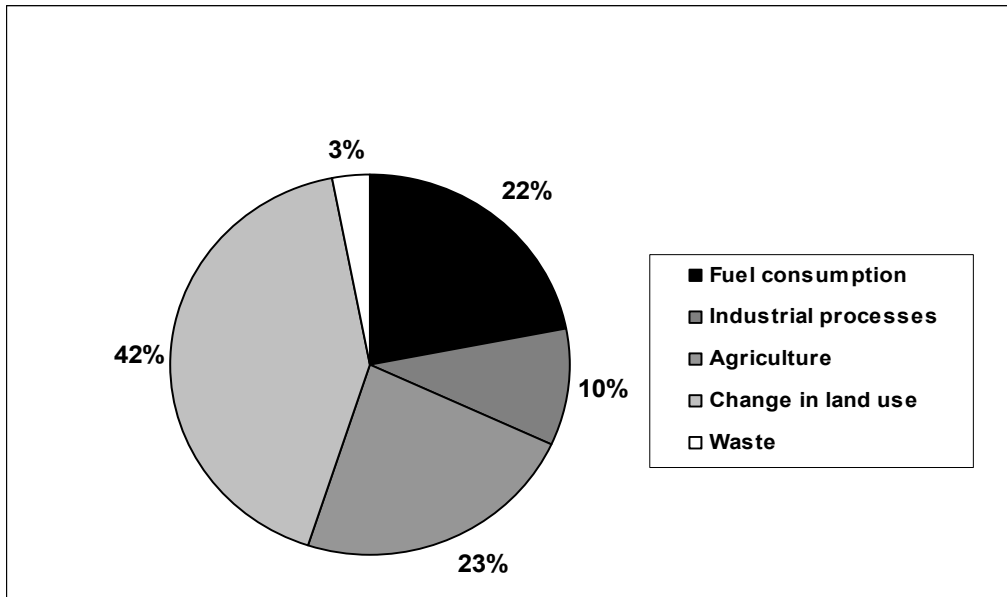
By understanding better the international carbon market (demand, supply, price, risks, etc.), the government is expected to be able to make decisions on options and opportunities resulting from this mechanism, and propose an institutional framework that allows to participate successfully in this potential market. The sale of CERs (Certified Emission Reductions) is an instrument which contributes towards sustainable development. CDM projects can also play an important demonstrative and educational role for the Peruvian private sector.

The NSS was carried out by CONAM through a team of national consultants, the consulting company Finanzas Ambientales S.A.C., and a team of international consultants (Carbotech S.A.).

### **2. GHG Emissions in Peru**

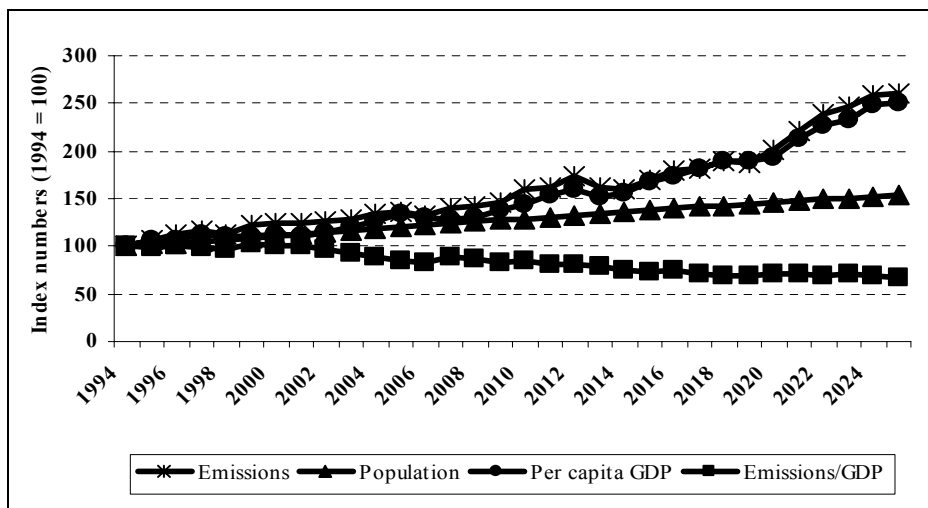
According to the 1994 national inventory (CONAM, 2001), the total emissions in Peru were about 100 million tons of CO<sub>2</sub>, one third of which originates from energy sectors and two thirds from non-energy sectors (agriculture, waste, land use change). The sectors consuming most fuel are the transport sector (8 million tons of CO<sub>2</sub> or 25% of emissions from the energy sector), the residential/commercial sector (3.3 million tons of CO<sub>2</sub> or 10%) and the industry sector (2.9 million tons of CO<sub>2</sub> or 9% of emissions from the energy sector).

**Chart 1. CO<sub>2</sub> emission distribution by sectors (1994)**



The following chart shows the annual evolution of emissions and their determining factors: population, per capita GDP and emissions/GDP (tons of CO<sub>2</sub> per GDP).

**Chart 2.**  
**Peru: Evolution of determining factors of CO<sub>2</sub> emissions**  
**(1994=100)**



Note: The variables in this chart are measures using index numbers.  
Source: Bruno Seminario

When the per capita income increases and the development level of a society is enhanced, emissions increase at first and then decrease due to the structural change in the mixture of the main fuels used and control measures taken. The results show a strong and sustained increase in GHG emissions for the 2001 – 2025 period. Indeed, they will double for the period in question. Emissions from the energy sector increase 2.5 times, while emissions from the non-energy sector increase 1.7 times.

The development capacity of Research and Development R&D in Peru is restricted by the low national priority given to these activities at the level of political decisions taken by the

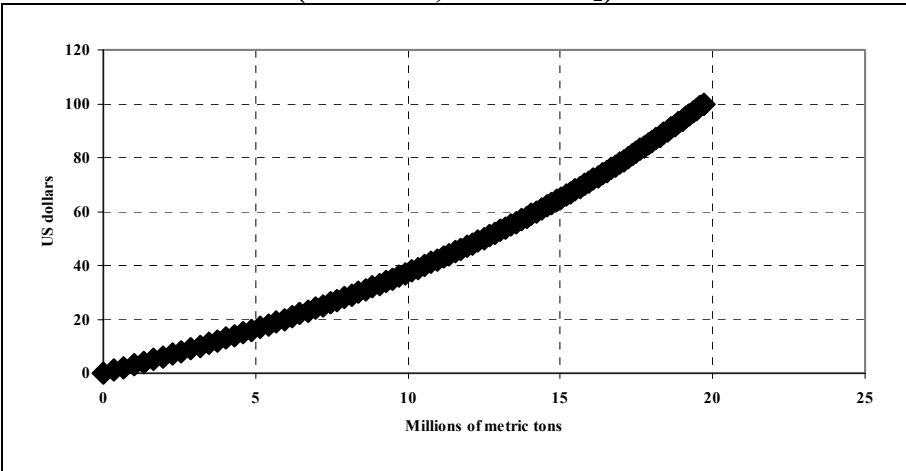
Government, universities, institutes and companies. The allocated budgets and use of such budgets in terms of amounts earmarked for scientific and technological development activities are very limited. For example, in real terms, not more than 0.02% of GDP is annually allocated for activities directly related to R&D. Peru is ranked in last positions in terms of R&D investment in Latin America. The potential technology transfer to be made through the CDM projects could thus contribute towards the sustainable development in Peru.

**3. Marginal Abatement Costs**

From the marginal abatement costs, the supply of emissions Peru could place in the international market at a given market price (US\$ per ton of CO<sub>2</sub>) is calculated. The abatement costs were calculated using a simplified version of RICE-99 and DICE-99 models developed by William Nordhaus and Joseph Boyer. The RICE-99 model (the Regional Integrated Model of Climate and the Economy) allows to study the economic impact of the climate change, analyze the effectiveness of abatement policies, and quantify the relative cost of such policies. It is a “top down” calculation that allows to analyze the theoretical supply available in Peru.

Chart 3 shows the supply of CERs in Peru for the 2008-2012 period, in 1994 constant dollars; for example, at a price of US\$ 20 the supply in Peru would be about 9 million tons of CO<sub>2</sub> reduced per year.

**Chart 3: Marginal Abatement Costs  
(US\$ 1994, MT of CO<sub>2</sub>)**



Source: Bruno Seminario.

#### 4. The Market of Greenhouse Gases (GHG)

The determining factors of the GHG reduction market are the BAU (*Business as Usual*) projections of GHG emissions from Annex B countries/regions (developed countries), the marginal abatement costs (MAC) of GHG reductions in all the countries/regions, the rules governing the market (for example, supplementarity or treatment of sinks) and the behavior of the buyer and seller (participation of USA, market structure).

The amount of “hot air” from the former Soviet Union and Eastern Europe is a question of vital importance because this supply with zero cost may be greater than the required reduction in the countries ratifying the Kyoto Protocol.

Based on the CERT model (Carbon Emission Reduction Trade Model) that incorporates data from different models and sources, a probable scenario may be developed, which takes into account specific values for the above factors. The estimated market price ranges from US\$ 1 to US\$ 6 dollar per ton of CO<sub>2</sub> reduced.

**Table 1. Probable Market Scenario  
(US\$ in 2000)**

Scenario	World market price (US\$/MT of CO <sub>2</sub> )	Traded vol. of imports Annex B countries (MT of CO <sub>2</sub> )	World export revenues (Million US\$)	Export revenue Non-Annex B countries (Million US\$)
Minimum	1	1,000	1,000	100
Average	3	1,300	3,900	1,100
Maximum	6	1,600	7,200	1,600

The current market prices are volatile and greatly depend on the project quality. However, in 2002 prices ranging from US\$ 3 to US\$ 5 dollars per ton of CO<sub>2</sub> are noted. The large buyers for the 2001-2003 period have been the World Bank through the PCF, Canada, Japan and the Netherlands, and have concentrated on the CDM market. In last years, there has been a change from sinks projects to reduction projects, including renewable energy and energy efficiency, methane projects, among others. The switch away from LULUCF projects (sinks) has been induced by the Marrakech agreements that limit the type of recognized LULUCF projects in the CDM, as well as limitations to the usage of sinks to fulfill commitments.

The domestic abatement by Annex B countries could account for about 40% of the required reduction, while “hot air” added to the Joint Implementation (JI) could account for about 30%. These results are based on the former Soviet Union’s “price leadership” to maximize profits. The size of the CDM market could be 400 million tons of CO<sub>2</sub> per year.

About 80% of the CDM market is likely to be concentrated in the Asian countries, especially China, which is the second largest seller, preceded by Russia. The largest seller in Latin America would be Mexico. However, Latin America is expected to have a greater market share, since the Asian countries, especially China and India, will not be able to exploit completely their potential due to their low capacity to implement CDM projects. On the contrary, the countries of Latin America will tend to be favored by investors from the USA and Canada.

The GHG market share of Latin America is significant, which is reflected in the fact that about 75% of financial flows of CDM carbon for the 2001-2002 period was allocated to Latin America, while financial flows allocated to the Asian continent were limited. Latin America has been able to attract some special agreements such as the Latin American Carbon Program of the CAF. Therefore, an amount of 50 to 800 million US dollars of CER exports from Latin America is expected.

Given the current range of prices, Peru may expect to export approximately US\$ 5 to US\$ 10 million of CERs per year. At present, there would be a market for these exports since the Kyoto Protocol allows to use certificates generated from 2000 onwards for the first period of commitments between 2008 and 2012 (referred as to *banking*). However, a more realistic strategy is to exploit progressively this potential for exports. More specifically, to export US\$ 5 million at a world market price of about US\$ 4.

**Table 2. CER Export Scenarios in Peru (US\$ in 2000)**

Scenario	World price (US\$ per MT of CO <sub>2</sub> )	Annual exports (Millions MT of CO <sub>2</sub> )	Export revenues (Millions of US\$/year)
Low	2	~ 1	~ 2
Medium	4	~ 2	~ 8
High	6	~ 3	~ 17
Optimistic	10	~ 5	~ 47

Source: Calculations based on CERT 1.3.

These figures are conservative since only energy projects have been considered in projections, and not non-energy projects, where Peru has a great potential.

In the last few years, diverse voluntary initiatives of municipalities, states, countries, regions, companies, NGOs that share the main objectives of the Kyoto Protocol but are not governed by their procedures, have emerged. These initiatives are called “parallel markets”. The parallel market prices show a great variation, depending on the buyer requirements. They range down to very low prices, for example, for carbon sequestration projects not accepted by the Protocol (forest conservation), to high prices linked however e.g. with strict requirements (e.g. in terms of additional impacts). Such markets tend to have higher transaction costs.

It was believed that the parallel market would be very small, however, as the period of compliance (2008-2012) is approaching, there are more and more initiatives that respond to their promoters’ specific needs, which are not met by the Protocol’s regulations and by decisions in their country (for example, USA). Even when, in terms of transaction volume, these new parallel markets may be still small on a global scale, they constitute an important market for Peru, as Peru has a significant potential of small scale projects which are potentially attractive for such initiatives. In that sense, Peru should follow carefully these initiatives that are an option supplemental to and not excluding the Kyoto Protocol.

The common denominator of these initiatives is that they recognize the significance of the climate change and the need to reduce GHG over time, however, some initiatives go beyond 2012, because great industries require longer periods to recover their investments, others recognize forest activities as eligible because deforestation is still part of the problem. Most of them seek to reduce transaction costs in relation to the Kyoto Protocol, some of them pay more for certain type of prioritized projects (for example, renewable energies), others are voluntary and depend on strong incentives, among others.

Finally, as Peru is a highly vulnerable country (e.g. glacial recession, soil erosion, loss of areas due to water level elevation), it should prepare a project portfolio to apply to the adaptation fund (created by using 2% of CDM transactions), the Special Climate Change Fund created by the Marrakech Agreements in 2001 and international technical cooperation. These projects would have a positive synergy with emission reduction projects in vulnerable areas.

## 5. Emission Reduction Projects

25 projects to reduce 36 million tons of CO<sub>2</sub> were identified, with an investment of 754 million dollars. They are located in energy, industry, transport, solid waste and sinks. From the total of projects, three are at the feasibility stage and nine at the pre-feasibility stage. From the other 13 projects, seven are at the project profile stage, and six at the project idea stage.

**Table 3. Project Portfolio**

	Name of Project	GHG Reduction (MT of CO <sub>2</sub> ,10 years)	CO <sub>2</sub> , Revenue (US\$)	Investment (US\$)
<b>ENERGY PROJECTS</b>				
01 <sup>a/</sup>	Electric Power Plant - Bagasse, Paramonga	770.000	3.080.000	10.600.000
02 <sup>a/</sup>	Hydroelectric Power Plant Cia. Minera del Norte	500.000	2.000.000	8.900.000
03 <sup>c/</sup>	Isolated Rural Electrification Systems, Tocache - Bella Vista	840.000	3.360.000	15.100.000
04 <sup>c/</sup>	Hydroelectric Power Plant of Tarucani	2.228.000	8.912.000	42.000.000
05 <sup>c/</sup>	Hydroelectric Power Plant in the North Poechos	453.470	1.814.000	16.500.000
06 <sup>c/</sup>	Hydroelectric Power Plant Huanza	2.200.000	8.800.000	98.900.000
07 <sup>b/</sup>	Gas Electric Plant Enersur Ilo	2.000.000	8.000.000	100.000.000
08 <sup>b/</sup>	Additional Gas Demand – North Branch	1.900.000	7.600.000	115.000.000
09 <sup>a/</sup>	Hydroelectric Power Plant of Quitaracsa	500.000	2.000.000	75.856.000
10 <sup>d/</sup>	Closure of Pumping Station 9 of North Peru Oil Pipeline – Olmos	256.770	1.027.000	44.200.000
11 <sup>d/</sup>	Wind Park of Malabrigo	40.000	160.000	10.000.000
<b>SUB TOTAL ENERGY SECTOR</b>		<b>11.688.240</b>	<b>46.753.000</b>	<b>537.056.000</b>
<b>INDUSTRIAL PROJECTS</b>				
12 <sup>a/</sup>	Pozzolan Increase of % in Cement	1.070.000	4.280.000	320.000
13 <sup>c/</sup>	Energy Efficiency in Boilers	170.000	680.000	5.000.000
14 <sup>a/</sup>	Methane Reinjection in Talara	146.000	584.000	726.000
<b>SUB TOTAL: INDUSTRY SECTOR</b>		<b>1.386.000</b>	<b>5.544.000</b>	<b>6.046.000</b>
<b>FOREST PROJECTS</b>				
15 <sup>a/</sup>	Timber Forestation, Central Jungle	487.000	1.949.000	13.862.000
16 <sup>a/</sup>	Reforestation with Local Species for Industrial Purposes – Lower Jungle	364.000	1.456.000	1.351.000



17 <sup>b/</sup>	Reforestation with Local Species - San Martín	672.000	2.688.000	14.811.000
18 <sup>b/</sup>	Forestation in arid areas of Northern Coast	547.000	2.188.000	15.361.000
<b>SUB TOTAL: FOREST SECTOR</b>		<b>2.070.000</b>	<b>8.281.000</b>	<b>45.384.000</b>

<sup>a/</sup> Pre-feasibility study, <sup>b/</sup> Project profile, <sup>c/</sup> Feasibility study and <sup>d/</sup> Project Idea.

#### WASTE MANAGEMENT PROJECTS

19 <sup>a/</sup>	Waste Lima City	10.160.000	40.640.000	2.000.000
20 <sup>d/</sup>	Waste Huancayo	703.000	2.810.000	1.540.000
21 <sup>d/</sup>	Waste Chiclayo	975.000	3.900.000	2.140.000
22 <sup>d/</sup>	Waste Arequipa	1.550.000	6.200.000	3.420.000
23 <sup>d/</sup>	Waste Huaraz	136.000	545.000	320.000
<b>SUB TOTAL: WASTE SECTOR</b>		<b>13.524.000</b>	<b>54.095.000</b>	<b>9.420.000</b>

#### TRANSPORT PROJECTS

24 <sup>b/</sup>	Mixture of ethanol and gasoline, fuel	2.828.000	11.311.000	30.000.000
25 <sup>a/</sup>	High-capacity segregated corridor - Lima	4.078.000	16.312.000	126.000.000
<b>SUB TOTAL: TRANSPORT SECTOR</b>		<b>6.906.000</b>	<b>27.622.000</b>	<b>156.000.000</b>
<b>TOTAL IN 25 PROJECTS</b>		<b>35.574.000</b>	<b>142.296.000</b>	<b>753.906.000</b>

<sup>a/</sup> Pre-feasibility study, <sup>b/</sup> Project profile, <sup>c/</sup> Feasibility study and <sup>d/</sup> Project idea.

## Industry

According to the last national emission inventory (1994), the industry sector generates approximately 10 million tons of CO<sub>2</sub>, and the Mining and Chemical Industry subsectors are the main sources of emission. In terms of energy, this sector has a potential for electric power saving (5 to 10%) and fuel saving (10 to 25%), which could be utilized, with an associated reduction of CO<sub>2</sub> emissions.

From the three identified projects, two were developed specifically:

- The project “Graña y Montero” located in Talara consists in reinjecting the natural gas associated with the extracted oil into the gas field. The reduction is estimated at approximately 150,000 tons CO<sub>2</sub> in 10 years, that is, 15,000 tons per year. The project could qualify as “small project” and its social benefits could be added to make it more attractive to potential investors.
- The project “Cemento Andino” intends to increase the pozzolan content in cement production, and decrease the clinker content by 25%. An average reduction of 1.1 million ton of CO<sub>2</sub> is estimated to be achieved in 10 years, i.e., 100,000 tons of CO<sub>2</sub> per year.

## Energy

The sector’s potential for CO<sub>2</sub> reduction consists basically in renewable energy generation, improved hydrocarbon extraction efficiency and a better utilization of resources in the electric power generation. The sector accounts for 23% of greenhouse gas emission. In that sense, the potential for GHG reduction in this sector is important, since it is a sector that will continue to grow as all other sectors develop.

However, it must be considered that the potential for reduction due to the national interconnected system expansion is not great, since this expansion implies 81% hydroenergy and only 19% fossil energy.

From the eleven energy projects identified, two were developed at pre-feasibility level:

- Expansion of the national electric distribution system Tocache-Bellavista with the purpose of supplying reliable electric power to approximately 250,000 inhabitants in the North Central Jungle of Peru. In a 21-year period, a reduction of about 2.5 to 3 million tons of CO<sub>2</sub> (i.e. about 150,000 tons of CO<sub>2</sub> per year) is expected.
- “Paramonga” Project, whose main purpose is to change from a power generation system using diesel oil to a power generation system using bagasse, consuming thus sugar cane waste, the main product of the company AIPSA (interested company). An average reduction of approximately 700,000 tons of CO<sub>2</sub> in 10 years, that is, approximately 70,000 tons of CO<sub>2</sub> per year is estimated.

### ***Transport***

The transport sector is the sector ranked second in the total final energy consumption in Peru. For the 1985-2001 period, the energy consumption in this sector increased annually by 2,6%. The opportunities for GHG reduction are mainly concentrated on change from currently used fuel to fuel containing less carbon (for example biofuels), change to more energy-efficient vehicles (including larger buses or trucks), changes of transport systems or modes (promotion of public transportation, etc.) and improvements in management (e.g. adequate maintenance). A combination of several factors, e.g. a new transportation systems using new vehicles and new fuels, may cause a very large impact. Concrete CDM experiences in this sector are not yet existent.

The project developed was “ProTransporte”. The main purpose of this program is to implement progressively mass transport services, prioritizing the transport in high-capacity buses through exclusive traffic lanes between the main trip-generating areas in Lima. An efficient mass transport system reduces CO<sub>2</sub> emissions per passenger-kilometer. The emission reduction is mainly due to:

- replacement of old buses with new vehicles using less fuel.
- replacement of small vehicles with larger vehicles.
- change from private to public transportation mode

The total reduction expected to be achieved is in the order of 1.7 to 4.1 million tons of CO<sub>2</sub> according to 10-year calculation scenario, i.e. 170,000 to 400,000 tons of CO<sub>2</sub> per year.

Another interesting proposal to be developed in the transport sector is the alternative of using ethanol as biofuel. Peru has climatological characteristics that favor the production of crops such as sugar cane and sweet sorghum, which are used as raw materials for ethanol production.

### ***Solid Waste***

The General Law of Solid Waste stipulates that sanitary landfill shall be used as the technology for final disposal of garbage collected by the municipality. Given that the compliance with this Law involves an increase in methane generation there is a great potential to develop CDM projects in the different cities of Peru. The fact that the possible refunds

generated by the sale of CERs may be used to finance a substantive part of sanitary landfill operation costs attracts attention.

The project developed in detail in this sector is “Relima”. The main purpose of the project is to reduce methane emissions. The reduction of CO<sub>2</sub> equivalent is significant. However, more detailed studies are missing to clarify questions about the actual potential for reduction.

### ***Forest Sector (sinks)***

Forest burning and indiscriminate forest cutting in the Amazonia generate large GHG emissions and reduction in carbon sequestration capacity. However, this study placed less emphasis on sinks due to decisions made at the Marrakech Conference of Parties (COP 7) to restrict the access to the market of this project type. However, four interesting projects were identified at PIN level, which could form part of a proposal to the BioCarbon Fund

According to the 1998 National Greenhouse Gas Inventory in Peru, based on the 1994 inventory, the largest annual GHG emissions and sequestration were found in the area of land use, land use change and forestry (LULUCF). It was determined that 42% of total GHG released by Peru belongs to this area.

Peru has a great forest potential and can use this mechanism or parallel markets as additional sources of revenue, and attract green investors or companies responsible for implementing forest projects (plantations, reforestation, etc.).

With respect to plantation development, the balance between captured and released carbon is a potential to be considered, since in Peru there are vast areas where plantations may be developed for commercial or environmental purposes, such as the coast, where low-irrigation plantations may be developed; the mountains where there already are some experiences in plantations, which could get funds to develop their projects through CERs, especially to put up with the first hard years of forest investment when there are no revenues from timber trading.

As for reforestation project development, it is known that land areas fit for reforestation reach around 10 million hectares. They comprise areas deforested in the past and are distributed throughout the national territory as shown in the following table. It is worth mentioning that one of the main problems in Peru is the lack of a zoning of species for reforestation in such suitable areas.

**Table 4. Distribution of Lands for Reforestation (Ha.)**

<b>Region</b>	<b>Lands fit for plantation</b>	<b>Reforested lands</b>	<b>Lands to be reforested</b>
Coast	500,000	34,877	465,123
Mountains	7'500,000	357,026	7'142,974
Jungle	2'500,000	20,797	2'479,203
Total	10'500,000	412,700	10'087,300

Source: Forest Peru in Figures (INRENA, 1999).

The forest resources in Peru include 78,8 million Ha. of natural forests. 74,2 million Ha. of these forests are located in the jungle region, 3,6 million Ha, in the coast, and 1,0 million Ha. in the mountains. Because of these vast forest areas, Peru is ranked second in extension of natural forests in South America, and ninth worldwide. The Peruvian forests are home to a great biological diversity and provide diverse economic and environmental services for the community's benefit.

## 6. Financial Options for CDM in Peru

In Peru, there are opportunities for investments in projects with a positive impact on GHG emission reduction or carbon sequestration. However, there are financial barriers (apart from legal, cultural, business barriers, among others) that do not allow to channel financial resources towards such projects. Carbon projects are a secondary component of a productive project. In financial terms, the carbon component ranges from 5% to 20% against project investment size.

Bearing in mind that Peruvian companies have a low level of capitalization, venture capital funds are needed to finance productive projects with a high carbon component. However, in Peru a mature venture capital industry does not exist and the capital market is in the process of growth. CDM could give an opportunity to “activate” the market of venture capital investment funds. In the following table some barriers and solutions to financing of projects are listed.

**Table 5. Solutions to eliminate the national barriers to funding of CDM projects**

Barrier	Proposed Solution
Transaction costs against project size	<ul style="list-style-type: none"> <li>• Baselines: support from technical cooperation. Candidates for PhD-MSc prepare baselines in Peru.</li> <li>• Process times: Standardize processes</li> <li>• Legal expenses: Model contracts</li> </ul>
Small transaction size	<ul style="list-style-type: none"> <li>• Bundle small projects.</li> <li>• Promote carbon project incubators</li> </ul>
Difficult funding of SMEs	<ul style="list-style-type: none"> <li>• Create guarantee mechanisms: funds, insurance.</li> <li>• Special credit lines</li> </ul>
Weak capacity to formulate high quality projects	<ul style="list-style-type: none"> <li>• Train local consultants</li> <li>• Promote a “service cluster for CDM projects”</li> </ul>
CDM institutionality	<ul style="list-style-type: none"> <li>• Proactive CDM Office, promoting investments, with qualified personnel, credibility, political endorsement, and financial resources</li> </ul>
Capital investment prior to CER generation	<ul style="list-style-type: none"> <li>• Special credit lines</li> <li>• Project incubator</li> <li>• Related venture capital fund</li> </ul>
Confusion about CDM (businessmen)	<ul style="list-style-type: none"> <li>• Continuous training for businessmen</li> <li>• Create CDM work groups in trade associations, create critical awareness</li> <li>• Create a business CDM communication system</li> </ul>
Conflict resolution systems	<ul style="list-style-type: none"> <li>• Train legal system, including experts</li> <li>• Issue internal legal norms on jurisdictions</li> </ul>
Bank staff unaware of CDM	<ul style="list-style-type: none"> <li>• Continuous training</li> <li>• Create CDM work groups in bank association, create critical awareness</li> </ul>
Little local experts in carbon	<ul style="list-style-type: none"> <li>• Courses, workshops and continuous training</li> <li>• Create carbon expert schemes</li> </ul>

Source: Salazar (2001), IETA (2002).

The main risks to which the CDM projects in Peru are exposed are shown in Table 6.

**Table 6. Strategies and risk abaters for project development**

<b>Risks</b>	<b>Strategies and risk abaters</b>
The Kyoto Protocol does not come into effect	Seek parallel markets for CDM projects.
Project not approved by the environmental authority in Peru	Project design quality, hire specialized consultants, promoter quality
CERs not accepted in the buying country	Seek parallel markets, <i>due diligence</i> of buyer and his country, carbon insurance, well-founded proposal
Overestimated baseline	Specialized consultants, Use <i>buffers</i> to sell a part of carbon generated. Be conservative in projections.
Very high transaction costs	Group projects into a sectoral baseline, company incubators, seek specialized cooperator sources, alliances with research centers, avoid small projects, train local consultants.
Reduction in CER prices	Sign forward sales contracts, options, securitization. Seek markets parallel to Kyoto, which reward the socio-environmental externalities.
Seller's noncompliance with emission reduction due to internal and/or external factors.	Create a <i>buffer</i> and sell only a part of carbon generated (CERs). Sign forward carbon calls. Carbon delivery insurance.
Bankruptcy of company under an "umbrella" program	Include a "drop" percentage in the baseline, create a buffer and sell a part of carbon generated, select carefully participants.
Buyer's noncompliance to pay the amount and at the scheduled date.	<i>Due diligence</i> of buyer. Sell for cash on delivery. Request bank guarantees. Include severe penalties in the contract.
Impossibility to oblige the buyer to pay	Request guarantees from the buyer. Seek AAA buyers. Include penalties in the contract. Carbon insurance.

Sources: IETA (2002), Salazar (2001).

Risk abaters improve the promoters' capacity to negotiate with main buyers of CERs, reduce premiums for risk, stabilize projected cash flow, add confidence to financial projections, and facilitate the specialized venture capital inflow. In Peru, a carbon fund based on the initial portfolio prepared by the NSS, including 25 projects, may be launched. Thus, the opportunity given by the market to finance projects with very low marginal costs of GHG reduction and generating relevant carbon amounts would be used.

## **7. Strategy and Implementation of CDM in Peru**

The main barriers are found at project structuring, development and performance stages. They include the difficulty to access funding sources for project pre-investment and investment, gaps or absence of regulatory frameworks for specific activities, noncompliance with laws, and nonexistence of technological supply chains linking current clean technology suppliers to potential customer, among other things.

Regarding the own barriers of the CDM at national level, they include the lack of CDM information and training at all levels and in all public and private institutions; high transaction costs to make a project eligible for CDM and the absence of a legal framework recognizing CERs as a negotiable instrument in the local financial market

### ***Transaction Cost***

The strategies to reduce the transaction costs are:

#### a) Generate local capacity

Peruvian consultant training in CDM, in such a way that they gain knowledge of baselines, verification, monitoring, etc. International PhD students are likely to be invited to apply their techniques to Peruvian projects at low cost and create a critical awareness among consultants that are expert on the subject.

b) Create project incubators

By creating incubators, projects will have lower costs when including in the “package” of search for investors the CDM component. In addition, incubators facilitate the technological package validation that adds value to the business, improve quality of the project’s business plan, help the promoter in seeking strategic allies to strengthen the project, among other things.

c) Expand the CDM knowledge network

Increase the range of training by using true information on the CDM management. This means building small capacities (student exchange, training travels to countries that are in the vanguard of CDM) to create a transference network involving both private and public sector and civil society in general.

d) Umbrella projects

In developing countries, the use of “umbrellas” is promoted to group small projects in order to achieve a larger transaction at lower cost. In this way, the negotiation capacity is enhanced, diversifies the portfolio risk and promotes the direct investment in the host country. However, this mechanism must be carefully designed for the following reasons:

*The entity and institutional nature of organizations grouping these projects.*

There are no sound institutions that represent interests of both players (buyer/seller). Umbrellas are not companies but alliances between government and private sector, with an initial subsidy because their transaction costs are high. There is no certainty that such institutional nature will be sustainable in the long term and they are still experimental. In practice, they operate as a carbon broker without becoming a broker, then the institutional architecture is critical to define their success and/or failure over time.

*The quality of promoters*

The quality of CER promoters is critical, since they are responsible for success or failure of the operation. For umbrellas, companies having a low credit *rating* offer carbon credits to the market, but there is no guarantee that such companies remain in the market in 2012, when the first phase of compliance with the Kyoto Protocol is completed.

*Greater financial engineering*

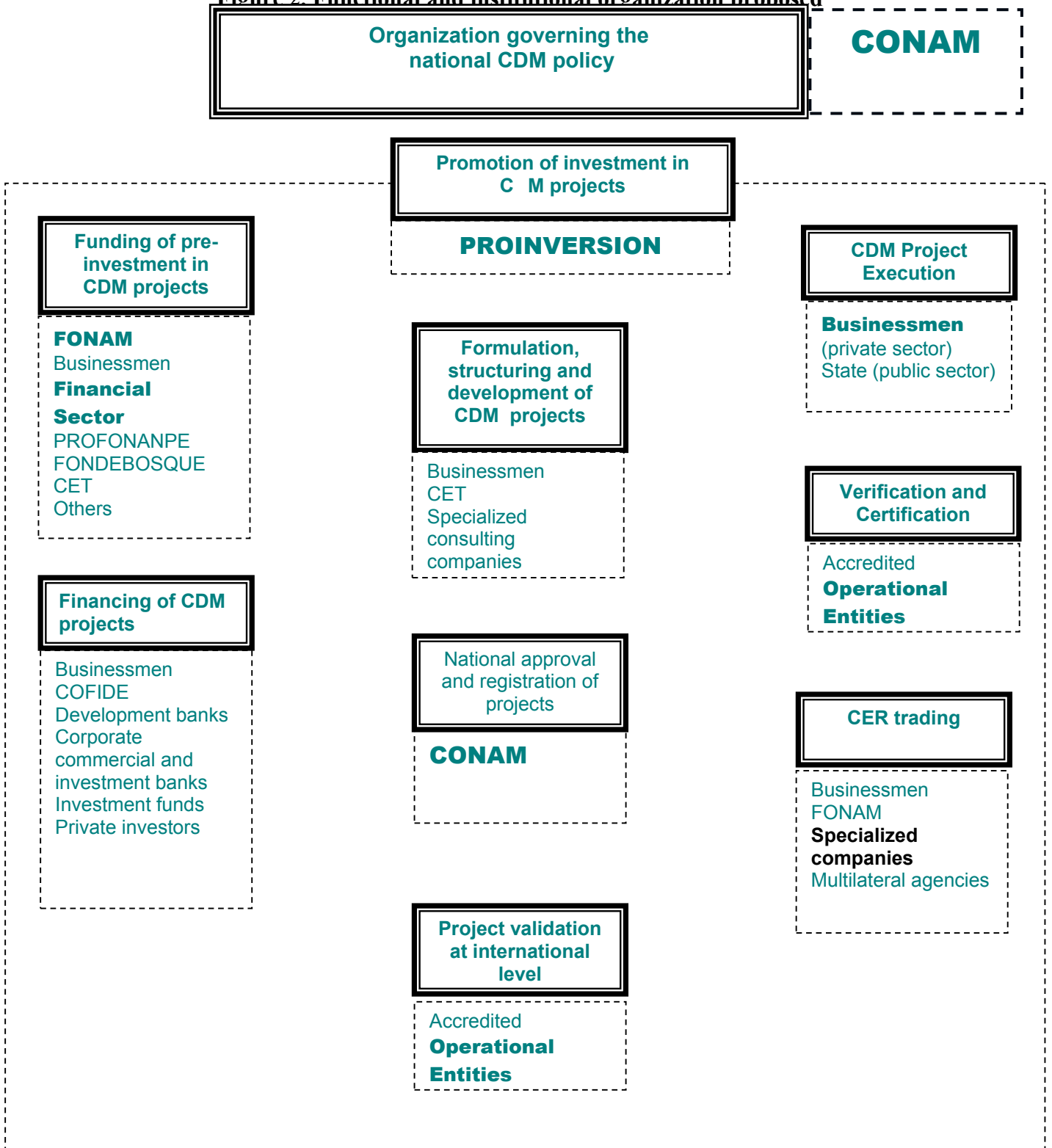
The sale of CERs from *ex-ante* “umbrellas” requires a greater financial engineering than e.g. an operation proposed by the subsidiary of multinational company in a Non-Annex 1 country.

***Institutionality***

It is proven that the countries having most used the opportunities resulting from the CDM, are not necessarily those with the lowest marginal cost of reduction, that is, countries with best comparative advantages, but those countries that generated a support institutional nature for projects qualifying within the framework of the Kyoto Protocol. In that sense, the creation of an office providing CDM project promoters with guidance and general coordination services is justified in order that the country facilitates the presentation of projects of international quality. It is proposed to use the State’s administrative infrastructure and involve entities that, even though they are not active in the subject due to the nature of their creation and action plan, agree with the objective of providing investors with services. Thus, the intention is to not duplicate efforts.

The main functions of a CDM office would be to promote investment in CDM projects, coordinate the building of local capacities, promote the development of a legal framework, foster project funding and stimulate the technology transfer. It is proposed that the CONAM (National Environmental Council) specializes in regulation, evaluation and registration of CDM projects; and the promotion function is transferred to the entity specialized in private investment promotion in the country: PROINVERSIÓN (Agency for Investment Promotion). On the other hand, the National Environmental Fund (FONAM) is a player that will facilitate the obtaining of financial resources needed to execute the specific action plans for CDM promotion in Peru through activities related to potential carbon buyers in the international market, as well as to facilitate the implementation of financial options.

Figure 2. Functional and institutional organization proposed





## *Steps to be taken*

To take advantage of the carbon market, it is necessary to build comparative advantages that allow Peru to take a competitive position. To this effect, it is imperative to create a favorable national environment for investment, CDM project quality, low transaction costs and simplicity of national approval procedures. Initial actions to achieve such objectives are:

### *First step* – Facilitate the institutional coordination

Through ratification of the Kyoto Protocol and designation of CONAM as the National CDM Authority (September 30, 2002), the conditions are defined to create a CDM Promotion Office.

### *Second step* – Promote the investment in CDM projects

This will be the main function of the CDM Promotion Office. In this sense, it shall coordinate its functions with the other players at national and international level. Its immediate functions include:

- Make itself known at national and international level
- Coordinate the dissemination of information and training
- Create a database containing local initiatives of climate change and its action plans, information on projects that currently are negotiating CERs, information on consulting companies available to prepare CDM projects, information on possible CER buyers, information on potential investors interested in financing this type of projects (investment funds), status of international negotiations.
- Design an information dissemination strategy.
- Manage the promotion of the project portfolio resulting from this study.
- Involve the national financial sector in the development of this promotion strategy.

### *Third step* – Build local capacities

The following step of the CDM Promotion Office shall be information dissemination and training for different involved sectors. In this sense, it shall:

- Inform businessmen about the CDM opportunities and implications.
- Coordinate the training for national consultants to reduce transaction costs of CDM projects in the following areas:
  - Inform and train the national financial sector to consider the granting of credits and investments in CDM projects, as well as management of investments funds and carbon funds.
  - Inform and train the public sector to align their development strategies and policies with the new international trends towards environmental and social responsibility.

### *Fourth step* – Promote the development of a legal framework

In parallel the CONAM, as the environmental regulator, shall foster the dialogue among the competent sectors to design the legal framework that allows CERs to become a negotiable instrument in the national financial system (the ideal objective would be to classify CERs as a security). More specifically, converting CERs into a security and a preferred guarantee according to the SBS (Superintendence of Banking and Insurance) rules.

### *Fifth step* – Promote project funding

- The FONAM should establish a relationship with both international investment and carbon funds.

Foster the granting of national credits and investments in CDM projects, as well as management of investment funds where eco-financial tools are used..

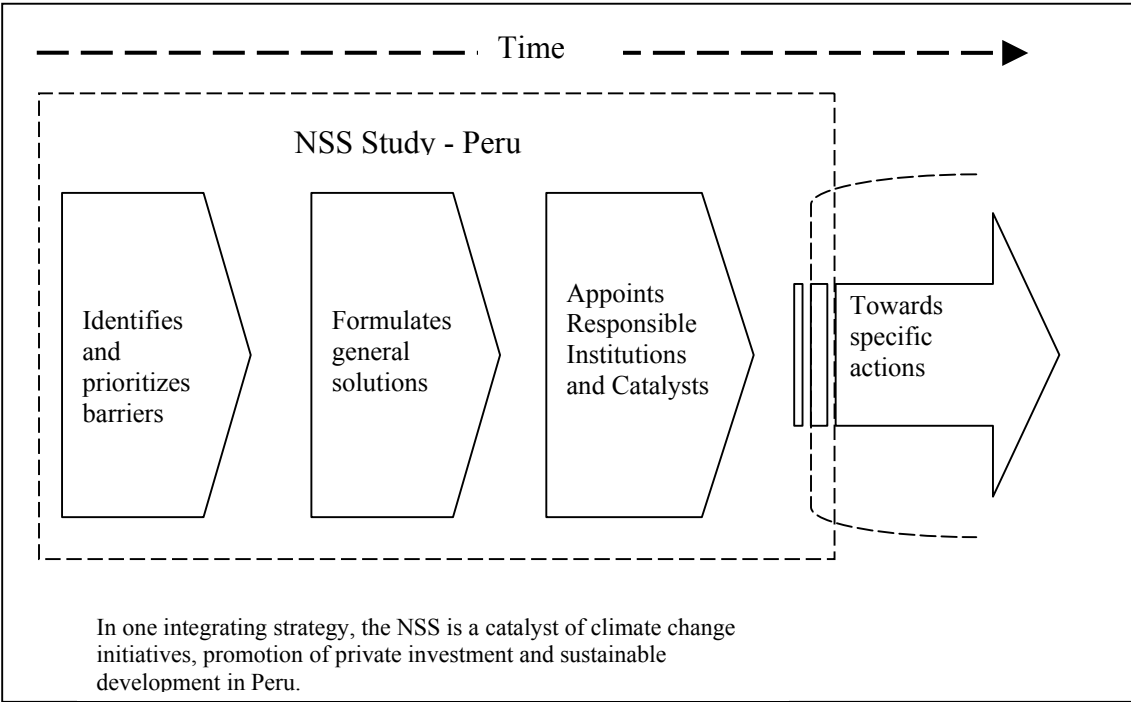
- Try to incorporate the climate change components, among them, CDM, into the project portfolio the Peruvian government negotiates with regional, bilateral or multilateral financial entities.
- The CDM Promotion Office, with the support of the FONAM, shall try to enter into a dialogue with the financial sector to implement the proposal for a venture capital investment fund, especially designed to finance CDM projects.

*Sixth step – Promote Technology Transfer*

The success of different projects managed by CONCYTEC and aimed at creating conditions and developing technological innovation must be ensured. The technological component of CDM projects could participate in this CONCYTEC effort. In addition, the CDM Promotion Office could facilitate the access to additional sources of financing to develop these CDM projects with a technological innovation component.

As shown in the following figure, once this study has been completed, the CDM Promotion Office would begin to operate, concentrating initially on the dissemination of information, and building of capacities. Progressively, based on the information obtained, specific and detailed actions aimed at eliminating barriers would be formulated.

**Figure 3. Continuity of the NSS-Peru**



The following table shows the national strategic plan to implement CDM:

**Table 8. Strategies to promote the Clean Development Mechanism in Peru**

Strategy	Objective	Instrumental Targets
1. Disseminate information on CDM.	1.1 Inform Peruvian businessmen (at least one out of three businessmen with a potential for emission reduction is familiar with the CDM concept six months after startup of the CDM Promotion Office).	1.1.1. Disseminate general information through mass media (Internet, press, radio, television, magazines, booklets) and negotiate with survey takers the collection of additional information through their surveys aimed at productive sectors. (Include in their annual surveys such question as: ¿Do you know what is CDM? to measure the success level of these dissemination efforts). 1.1.2. Include the CDM issue and its context in the curricular structure of university programs and postgraduate studies, as well as in the national efforts to strengthen the blue front.
	1.2 Inform the national financial system about the opportunities for investment related to CDM (two out of five investment analysts in the local banking familiar with CDM project financing and CER trading).	1.2.1. Specialized media. Advertising reports, etc. 1.2.2. Identify visible projects and develop them as demonstrative (or pilot) projects. 1.2.3. Selective marketing to reach directly the decision-makers in the business and financial sectors.
	2.1 Have local specific capacities to formulate, structure and finance CDM projects	2.1.1. Channel resources from the international cooperation to finance this training. 2.1.2. Call sectoral consultants to take part in the new opportunities for consultancy in CDM projects and CER trading and invite them to participate in training workshops. Contact research groups and postgraduate programs (Ph.D., M.Sc.) to develop theses on development, implementation or adaptation of methodologies and tools to carry out baselines, emission calculation, monitoring plans and marketing strategies for Peruvian CERs. 2.1.3. Conduct training courses according to the needs of each sector and implement a quality assurance system for services provided by CDM consultants.
2. Build local capacities to reduce transaction costs and improve access to pre-investment resources for CDM projects.	2.2 Have institutional capacities to validate, verify and certify CDM projects	2.2.1. Invite national project certifying/rating agencies to develop supplemental services related to CDM and carbon markets. 2.2.2. Inform companies interested in becoming an Accredited Operational Entity (DOE) about available training resources.
	2.3 Promote the financing of the CDM project pre-investment stage (at least 2 out of 10 projects obtain funds for the pre-investment stage during the first 12 months of startup of the CDM Promotion Office).	2.3.1. CDM projects obtain international technical cooperation for the pre-investment stage (feasibility studies, PDD preparation, Baselines, etc.) from organizations such as PCF, CAF and others. 2.3.2. Private investment through promotion of the <i>Public-Private Partnership</i> and/or tax incentives. 2.3.3. National funds oriented towards pre-investment of subsectoral projects (for example: PROFONANPE, FONDEBOSQUE) 2.3.4. Evaluation of possibilities of financing with debt equity swap for CDM projects.

**Table 8. Strategies to promote the Clean Development Mechanism in Peru  
(Cont.)**

<b>Strategy</b>	<b>Objective</b>	<b>Instrumental Targets</b>
3. Promote rules that facilitate the capital and technology transfer.	3.1. Create an integrated legal framework to regulate the CDM operation in the country.	<p>3.1.1. Define criteria for CER ownership and conflict resolution mechanisms through creation of an interdisciplinary Ad Hoc, which would prepare a proposal for Integrated CDM Law. This interdisciplinary Ad Hoc Committee could propose that the status of law be given to DS No. 095-2002 – PCM dated on October 1, 2002.</p> <p>3.1.2. Validate CERs as a negotiable security in the country and a preferred guarantee according to the SBS (Superintendence of Banking and Insurance) rules.</p> <p>3.1.3. Increase the legal certainty in assigning institutional competencies for CDM through dialogue and agreements among the relevant sectors.</p>
	3.2. Create conditions and facilitate the financing of CDM projects (2 out of 10 CDM projects submitted to the national CDM authority access to locally and internationally required technical and financial resources, within the first 12 months of startup of the CDM Promotion Office)	<p>3.2.3. Facilitate businessmen the access to information on export loans granted by the financial institutions through technology providers (machinery and procedures). Information on national and international sources of financing willing to finance CDM projects. Information to access guarantee funds that minimize the investors' perception of risk. Information on prices paid in the market and forecasted prices to sell at the most appropriate/profitable time, that is, maintain a transparent and updated carbon market information system. Identify, contact and know CER buyer requirements (CAF-PLAC, PCF, IFC, brokers, among others)</p> <p>3.2.2. Disseminate in the national financial sector the use of innovative financial mechanisms such as <i>Project Finance</i>, securitization of underlying assets, derivatives, forward contracts, CER placement in parallel markets, valuation of positive externalities of CDM projects, aggregate negotiation, carbon <i>underwriting</i>: stock subscription line to ensure the buying of CERs, etc.</p>