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SUMMARY

This report is part of the work developed for the ANDENERGY project, and it is an assessment of the policies and regulations of the energy sector in Peru and Ecuador. For both countries, particular attention has been given to renewable energies and to the policies and initiatives specifically conceived to address the linkages between energy and poverty.

In fact, Energy-Poverty, defined as a lack of access to modern energies, is one of the barriers to the human development and there exist a strict correlation between Human Development Index and the per capita energy consumption. Moreover, access to modern energy is now considered a pillar for any strategy of poverty reduction and, in this context, is widely accepted that the use of renewable local energy sources gives a valuable contribution. In the words of former UN Secretary general, Kofi Annan:

*In the developing countries, some 1.6 billion people still lack access to electricity and about 2.4 billion continue to rely on traditional biomass for cooking and heating, mainly in the rural areas. Achievement of the Millennium Development Goal of halving, by 2015, the proportion of the world’s population whose income is less than $1 per day will depend on providing these people with access to modern energy services for their basic needs and for income generation. Decentralized renewable energy systems can contribute to poverty eradication efforts, in particular in areas with widely dispersed rural populations* (UN news service, 19.08.2005).

Of particular relevance also is that energy has been an area where important reforms have been carried out in the last decade. The majority of developing countries, experienced energy policy reforms, under the guidance and assistance of International Organizations, and in many cases reforms are still ongoing. It is so of particular relevance to analyze what is the state of the art of the reforms, and what are their implications over the energy needs of the poor.

Both Ecuador and Peru reformed their energy sector and so, after 1996 (Regime Law of the Electricity Sector, LRSE, in Ecuador, and Law N° 26.734 in Peru), both countries adopted similar energy policies (including de-monopolization, unbundling, regulatory bodies, privatization, removing subsidies) following the recommendations of the Bretton Wood Institutions. Anyway, especially in Ecuador, the State still maintain a majority role in generation, transportation, and distribution companies.

Both countries present a strong polarization: between the North and the South regions in Peru, and between the coastal region and the mountains in Ecuador: the Amazon region is particularly challenging for the electrification. To this regard it has been found that the renewable energy electrification projects have been focused on Solar PV, Micro hydro and Wind energy excluding geothermal and biomass (despite the abundance of these resources evidenced, for instance, by the importance of the sugar-mill power generation).

In both countries, the traditional paternalistic approach followed to disseminate solar PV technologies showed unsuccessful, due to the lack of ownership of the projects from the communities. In addition, because many project, especially large scale, do not have many links with the existing local economies, there is a crescent level of popular un-acceptance
of power related projects as they are seen as a form to take a public/ancestral resource that belongs to the local population for the welfare of few companies. The research showed a need to incorporate elements of ownership into the energy projects, like local participation of the Local Energy Boards to take basic care of the equipment, the obligation of the beneficiaries to pay for the service, the intervention of the local power distribution companies to provide technical assistance and monitoring and evaluation components. With these characteristics RE projects could be the mainstream choice for a large majority of off grid or isolated grid applications, where their costs can be significantly lower than fossil fuel solutions, and being widely implemented.


1) The introduction deals with the objective of this work, that is to identify policies and regulations, at the national, regional and international level, on energy and energy services for poverty alleviation and with methodological aspects.

2) The second chapter is dedicated to the Energy policies and regulations in Ecuador. The first step has been identifying the institutional organization of the energy sector, and the role of the major national bodies, in particular the Ministry of Energy and Mines (MEM, with the Directorate of Energy Efficiency and Renewable Energies – DEREE and the National Hydrocarbons Directorate - DNH), the National Electricity Council (CONELEC), Petroecuador and the Ministry of Environment (ME, with the National Environmental Protection Directorate - DINAPA).

In Ecuador the oil sector represents a great part of the fiscal income and of the GDP. The Hydrocarbons Law assure complete tax exemption for the exploration and exploitation including exemption of the import duties for equipment during the first ten years of production. The price of LPG, mostly imported, is subsidized. The diesel oil used for power generation has a special price so that the electricity tariffs can be kept low. Regarding the electricity sector generation capacity has not grown as expected and in the last few years, the country had to resort to electricity imports from Colombia, and so the 2005 tax law gives fiscal incentives on the order of 10 years for new investments.

The electricity sector in Ecuador has been deeply reformed. In ten years of reforms (1996-2005) Ecuador passed from a regime of monopoly in the electricity sector to one with 13 power generation companies, 1 transmission company, 13 self-generators and 20 distribution companies, the majority of which with generating plants too. The chapter also analyzes the specific pro poor measures and the role of the fund for rural electrification.

3) The third chapter is dedicated to the Energy policies and regulations in Peru.

As in the case of Ecuador, the analysis started with the recognition of the institutional structure. In Peru the national entities analyzed are the Ministry of Energy and Mines (MEM, with the Electricity, Hydrocarbons, Environmental and Social Directorates) and the Organization for the Oversight of Energy Investments (OSINERG).
Regarding the oil sector, it has to be noted that in Peru the retail price of the oil based fuels (gas and fuels) are much higher and this produce a constant illegal smuggling of those fuels from Ecuador to Peru to be sold in a up to 300 % interests.

For the electricity sector, Peru also moved from a situation of state owned monopoly to a market based system with several power, transmission and distribution companies and tariff and energy supervision commissions.

4) The fourth chapter is on regional policy and regulations and in particular it deals with the role of the Andean community and of the Latin America Energy Organization.

5) The fifth chapter is dedicated to the analysis of International Energy Policies. In particular in this chapter analyse the evolutions of the policies advocated and financed by the World Bank Group and the major UN policy actions. The World Bank Group initially supported state owned monopolies, but starting from 1993 advocated, even through financing conditionality, a series of market reforms and privatizations in its client countries, with mixed results. In more recent years the focus of the WBG has been more concentrated on the linkages between energy and poverty. The chapter also discusses the role of the WBG in the extractive industries and in promoting renewable energy sources and carbon financing. Finally, a brief review of the principal UN actions and conferences on energy policies is given.

6) The 6th chapter is the concluding notes, where it is noted that the countries have very similar energy policies. In both countries there is much room for improving renewable energy role especially for remote and unconnected areas.

Both countries count with programs and funds for the fight against poverty and the extension of the energy services in rural zones, and yet they are yet unknown (or poorly reported to the general population), on its use.

Tables S-a and S-b present a summary of main policy and instruments for improving energy access for the poor population. It is shown that Ecuador has currently a State supply approach for providing economic access to energy for the population. Subsidies for LPG and transport fuels are instruments that are present in the Ecuador policy framework but not in the Peru. Currently the price of the 15 kg bottle of LPG is around 1,6 US$ in Ecuador, while the price of the 10 kg bottle is 10 US$ in Peru. In this sense there is a significant difference in Ecuador and Peru State approach.

It is also worth mentioning that one the main lessons from past isolated electrification projects is that the lack of appropriation of users has been a common element in this type of project failures.

<table>
<thead>
<tr>
<th>Table S-a (Table 7): Policy (instruments) related to energy and poverty in Ecuador</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy (instruments)</strong></td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>LPG Subsidy</td>
</tr>
</tbody>
</table>
Deliverable 1

Population in Ecuador uses LPG for food cooking. It has positive effects related to the more affordability of LPG towards traditional domestic energy. Smuggling problems arise with neighbouring countries.

<table>
<thead>
<tr>
<th>Policy (instruments)</th>
<th>Potential Beneficiaries</th>
<th>Access Focus</th>
<th>Budget</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport fuels subsidies</td>
<td>Population with a mean of transport</td>
<td>Economic</td>
<td></td>
<td>Since it is not focused, it does not allocate properly resources to the most needed part of the population</td>
</tr>
<tr>
<td>Electricity tariff subsidy (&quot;tarifa de la dignidad&quot;)</td>
<td>Poor people with physical access to electricity Around 2 million users</td>
<td>Economic USD 64.9 millions 2007 - 2008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creation and operation of FERUM for rural and urban marginal electrification. Criteria include that the project should benefit at least 8 households. The limit for investment is 1000 US$ per household for grid extension. For renewable isolated energy systems the limit is 1300 US$.</td>
<td>Rural and marginal urban population without physical access to electricity 1997 – 2006 a total of 9221 projects that benefited 1 290 431 households</td>
<td>Economic and physical</td>
<td>1997 – 2006 around 346 million USD</td>
<td>Some of the systems have been abandoned, there is lack of appropriation by users</td>
</tr>
<tr>
<td>Installation of PV systems by Ministry with own funding and/in cooperation with NGOs and international donors</td>
<td>Rural communities distant from grid.</td>
<td>Economic and physical</td>
<td></td>
<td>Commonly the approach of distribution companies is to focus on communities close to the grid</td>
</tr>
<tr>
<td>Exclusivity of distribution companies electricity supply in concession areas</td>
<td>All the population</td>
<td>Economic and physical</td>
<td></td>
<td>The increase of the hydropower base would lower the price of electricity</td>
</tr>
<tr>
<td>Law for the promotion of renewable energy</td>
<td>All the population</td>
<td>Economic and physical</td>
<td></td>
<td></td>
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Table S-b (Table 8): Policy (instruments) related to energy and poverty in Peru

<table>
<thead>
<tr>
<th>Policy (instruments)</th>
<th>Potential Beneficiaries</th>
<th>Access Focus</th>
<th>Budget</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Electricity tariff subsidy FOSE</td>
<td>Poor people with physical access to electricity</td>
<td>Economic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural electrification</td>
<td>Rural</td>
<td>Physical</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In both countries, renewable energy sources do not seem to be a central focus of actual policies and there is a non inclusive policy for the small scale RES connection to the grid (at least 1 MW in Ecuador and at least 1 % of installed power capacity in Peru). The power sector continues to be in crisis, particularly in terms of their financing and their ability to meet demand, at least-cost, on an environmentally sustainable basis. The sector will require significantly expanded access to energy to enhance security of energy supply and social equity, create jobs and reduce and protect the global and local environment.

Finally it is important to notice the different paths regarding energy investment that Ecuador and Peru would take in the near and midterm future. While Peru would go into a direction of promotion of private investment, Ecuador would try to expand it capacity mainly by State investment especially in hydropower.
1. Introduction

Article 3 of the Bonn International Conference for Renewable Energies Final Political Declaration (Bonn Conference, 2004a) states that reaching the goals of the United Nations’ Millennium Development Goals will require significantly expanded access to energy in developing countries, particularly the MDG 1 related to halving the proportion of people living in extreme poverty and the the MDG 7 on environmental sustainability. The article states that, if market development and financing arrangements are enhanced, an estimated of up to 1 billion people can be given access to energy services from renewable sources. The Conference’s resulting Policy Recommendations state that benefits from increased use of renewable energy include “enhanced security of energy supply, reduced threat of climate change, stimulation of economic growth, jobs creation (often in rural areas), higher incomes, poverty reduction, improved social equity, and protection of the environment at all levels. Renewables can also improve access to energy services by providing reliable and affordable energy supply for people in rural and urban areas.” (Bonn Conference, 2004b, pp.5) The document also states that increased utilization of renewable energy should be seen as a means to such ends, not as an objective by itself.

A Friends of the Earth report (Friends of the Earth, 2005) states that the provision of clean, renewable energy combined with improved energy efficiency, can meet our current energy needs and provide access to electricity to those without service. The report also states that “with increased financing for, and provision of renewable energy sources in developing countries many of the 1,6 billion people who do not have electricity can be provided with clean, healthy energy. At the same time, increased demand for power in developing countries from growing industries and population growth can be met using clean, renewable sources of power that do not contribute to climate change” (Friends of the Earth, 2005, pp. 2).

The countries involved in Andenergy Project¹ show relatively high degrees of urbanization; Ecuador has a rural population of 37,3%² and Peru of 27,2%. The proportion of poor people among the rural population is higher in Peru -62%- than in Ecuador -47%- (FAO, 2006).

The share of primary energy per type of source can be appreciated in Figure 1. Ecuador primary energy is strongly dominated by oil, 405 PJ, which accounts for the 82% of the total offered primary energy. The second type of energy is hydroenergy. Natural Gas, cane products and firewood are also used. Figure 2 presents the share for Peru. Total amount of primary energy in Peru in 2004 was 436 PJ. Oil share of Peru is also the highest but it is less significant than for Ecuador with 34%. Peru also has a higher share of natural gas (26%). Hydroenergy accounts for around 20% of Peruvian primary energy.

¹ More information at: http://www.andenergy.org/.
² Ecuador’s 4,7 of its 12,6 million people are rural. In Peru 7,0 million out of the 25,7 are in rural areas.
Deliverable 1

Primary Energy in Ecuador 2004
[Type, Amount [PJ], %]

- Oil, 405.06, 82%
- Cane products, 13.15, 3%
- Hydroenergy, 35.02, 7%
- Natural Gas, 24.27, 5%
- Firewood, 12.32, 3%
- Other, 13.15, 3%

Figure 1: Primary Energy in Ecuador offered inside the country 2004 (adapted from OLADE SIEE 2004).

Producción de Energía Primaria 2004 (Perú)

- Petróleo; 33,7%
- Hidroenergía; 19,6%
- Gas Natural+LGN; 25,7%
- Bosta, Yareta; 2,1%
- Bagazo; 2,6%
- Leña; 15,7%
- Carbón Mineral; 0,1%

Figure 2: Primary Energy in Peru offered inside the country 2004 (Ministerio de Minas y Energía 2005).
Final consumption of energy for Ecuador and Peru is less different. Figures 3 and 4 present this for both countries. It can be noticed that for Ecuador, the main final consumption is transport with 40%, for Peru is also transport with 33%. The second sector for Ecuador is industry, for Peru is the residential sector.

**Final Energy Consumption Ecuador 2004**

**Sector, PJ, %**

- Transport, 114.37, 40%
- Industry, 91.12, 32%
- Residential, 61.21, 22%
- Agriculture, fisheries and mining, 0.34, 0%
- Business and public services, 14.55, 5%
- Construction and others, 3.06, 1%

**Figure 3**: Final Energy Consumption per Sector in Ecuador 2004 (adapted from OLADE SIEE 2004)
In Ecuador, according to the 2001 Population and Housing Census, 89.7% of the dwellings had access to electricity been 93.3% in urban and 79.1% in the rural areas (CONELEC, 2004). In Peru an estimated of six million poor rural people do not have access to electricity (Jiménez, 2006).

Both countries have in place policies and regulations to upgrade their electricity sector and to provide access to their populations (including those living in the rural and marginal-urban areas). The countries also have policies to promote the deployment of renewable energy systems (as alternative to fossil fuels based electricity generation feeding their national grids), and as alternatives to grid extension for electrification of isolated, strategic and/or environmentally sensitive areas. The degree to which the existing policies and regulations in place in each country is in line with the international policy and regulatory recommendations needs to be assessed as well as to which extent the existing policies for the power and energy sectors are benefiting the poor.

The institutional and organizational arrangements of the energy sectors show some degree of variation between the countries, and for the electricity sector the adopted model for the sector reform reflects the recommendations promoted by the World Bank\textsuperscript{3}. The general guidelines for the electricity sector reforms included the following features: “a) de-monopolization of the electricity sector, which was run by public entities prior to the reforms; b) unbundling generation, transportation, and distribution activities, with several degrees of limitation imposed on the vertical integration of the system; c) creating

\textsuperscript{3} The World Bank recommendations are analyzed in more detail in section 5 of this report.
competition at the generation level and creating spot markets; d) creating relatively independent Regulatory Bodies or Tariff Regulatory Commissions; e) privatization; f) modifying the criteria for cost allocation among users and increasing the average tariff level; g) totally or partially removing subsidies and banning cross subsidies among categories of users” (Kozulj and Di Sbroiavacca 2004, page 10).

Although there are signs of change, the culture of the power sector institutions tends to be essentially technical with an approach to energy provision typically made on a supply oriented vision, which may be a barrier to the inclusion of social and environmental concerns into the policies and programs of such sectors, including the issue of providing electricity to the poor.

On the other hand, both countries have programs to combat poverty and to promote sustainable development. These programs normally operate in different government offices in more socially or environmentally oriented institutions. Although they may be using participatory approaches to project formulation including the potential beneficiaries of the projects in the formulation/design phase of the initiative, within the entire cycle they do not necessarily include the participation of technical people from the power sector, and sometimes work in isolation from each other and amongst themselves; and what could be even worse, they sometimes compete for limited funding. These situations, if and/or when present, may also represent a barrier to the provision of modern energy services for poverty alleviation.

The present document reports the work conducted in Work Package 2 of the Andenergy project that aims to identify and analyze the national, international and regional policies and regulations on energy and energy services for poverty alleviation in the countries, and to identify potential options for enhancing the role of renewable energy technologies for this purpose.

1.1 Objectives and scope

1.1.1 Objectives

The overall objectives of the package are the identification of the national, international and regional policies and regulations on energy and energy services for poverty alleviation in relation to the two target countries: Ecuador and Peru, and the identification of potential policy and/or regulatory options to promote the dissemination of renewable energy technologies for poverty alleviation.

1.1.2 Scope

The scope of the work includes the identification of the national energy policies and regulations, like referential plans on energy and sustainable development, programs on poverty reduction, specific programs for renewable energy promotion, specific programs on environment and energy, for the target countries.

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4 In Ecuador for example, programs to fight poverty are typically coordinated by the Ministry of Social Welfare, but rural water provision and sanitation are promoted by the Ministry of Housing.
The study also includes the identification and study of the regional/international energy policies and regulations on energy services for poverty alleviation and sustainable development, the initiatives and programs of the regional institutions, Andean Community, IIRSA, ECLAC, OAS, IDB, CAF, OLADE and international institutions like World Bank and the United Nations, will be analyzed and assessed. Policy assessments on energy, on poverty alleviation, and energy for sustainable development will also be analyzed.

The scope includes the assessment of the policies and regulations in the energy sectors of Ecuador and Peru with emphasis on the policies and regulations promoting renewable energy for poverty alleviation. The level of integration of international policy and regulatory recommendations on the policies and regulations of the countries, in particular those for the promotion of renewable energies, will be analyzed as well.

Due to the integration between trade, market and financing with policies and regulations in the case studies, the assessment, for six case studies, three in Peru and three in Ecuador, of the micro level effects of the policies and regulations, other scope of the work, it was included in the Deliverable 2.

1.1.3 Methodological approach
Policies and regulations in the Andean sector will be analysed at the macro level through a comparison between the International recommendations and the policies applied at the national level; at the micro level, the effects of those policies will be analysed through the identification and analysis of different case studies.
2 The energy policy and regulations in Ecuador

2.1 Organisation of energy sector

Going back a few years in the history, most of what can be considered government structure of the country goes back to the early days of the oil boom that coincided with the coming into power of the last military dictatorship in 1972. The Ministry of Natural Resources, the National Electrification Institute (Instituto Ecuatoriano de Electrificación - INECEL) and the State Oil Corporation (Corporación Estatal Petrolera del Ecuador - CEPE) were then created.

The Ministry was chartered with policy making and regulatory duties with emphasis on the petroleum activities. To regulate the petroleum sector the Ministry had a Hydrocarbon Directorate (Dirección Nacional de Hidrocarburos - DNH). The Ministry also had an Electricity Directorate mostly with policy making and monitoring duties. The country also created the National Energy Institute (Instituto Nacional de Energía - INE) that was in charge of energy planning, the preparation of the energy balances, and the development and promotion of energy efficiency and renewable energy.

INECEL was chartered with the planning, development, construction and operation of the power infrastructure of the country. It included a division dedicated to rural electrification that gave some emphasis to mini-hydro.

CEPE was in charge of all hydrocarbons related activities in the country including exploration, development, production, refining, commercialization, exports and imports.

In due time these two bodies grew so big that they overpowered the Ministry and the energy regulatory bodies. The National Energy Institute never got the opportunity to perform the tasks it was meant to, and its Director normally came from either one of its two big brothers.

With the income coming from oil and the relatively easy access to capital, the main electricity and hydrocarbon infrastructure was built including the oil pipeline, the Paute, Pisayambo and Agoyan Hydro Power Plants, the Esmeraldas and Gonzalo Zevallos Thermal Power Plants, the national electricity grid, the Esmeraldas and Shushufindi refineries, the oil port in Esmeraldas and the refined products pipeline from Esmeraldas to La Libertad. INECEL owned power plants, had a body in charge of the national grid and was the majority owner of the distribution companies that were created. CEPE in 1989 became the private company Petroecuador, a state owned, private-like, holding in charge of production, transport, trade and other hydrocarbon related activities. Petroproducción is the company of the holding in charge of oil exploration and exploitation, Petroindustrial is in charge of refining, and Petrocomercial in charge of transport and the internal trade hydrocarbon products.

With the crisis of the debt and the alleged inability of the country to invest in the development of the hydrocarbon and electricity sectors, the country engaged in a modernization attempt led by the National Modernization Council (Consejo Nacional de

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5 The Ministry has also policy and regulatory duties over the Mining sector in general.
Modernización - CONAM) with the aim to reduce the size of government and transfer to the private sector most of the until then considered sectors of national security issues, including both hydrocarbon and power sector as well as telecommunications, ports, airports, and other state owned enterprises and services. As we will see later, these efforts were aligned with what the policies being promoted by the World Bank.

The current organization of the energy sector includes the Ministry of Energy and Mines as leader, articulator and regulator. INE was dismantled and the areas of energy efficiency and renewable energy were moved to the Ministry of Energy and Mines within the Directorate of Energy Efficiency and Renewable Energies. Petroecuador is still in charge of the activities of the hydrocarbon sector regulated by the DNH; private sector participation in all phases of the hydrocarbons sector is already taking place, although not without problems.

New laws were passed, in particular the Regime Law of the Electricity Sector (Ley de Regimen del Sector Eléctrico - LRSE) (Suplemento, Official Register No. 43, October 10, 1996), that de-bundled the electricity sector and abolished INECEL creating National Electricity Council (Consejo Nacional de Electricidad –CONELEC). This law gave birth to the new structure of the power sector of the country. A description of the framework under this took place and the ensuing structure is presented in the sections below.

The Ecuadorian government through the Ministry of Energy and Mines, Petroecuador and CONELEC is promoting the participation of the private sector in both hydrocarbon and the power sectors.

A new law was also created in September 2006 to develop an investment fund for the electricity and hydrocarbons sectors (FEISEH). This law would facilitate the finance of hydropower projects (Peláez-Samaniego et al. 2007). According to the Minister of Energy and Mines in a round table to discuss new energy policy, the San Francisco hydropower project was the first working plant to be financed by the FEISEH (Eco. Alberto Acosta MEM during his presentation in the Consultation Table of Energy Policy, Process for Definition of the Ecuador National Plan, Cuenca, Ecuador, June 2007)

A more detailed account of the structure of the energy sector at the public and private levels follows.

2.1.1 Public Bodies

2.1.1.1 Ministry of Energy

The Ministry of Energy and Mines\(^7\) has as its mission to design, establish and promote the policies for the energy and mining sectors of the country taking due consideration of environmental and sustainability criteria. The Ministry monitors and controls compliance with the policies and regulations to ensure a stable business environment for the activities of all actors both public and private.

Objectives of the Ministry include; contributing to the socially equitable, regionally balanced, environmentally sustainable, and participative development of the country, promoting national and foreign investments, contributing to the increase of the GDP of the

country, and promoting renewable energy and energy efficiency.

The Ministry of Energy and Mines has a Directorate of Energy Efficiency and Renewable Energies under the Electrification Under-Secretariat. Additionally, it houses the National Hydrocarbons Directorate-DNH- which is the regulator of the activities of the sector, and the National Environmental Protection Directorate –DINAPA- that is the environmental regulator of the hydrocarbon sector. There is also a Directorate for Mining which is not analyzed here. A general vision of the Ministry structure can be seen in Figure 5.

![Figure 5: Organization of the Ministry of Energy and Mining (source: http://www.menergia.gov.ec/).](image)

### 2.1.1.2 Public enterprises

There are public enterprises operating in both the hydrocarbons and the electricity sectors. In the hydrocarbons sector, the Petroecuador\(^8\) holding continues to be public and operates in all the activities of the sector including retailing of oil products at the gas station level\(^9\).

Electricity distribution and commercialization is conducted by 19 companies and by the Corporation for Temporary Administration for Guayaquil’s Electricity that provides service to City of Guayaquil\(^10\) by delegation from CONELEC. The Solidarity Fund is the majority shareholder of the 19 firms\(^11\); the other owners are Municipalities, Provincial Governments and other public bodies of the provinces included in their concession areas.

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9 This, however, is a minor operation.

10 The city was served by EMELEC Inc., a private company that had a contract with the state to provide the service. The contract ended and the operation was taken over by the regulator after a bank owned by the same owner was closed due to financial mismanagement and the owner was out in jail.

11 The Solidarity Fund inherited the INECEL shares after its demise.
Table 1 shows the participation of the Solidarity Fund in the ownership of the distribution companies.
In Table 2 the ownership shares of the Solidarity Fund of generation companies are presented.

There are also state owned generating companies, and generators that belong to state owned institutions. An important public generator is Hidronación that runs the Marcel Laniado hydropower plant. Hidronación is owned in full by the Corporation for the Development of the Guayas River Basin and the Santa Elena Peninsula-CEDEGE.

The Solidarity Fund also owns the totality of the shares of Transelectric, the only transmission company of the country.
2.1.1.3 Regulatory institutions

The Ministry of Energy and Mines is the regulatory body for the hydrocarbons sector. The National Hydrocarbons Directorate is the technical-administrative body that controls, audits and oversees the hydrocarbon operations to insure that the constitutional, legal and regulatory mandates are complied with. The DNH has the duty to ensure the public that its rights are preserved.

The State is the sole owner of the natural resources for the generation of electricity and through the National Council of Electricity-CONELEC\(^\text{12}\), it may delegate to other sectors of the economy the generation, transmission, distribution and commercialization of electricity. It is a duty of the Executive Function of the State through the corresponding State Secretariats, the formulation and coordination of the national policy for the electricity sector. The State through the Ministry of Energy and Mines dictates the energy policy of the country. CONELEC develops and executes the policy for the state. CONELEC is the regulator of the electricity sector and also prepares the National Electrification Plan. CONELEC prepares for Presidential approval, all the regulations that it finds fit to ensure the best operation and development of the sector. A general vision of the Body structure can be seen in Figure 6.

This body is also responsible for the study and development of the Hydro power generation potential in Ecuador, been one of the main responsible (mainly based on previous studies from the former body), on the publication and deployment of new Hydro resources, that are already briefly described in the "Catálogo Resumen de la Generacion Eléctrica en el Ecuador", as well as at the Website of CONELEC, although it is rather old and some times does not count with field measurements yet with estimative made on hydrological data.

2.1.2 Private

2.1.2.1 Private enterprises
There are private companies operating in the energy sector in both the hydrocarbon production and commercialization and power generation. There are also a number of companies providing services in the hydrocarbon and electricity sectors.

2.1.2.2 Foreign enterprises
The following private foreign companies operate in the hydrocarbon sector operating oil fields under concession: Canada Grande, Energy Development Corporation –EDC-, Perenco, AGIP, CNPC (Amazon), Encanaecuador, Repsol-YPF, Ecuador TLC, CGC, Burlington, City Oriente, Tripetrol and Petrobras.

There are also foreign companies operating in power generation, amongst them Duke Energy and Energy Development Corporation-EDC- that owns Machala Power which uses natural gas from the Amistad Field offshore in the Guayaquil Gulf. Lafarge Cementos that owns the Selva Alegre Cement Plant is also a generator. Other firms have been granted generation licenses or permits. Annex A shows a list of firms with permit or licenses given by CONELEC (CONELEC, 2006) There are also foreign companies working as operators of power plants including General Electric from the US and Union Fenosa from Spain.
2.2 Hydrocarbon sector

2.2.1 Structure

Oil is a key resource for the economic development of the country, and the government has promoted the private participation in the sector in the last few years. According to the DNH, Ecuador produced around 418,000 barrels of oil per day in 2003, which represented 48% of the fiscal income and 20% of the GDP for that year. After the inauguration of the heavy crude oil pipeline (OCP) the country essentially doubled its production with the new calls for tenders for companies to operate more fields. Ecuador is currently the fifth largest producer of crude oil and the seventh of natural gas in Latin America. Ecuador has six sedimentary basins: Oriente (Napo, Pastaza and Sucumbios), Guayaquil (Progreso, Santa Elena, Golfo de Guayaquil), Manabí, Esmeraldas (Borbón), Litoral Pacífico (Offshore), and Cuenca. These basins have 190,700 km² of sedimentary rock; out which, 98,000 km² are in the Amazon Region (51.4%), 77,000 km² in the coastal region and 25,000 km² in the continental platform. Only the first two have been found to contain oil. The management and commercialization of hydrocarbons is conducted by the state-owned holding Petroecuador. The exploration and exploitation of the hydrocarbon fields is conducted by the State either directly through Petroecuador or in association with third parties.

As stated earlier, the Petroecuador holding is composed of three companies: Petroproducción, in charge of exploration and exploitation of the oil and gas fields, Petroindustrial, in charge of refining, and Petrocomercial that is dedicated to hydrocarbon transport and to the internal trade of hydrocarbon products. A more detailed description of the companies is shown in Annex A.

Petroecuador also manages and operates the Transecuadorian Oil Pipeline System -SOTE-, built in 1972 by Texaco-Gulf.

Petroecuador with a 65% rate of positive exploratory wells and an investment of 33.5 million dollars had found approximately 830 million barrels of oil until 2001. According to Petroecuador these results have been obtained at a cost 20 times lower than the cost of private companies. The relationship between the state and private companies has not been smooth as they have been accused of not complying with the contracts.

Figure 7 shows the blocks that have been given in concession to third parties for hydrocarbon exploration and exploitation:
2.2.2 Normative

The hydrocarbon industry is regulated by the Ministry of Energy and Mines. The regulated activities include prospecting, exploration, exploitation, refining, industrialization, storage, transport and commercialization of hydrocarbons and their products.

The Minister of Energy and Mines is the person in charge of the execution of the hydrocarbons policy approved by the President of the country and is also in charge of assuring compliance with the Hydrocarbons Law. The Minister may enact bylaws and emit ministerial orders to be able to efficiently perform his duties.

2.2.2.1 Laws

The hydrocarbons law considers the fields containing oil and associated substances as the sole property of the state and their exploitation must be performed according to the principles of sustainable development and the conservation and protection of the environment. The law prohibits any practices or regulations that could harm free competition and outlaws deliberate attempts to cause shortages of hydrocarbons supply within the country.

The state through Petroecuador, will carry out exploration and exploitation activities either directly or contracting out with other companies according to the pertinent legislation and prioritizing the participation of Ecuadorian firms. There are oilfields that are considered
marginal that are given special treatment\textsuperscript{13}. These fields, that are typically located far from the main infrastructure of Petroecuador, cannot represent more that 1\% of the total production. Their operation is awarded on a competitive basis (currently the country is evaluating bids for a number of them) and preference is also given to the participation of national companies.

Part of the net income coming from the exploration and exploitation contracts is allocated for the enhancement of the reserves.

The Hydrocarbons Law has provisions for the duration of the hydrocarbons exploration and exploitation contracts. The law specifies that the exploration period must be of up to four years which may be extended for an additional two years with the agreement of Petroecuador. If unsuccessful, the contractor may request Petroecuador to end the contract. The exploitation period is 20 years with extensions granted by Petroecuador if considered advantageous for the country.

To be able to sign contracts with the state, foreign companies have to establish themselves in the country, follow the Ecuadorian laws and must decline the option of any claims by diplomatic means.

The Hydrocarbons Law gives complete tax exemption to the creation of companies for the exploration, exploitation, and industrialization of hydrocarbons. The exemption also includes capitalizations and the tax on the total assets of the companies. There is also an exemption of the import duties for equipment, machinery, components and other materials necessary for the activities of all the exploration phase and during the first ten years of production, provided the items are not produced in the country.

Regarding hydrocarbon trade, the Ministry of Energy and Mines must submit for Presidential approval the national policy for import and export of hydrocarbon and hydrocarbon products. Besides Petroecuador, any person properly established in the country may import or export hydrocarbons and hydrocarbons products if they comply with the requirements established by the Ministry of Energy and Mines.

\textbf{2.2.2.2 Regulation}

The Minister of Energy and Mines being the regulator of the petroleum industry in the country has to update the regulatory body that rules the activities in the sector so as to achieve efficiency. Among the regulations there are Bylaws for commercialization of fuels, the Bylaws for Hydrocarbon Operations (Reglamento de Operaciones Hidrocarburíferas - ROH\textsuperscript{14}), the Bylaws for Hydrocarbon Refining and Industrialization.

Regulations apply to all activities of Petroecuador, of the national and foreign companies or of the associations and consortia of companies or firms delegated by the state. They must all comply with the law and its bylaws including the environmental provisions

\textsuperscript{13} ESPOL has the concession for a marginal oilfield and has contracted out the operation to Pacifpetrol a private company.

therein. The ROH states the duties and obligations of Petroecuador, and the contractors which include environmental protection, safety and technical standards such as those of the American Petroleum Institute- API- and other relevant technical standards.

2.2.2.3 Specific pro-poor measures (subsidies, incentives etc.)

The price of LPG, most of it imported, is subsidized. There have been several attempts to eliminate or at least diminish this subsidy but it is a very difficult political issue and the subsidy has stood. There is a price differential between the price of LPG for domestic use and for other applications, such industrial or commercial, however now LPG is illegally being used in public transport and industrial and commercial applications. The low price of LPG also creates an incentive for illegal trade to the neighbour countries, especially Peru.

The price of oil products has been kept constant despite the fact that the price of crude oil and a result those of the oil products that are imported, have suffered sharp increases. The diesel oil used for power generation has a special price so that the electricity tariffs can be kept low.

In some cases the state has included in concession contracts requirements of investments on the communities where oil is being extracted. An example of such provisions is the concession contract for the exploitation of the Ancon oilfields in the Santa Elena Peninsula. In such contract ESPLAN has to invest 30% of the net profits coming from the exploitation of the field in projects for the benefit of the communities of the Santa Elena Peninsula.\(^{15}\)

2.3 Electricity sector (production, transmission, distribution, electrification plan)

2.3.1 Structure

In 1996, the Ecuadorian government started the reform of its power sector. The Ecuadorian Institute for Electrification – INECEL – a vertically and horizontally integrated state monopoly chartered with the tasks of generating, transporting and distributing power in the country was dismantled and a new institutional arrangement was created by the Regime Law for the Power Sector (Ley de Régimen del Sector Eléctrico – LRSE). The new regulatory framework and institutional arrangement followed a model that, according to CIER (2001), was originated in Chile, then adopted by Great Britain and Argentina, and later followed by the rest of Latin America.

The general guidelines for the electricity sector reforms included the following features: “a) de-monopolization of the electricity sector, which was run by public entities prior to the reforms; b) unbundling generation, transportation, and distribution activities, with several degrees of limitation imposed on the vertical integration of the system; c) creating competition at the generation level and creating spot markets; d) creating relatively

\(^{15}\) As a result of this requirement ESPOL has sponsored projects to enhance the competitiveness of a community dedicated to the production of Panamá hats, which constitutes one of the case studies for Andenergy.
independent Regulatory Bodies or Tariff Regulatory Commissions; e) privatization; f) modifying the criteria for cost allocation among users and increasing the average tariff level; g) totally or partially removing subsidies and banning cross subsidies among categories of users” (Kozulj and Di Sbroiavacca 2004, page 10).

The former institutional arrangement was such that INECEL owned several hydro and thermal power plants spread over the country; it had an internal branch in charge of the operation and expansion of the National Grid; and, it owned the majority of shares of most of the distribution companies in the country. These distribution companies were in general jointly owned by INECEL and the provincial governments to which the particular company served. Some of these distribution companies had a small generation capacity.

The arrangement devised in the law resulted in the power plants owned by INECEL being split into several state owned companies, the transmission line of the National Interconnected System was assigned to another state owned company- Transelectric - the only transmission company in the country, and the shares of INECEL in the distribution companies were assigned to the Solidarity Fund, a state agency that is dedicated to social investments. In fact, as INECEL was the sole owner of the state power plants and the transmission infrastructure, the Solidarity Fund also owns the generation companies that resulted from the break-up of the generation branch of INECEL and of the transmission company.

The law and its updates, establish that it is the state government duty to satisfy the electricity demand of the country, either directly or through agents, and that the state can delegate to the private sector the generation and distribution of electricity.

The institutional arrangement established by the LRSE includes CONELEC as the regulatory body for the sector. CONELEC is the body through which the state can delegate to private actors the generation and distribution of electricity. This delegation has to be formalized via Concession Contracts, Permits or Licenses. CONELEC has also the task of updating the Ecuadorian Electrification Plan.

Consumers that have a maximum demand above 650 kW and consume more then 4,500 MWh/year, are allowed to buy directly from generators. Consumers with maximum demand below that level have to buy from the distribution companies that have the concession in their jurisdiction. There is an association of large consumers called EGRANCONEL which advances their interests. There are also a number of self-generators, which produce their own power.

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16 There was only one integrated private company of importance EMELEC, serving Guayaquil, the most populated city of the country. The company had a contract with guaranteed profitability that dated from mid last century and was feuding with the state regarding mutual debts and the renewal of its concession at the time of the reform.


18 The original aim of the Solidarity Fund was to manage and invest the proceeds coming from the management of the revenues that were to accrue by the privatization of the companies, both generators and distribution companies. The Solidarity Fund was also to receive the money from the privatization of state companies in other sectors such as telecommunications, oil, ports, etc. Opposition resulted in the inability of the country to proceed with the privatization process, and the Solidarity Fund is the current owner of the companies.


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Other key actors in the system are the generators, the transport company and the distribution companies that have the concession to perform those activities. According to CONELEC in June 2005 in Ecuador there were 13 power generation companies, 1 transport company, 13 self-generators y 20 distribution companies; out of the 20 distribution companies 14 had generation plants that were not separated from them as established by law. (CONELEC Statistics, 2005). As of June 2005, 82 consumers had been granted large consumer status, out of these 5 have lost the status. A total of 48 large consumers buy directly from generators, the remaining buy from their distributors either as regulated consumers or via long term contracts.

The National Dispatch Centre (Centro Nacional de Control de Energía – CENACE\textsuperscript{20}), is a private technical corporation that manages the electricity spot market. CENACE’s membership includes all the companies of the sector including the big consumers. CENACE has a Board with a representative from the President of the country, and members from the generators, distributors, the transport and the big consumers.

At the spot market, the dispatch of electricity is done by CENACE according to the audited generation costs of the different producers, seeking to minimize costs and maximize reliability; generators are paid using the generating cost of the last unit entering the system (Marginal Cost Model). Generators are also paid by installed guaranteed capacity (on a 5.7 US$/MW available for dispatch for the Grid). Tariffs to be charged to the different types of regulated consumers by the distribution companies are established by CONELEC and they are meant to cover the average costs of generation, the transport fees, and the distribution value added.

There has been an increase in private participation in power generation, mostly with thermal power plants from a total of around 2.740 MW before the year of the reform to the current 3.485 MW. Generation capacity has not grown as expected and in the last few years, the country had to resort to electricity imports from Colombia due to insufficient expansion of generating capacity. The current installed capacity of the country as of 2004 was 3.775 MW, been: 1.746 MW hydropower, 616 MW thermal gas turbines, 166 thermal natural gas fuelled gas turbines, 510 MW internal combustion engines, 446 MW steam thermal, 290 imports from Colombia. (CONELEC Statistics, 2005). Some 158 MW are not connected to the national grid (OPET, 2005, op cit.)

There are a number of projects that are being built and contracted (yet the majority does stay in the feasibility study), and the country government and energy related entities urge the private investors to invest in new electricity generation projects. Recently, a law was enacted to promote investment in key sectors of the economy including the power sector. This law gives fiscal incentives on the order of 10 years for new investments in the Guayaquil and Quito poles and up to 12 years tax exemption for investments in other parts of the country. (Tax Incentives Law, Law 20, Official Register 148, November 18, 2005)

The National System of Generation and Transmission is shown in Figure 8. The concession areas of the distribution companies of the country are shown in Figure 9.

According to the 2001 Population and Housing Census, in Ecuador, 89.7% of the dwellings had access to electricity with 93.3% in the urban areas and 79.1% in the rural

\textsuperscript{20} More information at: www.cenace.org.ec/.
areas (CONELEC, 2004). There is a need for providing access to a significant portion of the population, especially in the rural areas.

The degree of penetration of electricity in each of the distribution companies is shown in Figure 9. The companies with the lowest coverage are Sucumbios (60%), Esmeraldas (76%), Bolivar (77%) and Emelrios (80%). The best served are the areas of CATEG (serving Guayaquil), Quito and Galapagos with 97% the first two and 96% the last.

Figure 8: Ecuadorian National System of Generation and Transmission as of June 2005 (Source: CONELEC web page www.conelec.gov.ec).
Figure 9: Concession Areas Electricity Distribution Companies (Source: CONELEC Statistics, 2005).
2.3.2 Normative
The Regime Law for the Power Sector rules the activities of production, transmission, distribution and the preparation and execution of the Electrification Plan. There are bylaws and guidelines that complete the regulatory framework.

2.3.2.1 Laws
The LRSE - Ley de Régimen del Sector Eléctrico regulates the activities of electricity generation when the production is fed, in full or in part, to the national grid or to a distribution system. The law also regulates the services of transmission, distribution, commercialization as well as the import and export of electricity. The law states as the objectives of the national policy the provision of optimal quality and reliable service, the promotion of competition in the production market; the protection of the consumers interests; the regulation of the transmission and distribution of electricity establishing tariffs that are fair both to the investor and to the consumer; the promotion of investments in the sector; the development of electrification in the rural areas; the promotion of the use of renewable energy sources; and, the development of tariff systems that promote the rational utilization of energy.

The law gives CONELEC the responsibility for the regulation of the sector. CONELEC
has also the duty to develop the electrification plans, and the issuance of bylaws on safety and environment and the general standards that will be applicable to all transmission and distribution companies.

The law states that the activities of generation, transmission or distribution of energy will be performed by duly authorized companies. Companies, regardless of the composition of their shareholders, will be ruled by the Ecuadorian applicable laws. The LRSE establishes that the construction and operation of the new generation projects included in the Electrification Master Plan approved by CONELEC, will be given out in concession by CONELEC, through a public process, to national and/or foreign investors.

2.3.2.2 Regulation
CONELEC is in charge of regulating all the activities of the electric energy sector. There are regulations that point to achieve the goals of the energy plan at the national level. The regulations (bylaws) encompass international electricity trade, the activities of the self producers, the management of the national grid, the quality of the service, the criteria for payment to hydro power generators, the operation of the electricity wholesale market, and the activities of the energy distribution and commercialization companies. There are also regulations for entry of new actors into the sector.

2.3.2.3 Specific pro-poor policies (subsidies, social tariffs, etc.)
The LRSE purports to adopt measures that point to the public benefit, by protecting the customers while developing the sector. The law states that 5% of the excess profit will be used to create a fund to subsidize the installation costs to provide service to residential users in the Amazon region and the Galápagos. This fund is under the administration of the Solidarity Fund.

The law also states the right of the poorest consumers to have access to the service according to their purchasing power. The consumption level to be considered in this category is defined at the beginning of each year by CONELEC and depends on the geographical zone. To be considered for subsidized service the customer must consume less than the average residential consumption in their corresponding zone and under no circumstances they can consume more than the national average. Low consumption customers will be subsidized by the residential consumers with high consumption in each zone.

2.3.2.4 Rural Electrification
The Regime Law for the Power Sector also regulates rural electrification and the promotion of the use of renewable energy. A Fund for Rural and Marginal Rural Electrification (Fondo de Electrificación Rural y Urbano-Marginal- FERUM) was created for this purpose. This fund is managed by CONELEC and is financed by a contribution of 10% of the electricity bill on the commercial and industrial consumers, and other sources. According to the regulation for the management of FERUM, its funding can be used for
building new installations, upgrading existing installations, and improvement of the distribution systems in the rural and urban marginal sectors, or for the construction of renewable energy based generation systems and also for the maintenance of isolated systems, located in the border provinces, Amazon region and Galapagos. The administrator of the FERUM funds is the Solidarity Fund.

According to the FERUM bylaws, Provincial governments, in coordination with Municipalities and the Distribution companies that are concessionaires in the areas where the projects are planned, are chartered with the task of identifying and planning the projects to be executed. The general provincial plans are to be submitted to the corresponding distribution companies which in turn must submit them to CONELEC for analysis and approval. Distribution companies present proposals annually to CONELEC to gain access to FERUM funds. Unconnected systems are treated as distribution companies for the purpose of gaining access to funding. The distribution companies are the ones that receive the funding and build the projects.

### 2.4 Energy efficiency and renewable energy

The Ministry of Energy and Mines through its Directorate of Renewable Energies and Energy Efficiency (Dirección de Energías Renovables y Eficiencia Energética – DEREE) is chartered with the promotion of renewable energies and of the rational and efficient use of energy. Among its main objectives is the identification of sites with potential for the installation of such systems involving the universities in the research and development studies and promoting the rational use of energy. The DEREE is chartered with the task of adequately managing the Plan for Renewable Energies, and with the creation and direction of projects that contribute to those objectives.

The DEREE-MEM has several projects in Solar PV, Micro hydro and Wind energy; there are no projects in geothermal applications or biomass within the Ministry. DEREE currently has specialists in micro hydro, solar, wind, and energy conservation; there are no specialists in geothermal and biomass based systems. The senior people have come from the former Ecuadorian National Institute -INE, and from the Micro hydro unit of the former INECEL.

Main projects include in solar PV and wind projects in Galapagos with funding coming from different sources including GEF, E7, kfW, FERUM, the local Electricity Company and the Municipalities. According to a senior solar specialist of the DEREE-MEM, the traditional paternalistic approach followed to disseminate solar PV technologies has not worked as there was no ownership of the projects from the communities leading to the damage of equipment and finally to their waste.

A project that may constitute a milestone in the promotion of renewable energy for rural electrification is the PROMEC project. The PROMEC project\(^\text{21}\), which installed individual residential solar PV units in rural areas of the Amazon region of the country, appears to be more sustainable as it has incorporated features such as local participation of the Local Electrification Boards to take basic care of the equipment, the obligation of the beneficiaries to pay for the service and the intervention of the local power distribution

companies to provide technical assistance and enforce collection of the bills (Morales, 2006).

An important source for electricity provision is hydro mini and micro. DEREE has conducted work at different scales and there is expertise in the direction and a procedure is already in place to assess the potential of hydro sources for small applications. The former National Energy Institute conducted some work in this type of systems, and so did the former INECEL. There appears to be local expertise in building components for such systems, but this needs to be systematically assessed (Morales, 2006)\(^\text{22}\).

Since 1998 until 2006 FERUM has funded over 9.220 projects for a total of over 270 million US dollars. The number of dwellings without service that have benefited from FERUM funding totals 384,000. Renewable energy generation projects started to be funded in the year 2002. Since then a total of 54 projects have been funded providing electricity to a reported 1264 new houses and improving services to around 3,500 users. The total investment amounted to 5.117 million US Dollars, less than 2% of the total invested with the fund (FERUM Statistics, 1998-2006).

The LRSE states that CONELEC will also regulate the generation of electricity produced with non conventional energy sources, prioritizing its use. The law states that electricity generation produced with renewable energy sources will have a preferential rate and that the energy generated with these sources will be dispatched with priority by CENACE. However, the law put a cap of 2% of the total installed capacity of the country to the renewable generation that could use these incentives. Tax incentives are also available for this type of installations. The law stated a time limit until which companies could make use of the incentives.

Out of a total of 1.139 MW of new generation projects with concession contracts, 12,4 MW are wind power (10 MW Salinas and 2,4 MW in Galapagos), 5,71 MW are combined solar/wind (also in Galápagos) and 30,5 MW are sugar cane bagasse based steam power generation in one of the large sugar mills in the coastal region (Ecoelectric). The Salinas project and the 5,71 MW Galapagos projects are expected to start operations in late 2007, the bagasse project in December 2006 and the 2,4 MW project does not have a date fixed (CONELEC Future Generation Projects with contracts, CONELEC webpage). Information for the D3

Out of a total of 675 MW of projects with permits or licences but that do not have contracts yet, only the Villonaco project with 15 MW (located in Loja, a province south of Ecuador in the border with Peru) and the Proviento Project at Las Chinchas with 3,4 MW also located in Loja are wind, the rest is hydro and thermal. These two projects are expected to sign contracts in mid to late July this year. (CONELEC Future Generation Projects with permits or licenses, CONELEC webpage). According to OPET (2005b), citing CONELEC as a source, the San Carlos sugar-mill was to generate 35 MW, 5,5 for self consumption, Lucega, a company created by the Aztra sugar-mill was to generate 13 MW, 1,4 for self consumption, and Ecoelectric 5,4 MW with 1,1 for self consumption. The current information shows that Ecoelectric is attempting a capacity expansion.

\(^{22}\) This is a potential area of contribution from Andenergy to the work of DEREE and the Ministry.
Within the PROMEC project there is a component of extension of modern services to low income populations in rural and peri-urban areas. The project includes, with participation of the Directorate of Renewable Energies and Energy Efficiency of the Ministry of Energy and Mines (Dirección de Energías Renovables y Eficiencia Energética del Ministerio de Energía y Minas, MEM-DEREE) and CONELEC, the development of a national electrification strategy that includes grid expansion as well as projects not connected to the grid. PROMEC includes pilots of independent electrification projects based on renewable energy technologies.

The project also includes the provision of telecommunications services, an evaluation of E-readiness; and pilot projects of technology based small business development for peri-urban and large rural communities. There is also a PROMEC component, financed by GEF aiming at promoting energy efficiency (PROMEC portal at the CONELEC webpage).

There are other actors that play a role in the promotion of renewable energies in the country, amongst them universities, private firms, Official Development Cooperation and NGOs. Of particular interest is to assess the role that CORDELIM (www.cordelim.net), the national office promoting projects to be presented within the Clean Development Mechanism, is playing and can play in the promotion of renewable energy and the provision of modern energy services. Organizations such as CODESO, an NGO that has installed several systems in the Oriental region and Esmeraldas in the Coast (www.codeso.com), and projects such as SI LAE (www.silae.org) with funding from the European Union are also important to note.

2.4.1 Normative

2.4.1.1 Energy Efficiency

The country does not have a law to promote energy efficiency. In emergency situations, particularly when there is lack of rain in the basin feeding the Paute power station, there are attempts to promote energy savings among the population and all consumers in general; however these efforts have not been sustained. The PROMEC project funded by the World Bank has, as one of its components, the development of a proposal for a law to promote energy efficiency. This law is still in the elaboration phase. The PROMEC project objectives also include the assessment of the barriers and solutions for the dissemination of energy efficiency measures.

In the rest of this section it is described the law proposal that is being developed by the MEM related with the efficient use of energy and development of renewable energy. The document is currently at draft level. It is important to notice that this law deals with energy efficiency and renewable energy together.

The objective of the new law is to promote the efficient use of the energy and to raise it at level of National priority. The efficient use of the energy is defined as the optimal use of energy in all and each of the energy chains, from the selection of the energetic source, its production, transformation, transport, distribution, and consumption, including its reuse when it is technically feasible. For this the State will establish standards and infrastructure and it will create the legal, technical, economic and financial required structure with the
purpose of promoting and pushing projects of efficient energy use.

The responsibility of elaborating the policies of the efficient use of energy will be of the MEM through the Directory of Renewable Energy and Energetic Efficiency (Dirección de Energías Renovables y Eficiencia Energética)-DEREE -. It will also be their responsibility to promote, organize, and assure the development and pursuit of the programs of development of efficient use of energy.

In the new law it is stated the elaboration of official standards of efficiency, labeling and implementation and control of the application of those norms.

The Law would also outline special and specific obligations, for public service companies to generate, give and merchandize electric power and fuels that correspond to private programs matters of the National Plan of Energy Efficiency to carry out programs of efficient use of the energy.

The institutions of the State will also form a committee for the efficient use and saving of energy, and establish a Program of Efficient Use of Energy in each of their buildings with a surface greater than the 1000 m2. The program will be subjected to the approval of the Directory of Renewable Energy and Energetic Efficiency of the MEM.

The industrial, commercial and public and private services companies with high total energy consumption would have special and specific obligations as the performance of an energy audit to identify technical and economic measures related to the efficient use of energy and to present a plan of efficient energy management. The MEM would verify the execution of the plan. The limit for total consumption for which companies would require this would be defined by the MEM.

The Law would also establish incentives, additional positions, sanction for the companies that reduce or increase its energy consumptions or indicators of energy efficiency. Credit lines would also be assigned for development of projects of energy efficiency. It would be promoted the research and education related with the efficient use of the energy.

The Law would also include an article related with the popularization of the efficient use of energy. For this the MEM in coordination with pertinent entities would design strategies for the education and development of this.

The MEM would also coordinate with the Ministry of Education and Culture about including topics related with the efficient use of the energy in the curricular programs for the education sectors. It will also be promoted the creation of training programs and post-graduate education on efficient use of the energy.

The Directory of Renewable Energy and Energetic Efficiency of the MEM would analyze and would also develop actions, programs and projects aiming to the mitigation of climate change.

The Law would establish the creation of the Inter-ministry Coordinating Commission for the Efficient Use of Energy that would have a Technical Secretary managed by the MEM. This Commission would promote and control the policies and programs elaborated by the
Technical Secretary Department that would require the inter-institutional or inter-sector participation. The Commission would be formed by the MEM, the CONELEC, the Ministry of the Environment, the Ministry of Education and Culture, the Ministry of Industry, Trade, Integration, Fishing and Competitiveness, and the Ministry of Economy and Finances. Also if the National Executive requires so, the Commission will be able to also be integrated by any other organ of the energy sector.

The Law would include an article dedicated to the freeing of the payment of tariff rights and taxes of import of products, materials, equipment, pieces and parts, not produced in the country, dedicated to the rational use of the energy. In their place it would be created an unique tax of two percent of the CIF of the imported materials or equipments. This value would be dedicated to the development of activities related with the rational and efficient use of the energy.

The State through the Ministry of Economy and Finances would assign the MEM the 0.001% of the annual income of the exports of petroleum for the development of the efficient use of energy. It is also defined from where resources of the MEM would come.

**2.4.1.2 Renewable energies**

As was mentioned above, the LRSE provides the framework for the regulation of renewable energy systems in the country. CONELEC is the regulator. Regarding rural electrification with renewables, projects can apply for funding from FERUM (see above).

The new law proposal for efficient use of energy deals also with renewable energy. In the definition of Efficient Use of Energy it is included the optimal use of energy in all its chains including the selection of the energetic source, its production, transformation among others (see section 2.4.1.1).

**2.5 Environment**

According to the Environmental Management Law, all activities that would potentially cause environmental impact must obtain an environmental license from the environmental authority. The Unified Environmental Management System (Sistema Unico de Manejo Ambiental - SUMA) provides the framework to be applied to new and existing operations.

There is also the Environmental Control and Protection Law and its bylaws state the environmental standards that industries and other economic actors must comply with. The Ministry of the Environment is the national environmental authority; however, it may to delegate some of its attributions to other institutions with environmental competency. Amongst the institutions included are the Ministry of Energy and Mines for hydrocarbon operations and CONELEC for the electricity sector. For projects considered of national interest or that cross environmentally sensitive or protected areas, the Ministry is the only authority and for hydrocarbon or electricity projects the other two institutions act as cooperating authorities. The Provincial Governments and the Municipalities have also environmental competencies and may qualify their Environmental Regulatory Systems with the Ministry of the Environment to become an environmental regulator in their territory.
Other bodies with environmental competencies include the Ministry of Housing, the Merchant Marine General Directorate and the Ministry of Health. The SUMA provides a framework to define who would be the leading authority on a specific project. As stated above, for hydrocarbon projects the regulator is the Ministry of Energy and Mines and for electricity projects is CONELEC.

2.5.1 Environment and hydrocarbon sector
The industry is regulated by the Ministry of Energy and Environment through the National Directorate of Environmental Protection (DINAPA). There is a bylaw that regulates the Hydrocarbon Operations (Reglamento Ambiental de Operaciones Hidrocarburíferas - RAOH).

2.5.2 Environment and electricity sector
CONELEC is the regulator of the operations of the sector. The Environmental Bylaws for Electric Activities (Reglamento Ambiental para actividades eléctricas- RAAE) regulate the activities of the sector (Presidential Decree No. 1761). CONELEC has guidelines for the preparation and of Environmental Impact Studies for new projects and provisions for regulating existing projects and plants. There are guidelines for generation projects including hydro and wind energy projects.

Projects that require EIA are those over 1 MW and projects that cross environmentally protected areas.

2.5.3 Environment and energy efficiency
There are no regulatory ties between energy efficiency and environment. The law to promote energy efficiency is in the making as are proposals for energy efficiency labelling for appliances.

2.5.4 Environment and renewable energies
Renewable energy projects must comply with the Environmental Management Law, the Law for the Control and Protection of the Environment, the SUMA, the RAAE, and the applicable guidelines.

Yet there is a crescent level of popular un-acceptance of power related projects, specially hydro power generation, not only as the projects do – as stated by the general public perception – not give benefits to the local population and are seen as a form to take a public/ancestral resource that belongs to the local population for the welfare of few companies (specially as there are many projects that involve foreign companies – like in the oil business).
3 The energy policy and regulations in Peru

3.1 Organization of energy sector

3.1.1 Public Bodies

3.1.1.1 Ministry of Energy

The Ministry of Energy and Mines\(^{23}\), is the central rector of the Energy and Mining Sector and is part of the Executive Branch of the Peruvian Government. The Ministry has the duty to formulate and evaluate, in harmony with the general Governmental policy and plans, the national sustainable development policies for the mining and energy activities of the country. The Ministry is also the competent authority for environmental issues for the mining and energy activities. The main objective of the Ministry is to promote the integral development of the activities, regulating, monitoring and/or supervising, according to the situation, compliance; insuring the rational utilization of the natural resources of the country in harmony with the environment.

The MEM is organised in the following bodies.

General Electricity Directorate.- It is the technical normative body in charge of proposing and evaluating the policy of the Electricity Sub-sector; propose and/or emit, according to the situation, the regulations required by the Sub-sector. The Directorate promotes the development of generation, transmission and distribution of electrical energy; and provides support for the exercising of the concession providing/authorizing role of the state for the sustained development of the power related activities. The Directorate is led by the Director General for Electricity that is hierarchically under the Vice-minister of Energy.

General Hydrocarbons Directorate.- Is a service, user oriented, body whose main mission is to regulate and promote private investment in the Hydrocarbons Sub-sector.

General Mining Directorate.- The General Mining Directorate (DGM) is the line unit of the Ministry of Energy and Mines the directly under the Vice-Minister for Mining, in charge of regulating, monitoring and promoting the mining activities in the country, insuring the rational utilization of the mining resources in harmony with the environment.

General Directorate for Environmental Issues.- The General Directorate for Environmental Issues has the task of regulating, promoting and living advise to the Upper Management of the Ministry of Energy and Mines on environmental issues and in matters related to the relationships of the companies of the Sector with the Civil Society. As a result, standards to control environmental pollution from the mining and energy activities have been promoted and promulgated, aiming to the creation of the conditions for these activities to be conducted in line with the sustainable development of the country. The General Directorate for Environmental issues is the body to which the duly authorized actors of the sub-sectors have to submit the environmental documents demanded by law including the Environmental Impact Assessments (Estudios de Impacto Ambiental-EIA), the Preliminary Environmental Impact Assessments (Estudios de Impacto Ambiental Preliminares-EIAP), Environmental Audits (Auditorías Ambientales-AE), Sworn Declarations (Declaraciones

\(^{23}\) More information at: www.minem.gob.pe.
Juramentadas-DJ) as well as their modifications, and the Environmental Management Plans (Planes de Manejo Ambiental-PMA) and the Plans for Decommissioning or Abandonment of the activities.

Directorate General for Social Management. – The Directorate General for Social Management is the technical body in charge of the promotion of good relations between the mining companies and the Civil Society, as well as of the prevention and resolution of conflicts within the sub-sector. The Directorate has among its duties the formulation of policies and general plans for the promotion and strengthening of the harmonious relations among the mining enterprises, regional and local governments, civil society and other public or private entities for the prevention and solution of conflicts within the sub-sector. The Directorate also participates in the formulation of technical and legal standards and analyzes and states its opinion on accusations of non-compliance with the regulations and standards that might hamper the good relations between the companies and the civil society. The Directorate engages in activities to promote the resolution of conflicts including the subscription of agreements among the parties; develops and promote the development of the social studies needed for the development and responsible growth of the activities of the private sector in the mining sub-sector. The Directorate participates in the public hearings required by law for the approval of the Environmental Impact Assessments, in coordination with the competent Directorate. The Directorate is in charge of proposing, promoting and executing, when appropriate, training and capacity building programs in the topics relevant to relations between enterprises and civil society; as well as of promoting the projects and analyze the applications of International Technical Cooperation related to social aspects in the mining industry, in coordination with the Peruvian Agency for International Cooperation (APCI24).

3.1.1.2 Regulatory institution: OSINERG

The Organization for the Oversight of Energy Investments- OSINERG - (Organismo Supervisor de la Inversión en Energía)25 was created by the Law N° 26.734 published December 31, 1996, as the public body in charge of supervising and auditing the compliance of the legal and technical requirements for the activities of the companies in the sub-sectors of electricity and hydrocarbons, as well as of the compliance of the legal and technical standards related to the protection and conservation of the environment. OSINERG started acting in October 15, 1997. A general view or the organization is shown in Figure 11.

24 More information at: www.apci.gob.pe/
25 More information at: www.osinerg.gob.pe/
The mission of OSINERG includes the supervision of the correct supply of electricity and hydrocarbons and the efficient regulation of the services under its jurisdiction, acting with autonomy, equity and transparency.

OSINERG aims that the society get the maximum benefit from the services provided, seeking to obtain their trust and recognition.

### 3.1.2 Public and private enterprises

The most important enterprises in the different sectors are shown below.

**HYDROCARBONS SECTOR**

- Repsol exploración perú
- Mercantile perú oil & gas s.a
- Cía petrolera rio bravo s.a.
- Ramshon
- Petrolera monterrico s.a.
- Petro tech peruana s.a
- Emcopegas s.a.c
- Sapet development peru inc.
- Grañay montero petrolera s.a.
- Talisman energy
- Olympic peru inc,
ELECTRICITY SECTOR

Generation
- Empresa de Generación Eléctrica Cahua S.A
- Empresa Municipal de Servicios Eléctricos Utcubamba S.A.C
- Empresa de Generación Eléctrica Atocongo S.A
- Energía del Sur S.A - ENERSUR
- Empresa de Generación Eléctrica Pangoa S.A
- TERMOSELVA S.R.L
- Energía Pacasmayo S.R.L
- Sociedad Minera Corona S.A (Div. Energía).
- EDEGEL S.A.A
- Empresa de Generación Termoeléctrica Ventanilla S.A – ETEVENSA.
- Duke Energy International Egenor S.A - EGENOR S.A.A
- Shougang Generación Eléctrica S.A.A - SHOUGESA
- Empresa Electricidad de los Andes S.A
- Empresa Eléctrica de Piura S.A – EEPSA

Transmission
- Consorcio Energético Huancavelica S.A - CONENHUA
- Consorcio Trans Mantaro S.A - TRANSMANTARO
- Red Eléctrica del Sur S.A - REDESUR
- ETESELVA S.A
- Compañía Transmisora Andina S.A - TRASANDINA
- Interconexión Eléctrica ISA Perú S.A
- Red de Energía del Perú S.A
- Empresa de Transmisión Eléctrica del Centro - ETECEN*
- Empresa de Transmisión Eléctrica del Sur - ETESUR *

Distribution
- Servicios Eléctricos Rioja S.A - SERSA
- Consorcio Eléctrico de Villacuri S.A.C - COELVISAC
- Emp. de Serv. Eléc. Munic. Paramonga - EMSEMSA
- Electro Pangoa S.A
- Empresa Municipal de Servicio Eléctrico de Tocache
- EDELNOR S.A.A
- Luz del Sur S.A.A
- Eléctrica ED CAÑETE S.A
- Electro Sur Medio S.A.A

3.2 Hydrocarbon sector

3.2.1 Structure
By means of the Hydrocarbons Organic Law Nº 26221, put into effect in 1993, the State promotes the development of hydrocarbons activities with the participation of private
investment on a competitive basis. The law gives the Ministry of Energy and Mines the following tasks: Prepare, approve, propose and apply the policies for the sector, dictate the required standards, and ensure compliance with the law; as a result, the Ministry has attributions to regulate, promote, give concessions, and monitor compliance.

- The regulatory/normative function has the objective of keeping the regulations and standards up to date, according to the technology and economic changes.
- Regarding the function of giving concessions, within the framework of the Organic Law and its bylaws, the Ministry is performing its objective of providing all the assistance to the private investors requesting authorizations and concessions.
- Regarding the promotion of private investment, its objective is to direct investors, users and the general public, streamlining the processes and the management steps required to attract investment to any well managed country.

3.2.2 Normative

The laws in Peru related to exploration of natural resources promote conditions and normative that permit national development and the welfare of individuals. The governments promote the development of exploitation activities and economic growing. The Ministry of Energy and Mines and OSINERG are institutes which design, approve, propose and apply the governmental policy. PETROPERU S.A. is the biggest company that exploits petroleum in Amazon Regions; this company is regulated by MINEM and contributes to economic development.

Hydrocarbons are the main source by energy production. Free competition and free access to related economic activities are being promoted. Natural gas has appeared as a more sustainable way of energy production. Operating conditions for greater use of natural gas at national level has been established.

In regions close to hydrocarbon exploration, it has been establish the reimbursement of the General Sales Tax and the Municipal Promotion Tax for the Execution of activities directly related to exploration during the exploration. Investments in the Amazon region are being promoted by providing tax benefits for encouraging foreign investors.

There is also a promotion of the market for biofuels. This law allows private investment in economic sectors that were once the exclusive domain of public entities. The law eliminates all price controls, and guarantees equal conditions for state and private companies.

Main laws in the Hydrocarbons sector are:


• Law N° 26225.- (24/08/1993) Law for the Organization and Functions of PERUPETRO S.A.

• Law N° 28552.- (19/06/2005) Law for Modifications to the Law N° 27133.

• Law N° 27116.- (17/05/1999) Law that creates the Commission for Energy tariffs.

• Law N° 27037.- (30/12/1998) Law for the promotion of investments in the Amazon Region.


• Law N° 27763.- (26/06/2002) Complementary Law to the canon legislation and on the canon for crude oil and gas in Piura and Tumbes.

• Law N° 27624.- (08/01/2002) Law that establishes the reimbursement of the General Sales Tax and the Municipal Promotion Tax for the exploration of hydrocarbons.

• Law N° 27909.- (08/01/2003) Law referred to the scope of the income tax in the agreements and contracts that provide tax stability.


• Law N° 28109.- (21/11/2003) Law for the investment in the exploitation of marginal hydrocarbon resources and reserves at the national level.

• Law N° 28176.- (23/02/2004) Law for the promotion of investments in Natural Gas Processing Plants.

• Law N° 28443.- ISC Exoneration for Electric Enterprises.

• Law N° 28451.- Law that creates the CAMISEA - FOCAM Project Socio-economic Development Fund.

• Law N° 28694 (22/03/2006). Law that regulates the sulphur content in diesel fuels.

• Law N° 28849 (19/07/2006). "Law for the decentralization of the access to natural gas consumption"
3.3 Electricity sector

3.3.1 Structure
The structure of the power sector is defined by the Law for Electricity Concessions that recognizes five main actors:

a) **Customers or users**, which are divided in two categories: “free” customers and “regulated” customers.

b) **Power companies**, which can be generators, transmission or distributors, and operate independently.

c) **The Committee for the Economic Operation of the System** (El Comité de Operación Económica del Sistema - COES) of each of the interconnected systems, which are technical bodies that coordinate the operation of the system at the minimum cost, guaranteeing the security of electricity supply.

d) **The State**, represented by the Ministry of Energy and Mines through the Electricity General Directorate (Dirección General de Electricidad -DGE), which is the regulator of the sector and is in charge of awarding the concessions and authorizations for the participation in the power sector.

e) **The Energy Investments Supervisory System**, chartered with the regulation of the electricity sector and composed by:

   - The Electricity Tariffs Commission (Comisión de Tarifas Eléctricas -CTE), which is an autonomous, technical body-composed by five members-responsible for establishing the maximum tariffs for generation, transmission and distribution of electricity, as well as for defining tariff formulas applicable to regulated customers.

   - The Energy Supervisory Body (Organismo Supervisor de la Energía -Osinerg) is the entity with functional, technical, administrative and economic autonomy, within the Ministry of Energy and Mines, chartered with the monitoring the compliance with the law, regulations and technical standards in the activities in the hydrocarbons and power sectors.

   - The Institute for the Defence of Free Competition and Intellectual Property (Instituto de Defensa de la Libre Competencia y la Propiedad Intelectual - Indecopi), ensures that the standards of free competition as well as other standards within its scope, are applied in the hydrocarbons and power sectors.

The activities in the power sector are segmented in:

- **Generation**.-Generation is performed by private or state firms, which can produce electricity from hydro or thermal sources. The activity is Developer in a free competitive market where any company can install power plants. However, for cases where the generation requires exploitation of hydraulic or geothermal resources with capacity above 10 MW, the operator requires a concession from the Ministry of Energy and Mines.
• Transmission.- The transmission has as its main objective the facilitation of the energy transfers from the generators to the customers, for which the cost recovery is made by means of a connection toll paid by the generators to the operators of the transmission systems. The transmission systems operators require a concession when their installations affect goods owned by the State.

• Distribution.- The new regulatory framework allows that the distribution of electricity be performed by any person natural or legal, national or foreign, according to the system of authorizations and concessions established by the Ministry of Energy and Mines, which states that companies that have installed power above 500 kW require a concession. The distributors are obliged to provide electricity service to anyone that demands it within their concession area. Distributors are demanded to have valid contracts with generators to supply their demands of power and energy for at least the next two years.

• Commercialization.- Even though the existing legal framework of the power sector in Peru recognizes the activity of commercialization, in September 2000 the Bylaw for the Commercialization of Electricity in a regime of freedom of prices, modified article 129 of the Bylaw for Electricity Concessions. In these Bylaws the classification of customers not subjected to price regulation was changed so that they could be applied only where there is a COES, so as to allow competition for contracts with customers not subjected to price regulation (Presidential Decree Nº 017-2000-EM). The main objectives of these Bylaws are the definition of the minimum criteria to consider in contracts subjected to price freedom such as: contracts modalities, description of quality conditions, description of tariff formulas, determination of the price of the contract, among others. With these Bylaws customers will have the opportunity to buy electricity at the point of delivery from one or several providers, at the reference generation bars of one of various providers, or any combination within this range. This seeks to promote price competition in the distribution of energy.

3.3.2 Normative

3.3.2.1 Laws
The National Electricity Office is the organism responsible of proposing and evaluating the policies of the energy sub sector. The policies are oriented towards the development of generation, transmission and distribution activities, and promote the sustainable development of electric activities. This organism formulated and implemented policies in the Electric sub sector, that assure the adequate supply of electric energy in all the country; promoting the private investment of national interest. It also promotes gradual decentralization and encourages competition into the sector. These norms and other related are in the Compendium of Norms for the Electricity Sub-sector 2005. The Law of Electricity Concessions states that final users have the right to access to energy supplies but only after paying for the cost of installation. However, those who lack access to energy are generally people who do not have the economic means to pay for installation costs.

In September 2000, the Law for the Promotion of Energy Efficiency (No. 27345) was approved, declaring support for the efficient use of energy to be in the national interest. The objectives of the Law are to contribute to energy security, improve the country’s
competitiveness, generate surplus for exports, reduce environmental impacts, protect
consumers and raise awareness about the importance of efficient energy use.

Quality standards of electrical services are defined in a legal instrument. The document addresses
basically resource management, product and service delivery and flexibility in payment.

3.3.2.2 Regulation
In Peru, the Law of Electricity Concessions and its Bylaws (DS 009-93-EM, February
25, 1993) constitute not only the framework laws for the regulation of the power sector, but
also describe the methodologies that must be used to obtain the maximum prices for
generation, transmission and distribution. Such law has 11 titles, out which Title V
presents such methodologies.

Organic Law for the Sector of Energy and Mines. Legislative Decree N° 25962
(Published December 18, 1992). This law states the scope of the sector of energy
and mines as well as the structure, functions and competencies of the Ministry.

Bylaws for the Organization and Functions of the Ministry of Energy and

Modifications to the Bylaws for the Organization and Functions of the
Ministry of Energy and Mines, Presidential Decree N° 034-2003-EM (Published
November 7, 2003). These Bylaws establish and regulates the structure,
organization and functions of the Ministry of Energy and Mines, as well as its
relations with the decentralized public bodies and other related entities within the
scope of its competencies.

Unified Text of the Administrative Procedures of the Ministry of Energy and
Mines (Texto Único de Procedimientos Administrativos del Ministerio de
Energía y Minas -TUPA), Presidential Decree N° 025-2002-EM (Published
September 1, 2002). The TUPA defines the list of procedures, the documents to be
presented, the costs, time limits, the responsible for qualification, among others. If
any type of procedure is not listed in the TUPA, the Ministry of Energy and Mines
cannot ask for any requirement to start it.

Establishment of rules for the standardization of administrative procedures
before the Directorate General for Environmental Issues. Presidential Decree
N° 053-99-EM (Published September 28, 1999). With the aim of making uniform
the application of administrative procedures for the approval of the different
instruments for environmental management presented to the MEM, this norm
establishes which is the Directorate in charge of analyzing these instruments, which
is the body or Directorate in charge of monitoring the environmental aspects of the
activities under the control of the Ministry and the time limits established within the
approval processes for the EIA, EIAP, EA or PAMA, depending on the situation.

It is important to note that this norm uses the positive administrative silence, as it
establishes that if the MEM does not communicate to the proponent the
observations to the studies presented, or when the MEM does not make a decision
on the answers provided by a company to the observations made, within the established time limits, the studies are considered as approved. However, the Law N° 27444, on the General Administrative process, establishes that in environmental matters, the positive administrative silence is not applicable; as a result, if the time limits are surpassed without approval or the corresponding document, they must be considered as not approved.

Organizational Structure and Functions of the Energy and Mines Regional Directorates. Ministerial Resolution N° 097-93-EM/SG (Published May 13, 1993). This norm establishes the Basic organization and the functions of the Energy and Mines Regional Directorates (Direcciones Regionales de Energía y Minas - DREMs). The DREMs may propose actions oriented to the improvement and protection of the environment within the scope of their competencies, as well as bring for the consideration of the MEM, proposals for norms applicable to their corresponding regions.

Law N° 26505, Law for the promotion of private investment in the development of economic activities in the lands of the National territory and of the Native and Rural Communities. (Published July 18, 1995). This norm regulates access and utilization of land.

Right of way

Bylaws of the Land Law regarding the rights of way on land for performing mining and hydrocarbons activities. Presidential Decree N° 017-96-AG (Publisher October 19, 1996). These Bylaws expands article 7° of Law N° 26505 and as such regulates the procedure for the mining right of way when land is to be used for mining or hydrocarbon activities including transport of hydrocarbons and minerals. The procedure starts with the direct dealing between the owner of the property and the person requesting the right of way. In case no agreement is reached the procedure calls for a conciliation meeting. Regardless of reaching and agreement or not, the administrative process of requesting the legal right of way can be started, provided that the reports and expert analysis establish that the right of way is possible without affecting the property right; when this is the case, the right of way will be established and the corresponding compensation will be paid upon signature of a public document recognizing such right.

Environmental Management Special Program

Rules for the presentation of the Environmental Management Special Program (Programa Especial de Manejo Ambiental – PEMA), in the mining, hydrocarbons and electricity activities. Presidential Decree N° 041-2001-EM (Publisher July 21, 2001). The PEMA is an instrument that has to be presented in case the PAMA or the Decommissioning or Abandonment Plan cannot be presented due to Acts of God or fortuitous events. This program must be properly justified and must include a schedule of activities, and a detailed monitoring and control of emissions and effluents. The norm regulates the administrative procedure for its approval.

Norms dealing with the registration of entities authorized to conduct
Environmental Impact Assessments in the Energy and Mining sectors. Ministerial Resolution N° 580-98-EM/VMM (Published November 27, 1998). Establishes the requirements that need to be presented, their analysis, the duration of the inscription in the register, the sanctions and causes for deregistration, as well as the payment for the registration, by the entities that want to prepare Environmental Impact Assessments (EIA).

3.3.2.3 Specific pro-poor policies (subsidies, social tariffs, etc.)
In the electrical sector there is a subsidy scheme for the urban marginal and rural users. It is called the FOSE (Fond for the operation of electric services). Users connected to the electric grid of the national system with consumption between 30 and 100 kWh/month, the price of the kWh is 75% of the commercial price. For users of the isolated system with consumptions lower than 100 kWh/month receive a 50% subsidy.

3.3.2.4 Rural Electrification
The rural electrification plan is funded through the Rural Electrification Fund (FER). It is funded primarily through three sources: first, it obtains 2% of profits from electricity generation, transmission and distribution companies; up to 25% of the proceeds from private electricity companies; and transfers from the public treasury and from local and regional governments. The FER is a rotating fund of the Project Executive Direction (DEP) from the Ministry of Energy and Mines investing a minimum of 0.85% of the general budget to extending electricity services in Peru. Rural electrification projects are chosen based on technical (current state of the project, existing or planned electricity infrastructure, provincial electrification index), economic (current net social value and per capita investment level) and social factors (poverty index, geographical location).

The principal financial supports have come from the central government, other countries and from the most important national enterprises. At present, a total of 8 million people live in rural areas from which 80% (6.5 million people) do not have electricity. To improve this situation the Ministry of Energy and Mines has developed a second Peruvian plan for rural electrification for 2005-2014, with the objective to provide electricity access to 90% of Peruvians. The plan aims to minimize investment costs, support social-economic development of rural areas, attract private investors, apply clean technologies and protect the environment. Higher priority is given to projects located in regions where electricity supply is most deficient.

3.4 Energy efficiency and renewable energy
The Ministry of Energy and Mines is chartered with the promotion of renewable energies and the rational and efficient use of energy. At policy and funding mechanisms level the rural electrification plan seeks to incorporate renewable sources, where economically viable, into extended distribution lines. Higher priority is given to projects located in regions where electricity supply is most deficient.
As far as the electric energy generation, the participation of hydroelectric power plants is of 70%; the regions that have generated energy in high proportions in relation with the total production for electric market, were: Huancavelica (28,5%), Lima (16,8%), Junín (8,7%), Callao (7,8%), Ancash (6,7%), Moquegua (5,5%), Ucayali (5,8%) and Arequipa (3,5%).

Regarding small hydroelectric power plants, The Ministry of Energy and Mines through The FONER Project (National Rural Electrification Fund), has planned to make a study for the preliminary evaluation of the hydroelectric power nationwide. The study was planned to be ready by the middle of 2007. The ITDG, supported by the Inter-American Development Bank, implemented a revolving fund between 1992 and 2005, for the implementation of micro hydroelectric power plants in Peru. Through this mechanism credits for more than US$ 940.00 were obtained, mobilizing governmental complementary investments, private investments and cooperation investments close to US$ 3.000.000. 42 Microhydro power plants -MHPs were financed, representing, with relation to the installed power, 1,5 MW.

With the purpose of identify the potential zones for the application of solar energy, the Energy Solar Atlas has been elaborated, in the project frame PER/98/G31: “Rural Electrification based on the Photovoltaic Energy in Peru”.

Solar water heaters were introduced in the 80s by ITINTEC, some NGOs and universities. The surveys done by the Technical Energy Office of the Ministry of Energy and Mines in 1999, with the aim to elaborate the National Balance of Useful Energy evaluated the conditions of the solar collector panels for water heating in the residential and commercial sectors of 8 cities, especially in Lima and Callao. The study concluded that the installation of these systems in Peru was a success. Total installed capacity of about 6,7 MW” (CEPAL, 2005).

Some projects like Solsistemas, the Insular Photovoltaic Electrification Project and Rural electrification based on Photovoltaic in Peru have been developed. The latter has a total budget of US $ 8.714.157 which the US$ 3.930.093 corresponds to a donation of GEF (Global Environmental Facility), US$ 3.908.268 to the contribution of the government and finally 875.796 coming from the contributions of the final users (PER/98/G31,2004). The Executive Direction of Projects of the Ministry of Energy and Mines has planned the installation of 4,524 SHS in the 2007 and 2,500 in 2008.

There are other actors that play a role in the promotion of renewable energies in the country, amongst them universities, private firms, Official Development Cooperation and NGOs. The official office for the promotion of clean development mechanism projects is the FONAM (National Fond for the Environment of Peru). FONAM identifies possible projects, provides assistance in the development of MDL projects in its entire cycle, promotes Peru’s projects portfolio and provides support for the financial structure of MDL projects.
3.4.1 Normative

3.4.1.1 Energy Efficiency

Peru’s energy policy focuses principally on promoting development and the rational, efficient, and competitive use of energy resources, within a context of decentralization and regional development, in which priority is attached to private investment, demand satisfaction, and the use of renewable sources of energy in rural electrification.

The Law for the promotion of the efficient use of energy was published in 2000 (Law No. 27345). The law aims to assure the energy supply, improve the country’s competitiveness, generate exportable energy residuals, reduce the environmental impact, protect the consumer and strengthen the conscious thinking in society regarding the efficient use of energy. The efficient use of energy is defined as the utilization of energy carriers in different economic and services activities, using equipment and technologies with high energy efficiency and good practices and consumption habits.

The Regulation for the Law was published in 2007, the new regulation establishes sector programs, promotes the creation of financial mechanisms for equipment replacement and use of most adequate technologies in isolated and remote areas and the substitution of low efficiency energy sources.

The public sector would have to perform energy auditing in public organisms whose monthly energy consumption payment is higher than 4 Tax Imposition Units. In the areas where Vehicle Natural Gas (VNG) is available, the public sector vehicles would have to be converted to the exclusive or dual use with VNG.

Energy consumption indicators have been developed for orientation for the efficient use of energy. In coordination with the Ministry of Housing, Constructing and Sanitation the efficient energy use indicators will be included in National Regulation of Indicators.

The MEM in coordination with the relevant sector supports programs of orientation and capacity development in efficient use of energy in means of transport.

Besides, in coordination with Regional Governments, the Regulation establishes actions to copy successful experiences and projects in the country and promotes the cooperation and distributed generation as tools for the efficient use of energy.

Annual National Prizes for the Efficient Use of Energy for the private and public sectors will be sponsored. The new regulation also establishes the 21th October of every year as the “National Day of Energy Saving”. The MEM with the relevant authorities will define the requisites for the certification of professionals and companies as energy efficiency consultants or energy services companies.

3.4.1.2 Renewable energies

As was mentioned above, Peru’s energy policy focuses on the promotion of renewable
energy sources in rural electrification (see above). Rural electrification can apply for FONER funding, which can cover for installation of isolated renewable energy systems.

The Regulation for the Law for the promotion of the efficient use of energy (see above) establishes promotes the creation of financial mechanisms for equipment replacement and use of most adequate technologies in isolated and remote areas and the substitution of low efficiency energy sources. This would include the support for the use of efficient renewable energy distributed systems.

3.5 Environment

The Ministry of Energy and Mines created the General Directorate for Environmental Energy Issues. The Director of this department is one step down in hierarchy from the Vice-Minister of Energy.

The General Directorate for Environmental Energy Issues is the technical normative department dedicated to the proposal and evaluation of policy, proposal and/or emission of necessary normative, the promotion of activities related to conservation and protection of the environment regarding energy activities. The Directorate is also in charge of promoting adequate relationships between society and sector companies.

Environmental Impact Studies and Environmental Assessment and other related studies that are required by Law must be presented to the General Directorate for Environmental Issues.

Regarding energy and mines, environmental normative counts with three environmental management instruments, environmental impact studies (EIS) for new projects, environmental management plans (PAMA) for project implemented before the establishment of the environmental regulation, and environmental auditing which is oriented to control the fulfilment of the environmental commitments assumed by the companies.

3.5.1 Environment and hydrocarbon sector

The industry is regulated by the Ministry of Energy and Mines through the General Directorate for Environmental Affairs.

3.5.2 Environment and electricity sector

As mentioned above the General Directorate for Environmental Energy Issues (Ministry of Energy and Mines) is the technical normative department dedicated to the proposal and evaluation of policy, proposal and/or emission of necessary normative, the promotion of activities related to conservation and protection of the environment regarding energy activities.

3.5.3 Environment and energy efficiency

There are no regulatory ties between energy efficiency and environment.
3.5.4 Environment and renewable energies
Energy activities are regulated by Ministry of Energy and Mines through the General Directorate for Environmental Energy Issues.
4 Regional policy and regulations

4.1 International Agreements
At the World Summit on Sustainable Development –WSSD- of 2002, governments agreed to improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources, to increase the use of renewable energies, to enhance energy efficiency, and to provide cleaner liquid and gaseous fuels.

Latin America has set for itself the goal of reaching a 10% contribution of renewable energy to its energy supply mix by 2010. Some argue that this target is low as a number of Latin American countries already have significant proportions of hydro based energy supplies.

The Bonn Conference Political Declaration agreed upon by representatives of 154 participating countries underlines the need for regulatory and policy frameworks that support the development of profitable markets for renewable energy technologies and recognises the key role of the private sector. This includes removing barriers and allowing for fair competition in energy markets and taking into consideration the internalization of external costs for all energy sources. These frameworks are considered essential to realising the potential for renewable energy technologies, to creating adequate conditions for public and private investments in renewable energies, and to extend modern energy services to populations currently without access.

The Bonn International Conference on Renewable Energies provides a set of policy recommendations for governments to promote renewable energies. These recommendations are stated to be indicative of the available options for decision makers rather than prescriptions. Three main priority areas for renewable energy policies are:

a) establishing policies for renewable energy markets;

b) expanding financing options; and

c) developing the capacity required.

The Bi-National Peru-Ecuador Fund has promoted several projects in renewable energy including feasibility studies for wind energy power production for water pumping with CAF funding, feasibility studies for small hydro in the border region with UNIDO funding, Solar PV electrification for the Andean region in Loja with Spanish funding, a solar PV project with CAF funding and a feasibility study for a project for an oil pipeline Ecuador-Peru. Other projects include irrigation, drinking water and sanitation, education, tourism, roads, and promotion of productive activities.

4.2 The role of Andean Community, the Energy Integration
One important recent element on the history within the two countries was the last conflict, 26 The Bonn Conference Political Declaration agreed upon by representatives of 154 participating countries underlines the need for regulatory and policy frameworks that support the development of profitable markets for renewable energy technologies and recognises the key role of the private sector. This includes removing barriers and allowing for fair competition in energy markets and taking into consideration the internalization of external costs for all energy sources. These frameworks are considered essential to realising the potential for renewable energy technologies, to creating adequate conditions for public and private investments in renewable energies, and to extend modern energy services to populations currently without access.

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26 Of the three target countries, only Peru had a governmental organization committing to promote renewable energies, the National Environmental Council/National Environmental Fund (Bonn, 2004 c). Bolivia and Ecuador seem not to have been present at the Conference or if present did not present any commitments.
that yet left scars on both populations, yet other collateral effect was the creation of a bilateral fund that, with the recent election of the new president of Ecuador, is back on the scene of the relations within those two countries. The Andean Community has played an important role in the promotion of energy integration in the region; however the recent position of President Hugo Chávez of Venezuela that left the Community and the most recent Chilean inclusion in the Community needs to be put into perspective. The current deficit of installed power in Ecuador that has forced the country to buy electricity from Colombia and eventually from Peru at premium prices, has raised questions on the real meaning of the integration and the role that the Community can play, at least from the Ecuadorian side.

4.3 The role of the Initiative for the South American Infrastructure Integration (IIRSA)

The Initiative for the South American Infrastructure Integration (IIRSA) is a forum for discussion among the responsible authorities for infrastructure in transport, energy and communications in the twelve South American nations. The objective is to promote the development of infrastructure under a regional perspective, this in the context of a physical integration of South America and supporting the establishment of a sustainable and fair territorial development pattern (www.iirsa.org).

IIRSA has 10 action areas:

- The Andean Axis
- The Southern Andean Axis
- The Capricorn Axis
- The Hydro-way Paraguay-Parana Axis
- The Amazon Axis
- The Guyana Shield
- The Southern Axis
- The Central Inter-oceanic Axis
- The MERCOSUR-Chile Axis
- The Peru-Brazil-Bolivia

Peru and Ecuador appear together in two of this action axis, the Andean Axis and the Amazon Axis. Until now in these countries, most projects have been oriented in transport infrastructure, like building of highways and harbors.

One of the key areas for the infrastructure integration of IIRSA is energy. The strategic function of the energy integration in the Andean Axis is to integrate the energy systems to
improve energy efficiency and the reliability in generation, transmission and distribution of energy with the aim to support the development of sectors of high added value.

Among the IIRSA projects in energy integration in the Andean Axis are:

- Improving of the interconnections of Cuatricentenario – Cuestecitas and Corozo – San Mateo
- Electric interconnection between Colombia and Ecuador.
- Two micro-centrals in Chinchipe and Taguien
- A micro-central in Sucumbios province in Ecuador
- Extension of the petroleum pipeline in the North of Peru
- Natural gas interconnection projects
- Power plant in Santo Domingo
- Uribante Caparo Project (generation and transmission networks)
- Electric interconnection project between Colombia and Venezuela
- Electric interconnection between Ecuador and Peru
- Second phase of the Colombia – Ecuador electric interconnection project
- Electric transmission to Occidente

The Andenergy Project aims to support the creation of the Andean energy hub, through the development of a regional energy plan that reports the current energy practices and suggest the best options.

4.4 The role of OLADE

The Latin American Energy Organization – OLADÉ- was created in 1973 in the wake of the energy crisis. Its creation has been ratified by 26 countries in Latin America and the Caribbean: Argentina, Barbados, Bolivia, Brasil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haití, Honduras, Jamaica, México, Nicaragua, Panamá, Paraguay, Perú, República Dominicana, Surinam, Trinidad & Tobago, Uruguay and Venezuela.

The creation of OLADÉ was a response to the need of establishing a cooperation mechanism among the countries of the region in order to develop their energy resources and jointly tackle issues such as their efficient and rational utilization, to contribute the socio-economic development of the region. In the early seventies OLADÉ played an important role in the promotion and adoption of renewable energy systems in the region. Later on OLADÉ concentrated its efforts more on conventional energy sources, energy
planning, and modernization of energy regulatory frameworks; renewables took the back seat. Recent relevant activities of OLADE in the area of renewable energy include the Master Degree Program that OLADE held for several years in cooperation with the University of Calgary with funding from ACDI, and a project for rural electrification in cooperation with the same university that is still running. (OLADE’s website). OLADE’s projects as of October 2005 included also a project of electricity demand management in the Andean Region and work in CDMs (Chiquinga, 2005). Another area of work of OLADE is bio fuels.

The institution is in the process of reinventing itself to play a greater role in the energy integration of LAC. (Rios, 2006)

4.5 The Free Trade Agreement
Peru is about to sign a Free Trade Agreement with the US, while the negotiations of such an agreement between Ecuador and the US has been suspended and is pending on the willingness of both sides to re-start the negotiations. The possibility of signing a Free trade agreement between Ecuador and the US seems more difficult as the Ecuadorian President Elect Dr. Rafael Correa has questioned the negotiations and so has the Democratic party that in the November elections won the majority in the House of Representatives and the Senate in the US.
5 International Energy Policy

This section analyses the most important trends in international energy policy in the last decades, in particular the role that international organizations had played (and are playing) in shaping the energy policies of developing countries, through their support and advocacy activities\(^{27}\).

Energy is probably the most important international traded good, it is the backbone on which our societies are built and the essential prerequisite for any human activity. Even before the industrial revolution, in times much less energy-intensive than ours, the abundance or lack of energy (so, the rise or fall of agricultural productivity - the only energy source available then) has accompanied the rise and fall of great civilizations.

In modern times, the geographical distribution of the sources of energy is the most important geopolitical issue and the lack or insufficient access to energy for over 2 billion people is one of the most prominent barriers halting the rise in living standards and the escape from poverty.

International Energy Policy can be seen from two points of view: from one side there is the issue of how energy (and energy related goods, equipments and investments) are procured internationally, and from another side there is how the local and national energy markets and services are shaped following national interests and conditions, the advocacy of international organizations, and the influence of large multinational energy corporations and the market conditions.

The issue of the regulation in international market in energy goods is out of the scope of this report, and the document focuses on the policies advocated by the international organizations, their guiding principles, and how they influenced the energy policies in developing countries, even trough their financial concession and conditionality. The first portion of the section will analyse the policies of the World Bank Group, by far the most important player in shaping the international energy policy and in the second the UN Energy Initiatives that recently have been very active.


The World Bank Group is actually a major player in shaping international energy policies, through their activities of research, advocacy and financing. The activities of the Bank comprehend fossil fuels and extractive industries, internal market organization, electric utilities, renewable energies. The Bank also hosts in Washington an annual "Energy Week", one of the major gatherings of policy makers and the 2006 edition was centred on the theme energy for development, on occasion of the 14\(^{th}\) Session of the Commission of Sustainable Development of the United Nations.

Since the beginning, the World Bank involvement in the energy sector has been massive. In the past decades around 25% of all its lending activities referred to energy; more recently however, the share has dropped to a level between 5% and 10% because after 1993 the Bank focused more on market reforms and favoured the private participation in the energy sector\(^{28}\) as shown in Figure 12 and Figure .

\(^{27}\) Prepared by Giorgio Gualberti, IST- ggualberti@ist.utl.pt
From a general point of view, the policies advocated by the Bank, and the projects therefore supported, have changed during the years, together with the change happened in the world politics and economics and aid directives, facing the current wave in globalization and opening of the markets and, in the latest years a stronger attention to social and environmental issues (also with a greater support to renewable energy sources) to finally arrive to poverty reduction strategies and their related energy needs. The focus of the Bank policies has therefore moved from support to national utilities and large infrastructures, to structural adjustments, regulatory and market reforms, to focus on poverty reduction and support to sustainable development. The Bank adopted in 2001 a new Energy Business Renewal Strategy (EBRS) with four business lines. To be approved
by the Bank a project must be consistent with at least one of the following:

1. Improve access of the poor to modern energy services;
2. Improve macroeconomic and fiscal balances;
3. Promote Good Governance and Private Sector Development;
4. Protect the Environment.

The objectives of the World Bank energy policy (World Bank 2001) are the fuel transition from traditional to modern energy use for poor households, efficient and environmental sustainable use of energy, greater choice of energy services for consumers, and macroeconomic and fiscal stability. The World Bank Group envisages energy to be used in productive ways in order to sustain economic growth and to monitor the progress in this sector established a set of eight targets to be reached by 2010, valid for all developing and transition economies, of which four refers to market conditions, privatizations and regulations, two to energy efficiency, one to environmental issues and one to the social aspects. Specific country objectives might be fixed in the Country Assistance Strategy documents; however, in the cases of Peru and Ecuador CASs, specific energy objectives are not set.

<table>
<thead>
<tr>
<th>Box 1: World Bank Energy Quantitative Objectives to be reached by 2010</th>
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<tr>
<td>i. Increasing the share of households with access to electricity from 65 percent to 75 percent</td>
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<tr>
<td>ii. Increasing the share of large cities with acceptable air quality from 15 percent to 30 percent</td>
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<tr>
<td>iii. Reducing the average intensity of carbon dioxide emissions from energy production from 2.90 tons per ton of oil equivalent to 2.75</td>
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<tr>
<td>iv. Reducing the average energy consumption per unit of GDP from 0.27 ton of oil equivalent per thousand dollars of output to 0.24</td>
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<tr>
<td>v. Increasing the share of economies where industrial consumers have a choice of supplier from 15 percent to 40 percent</td>
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<tr>
<td>vi. Increasing the share of economies where the power industry is no longer a burden on the government’s budget from 34 percent to 50 percent</td>
</tr>
<tr>
<td>vii. Increasing the share of economies where private ownership and financing play a dominant role in energy supply from 25 percent to 40 percent</td>
</tr>
<tr>
<td>viii. Increasing the share of economies where regulators are required to oversee natural monopolies in an objective, transparent, and non-discriminatory manner from 35 percent to 50 percent</td>
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5.1.1 The World Bank Group policies in the electricity sector

During the 70's and the 80's the electricity sector, both in developed and in developing countries, was characterized, with few exceptions, by integrated state-owned utilities. At that time the economic paradigm was more shifted towards the state than towards the market, and the government in most countries controlled directly or indirectly large sectors of the economy. The guidelines for the support to state owned electric utilities have been fixed in a document in 1978, The Bank Operation Manual Statement 3.72 for public utilities projects. The OMS 3.72 stated that the Bank would follow four objectives:

a) Provide power service on the basis of least-cost development programs;

b) Strengthen the sector's institution and improve their efficiency;

c) Increase local resource mobilization and catalyse co-financing; and

d) Improve access to electricity by disadvantaged groups.

The progress towards these objectives has been reported slow and unsatisfactory in many developing countries. In the 80's and at the beginning of the 90's, for various reasons, the state of the electricity sector in developing countries deteriorated. Many utilities faced poor financial performances, which prevented them to make further investments and assure a decent quality of service, and absorbed considerable financial resources from the state.

The Bank pointed that this was due to three sets of factors:

- Exogenous factors; raise in oil prices, access to foreign loans, interest rates and inflation

- Inappropriate national policies on energy pricing, investments, institutional development and governance

- Enterprise related factors, conflicting objectives, lack of management accountability resulting in technical, operational and financial problems.

In 1993 the Bank decided to intervene on the last two factors and to do that with a completely new approach in supporting electricity utilities. The document "The World Bank's Role in the Electric Power Sector - policies for effective Institutional, Regulatory and Financial Reform" pointed that the fundamental problem has been that the closed command-and-control management approach is often subject to political compromise and that in numerous developing countries the political will to implement and adhere to financial and operating covenants and sound pricing policies has been disappointingly weak. Following the experience developed in Chile, England and Wales, the Bank set the new guiding principles for electricity support, emphasizing the need of market reforms, of the separation between the state regulator and the utilities and the participation of the private sector. In particular the Bank set the following principles:

I. **Transparent Regulatory Process** (A requirement for all power lending will be explicit country movement toward the establishment of a legal framework and regulatory processes satisfactory to the Bank)
II. **Importation of Services** *(In some of the Least Developed Countries, where there are weak public and private sectors, a relative lack of market forces and undeveloped capital markets, an early step in bringing about power sector reform and increasing sector-management efficiency will be to bring local, developed-country, or more advanced developing-country electric power services into the sector)*

III. **Commercialisation and Corporatization** *(The Bank will aggressively pursue the commercialization and corporatization of, and private sector participation in, developing-country power sectors)*

IV. **Committed lending** *(The Bank will focus lending for electric power on those countries with a clear commitment to improving sector performance in line with the above principles)*

V. **Private Investment** *(To encourage private investment in the power sector, the Bank will use some of its financial resources to support programs that facilitate the involvement of private investors)*

The new guiding principles did not leave much choice to developing countries, often burdened by huge external debts with the Bank, IMF, or with OECD Countries. To get additional assistance they had to implement the above-cited reforms. Effectively the energy reforms were not isolated, as they were a part of a wider package of economic reforms, known as Structural Adjustment Programs (SAP), that have been the base for Bank's support to developing countries in the '90s, and also presented the same framework of sound regulation, good governance, macroeconomic stability, market reforms, trade liberalisations and committed lending.

Those new policy objectives represented a great shift from the previous policy to support state-owned monopoly. The model that the World Bank advocated for reforming the power sector in developing countries was towards what is called an open competitive system in which essentially the state maintained the role of the regulator, often setting up an independent regulatory body, and the utilities underpin a process towards corporatization and commercialization and later, privatization and unbundling.

The World Bank Evaluation Department in 2003 pointed that privatizations and unbundling were not part of the original package of reforms but that by 1996 the Bank's "Statement of Good practices in the Electric Power Sector" (GP4.45) added private sector involvement as a clear goal and the Bank adopted a de facto reform approach that included, in addition to corporatization, commercialization and regulation, also unbundling, private investment in generation, private participation in transmission and distribution, and market competition. The OED pointed also that the 1993 policy enunciated what to do, but because of the limited experience worldwide in implementing such policies it was not accompanied by a strategy on how to do it and that the Bank was aware of that and anticipated that the necessary experience would be obtained by a "learning by doing".

OED continues affirming that the Bank recognised what was already a reality in the power sector in many countries, massive private investments, and formalized it. The parallels with what was happening in the private sector independently from the Bank are very strict. The international investments in developing countries power sectors grew considerably in the first part of the 90s, reaching a peak of 50 USD billions in 1997\textsuperscript{30}, driven by the boom in Independent Power Projects in East Asia and large privatizations in South America. With the 1997-1998 Asian financial crises, followed by the crises in Argentina and in other parts of the world, the private sector drastically reduced its investments in energy projects in developing countries and, as shown in Figure 14, the World Bank lending also dropped significantly after 1997, both in absolute and in relative terms to total Bank financing. From the data shown in figure 14, it seems that the Bank assistance has been accompanying the private investments and, when these dropped, did not provide additional resources to replace them.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure14.png}
\caption{IBRD/IDA Total Energy Financing (energy projects plus energy components in other projects) by region. Source World Bank: Renewing our Energy Business, 2004.}
\end{figure}

A Bank survey on International Investors expectative in the power sector of 2003 (mostly North American and Western European) highlighted that many investors (44\% of the interviews) were seeking high returns on the investments of more than 16\%, and identified that the most important factor for success (or failure) of the investments were (not surprisingly):

- The retail tariff level and collection disciplines
- Fair adjudication of tariff adjustment and disputes
- Operation control and management freedom

Regulatory commitment sustained through a long term contract

In the complex reality of developing countries, the fixation of the tariffs and the enforcements of contractual obligations have been two subjects of very intense conflict between the governments and the privatized electricity utilities, conflict that in some cases ended with an halt or a reverse of the privatization process. Contracts that were supposed to last for 15 or 30 years have been cancelled after a couple of years and legal battles aroused also on jurisdictional aspects, with the international investors seeking for an international arbitration panel and the local government claiming the local jurisdiction to solve the disputes, like in the famous case that opposed the Enron corporation and the Maharashtra government in India.

The principal advantages of the new approach in the Bank vision would come from three aspects. First the removal of subsidies and marked distortion measures would have led to a better allocation of resources, second the profit would have given a strong incentive to the efficient use of inputs and third competition, where possible, would have lowered the costs and passed benefits to the consumers. Experience from developing countries suggests that two necessary conditions must be met before the reforms are attempted: first the reform should be generally perceived as desirable and, second, it should be politically feasible (Bacon and Besant-Jones, World Bank, 2002).

The reforms introduced Private Sector Participation in the electricity sector in about 80 countries, and reshaped in a decade the structure of the electricity systems.

Given that, the electricity systems could be broadly divided in 4 groups:

1. Monopoly - One utility handles generation, transmission and distribution;
2. Purchasing agency - Independent Power Producers (IPPs) sell electricity to a single buyer that handles transmission and distribution
3. Wholesale competition - Different distribution companies may buy electricity directly from generators and have it delivered to their area under open access arrangements with the transmission entity.
4. Retail competition - Allows all customers to choose their electricity suppliers.

The reforms designed a path to move from model 1 to model 2 or 3 and eventually model 4. Developing countries adopted either model 2 or model 3; till now model 4 has been adopted only in England, Wales and Norway but not yet in any developing countries.

The timing of the reforms showed crucial in many countries from two points of view: first for policy reasons and concomitance with the electoral cycle, reforms are most likely to be conducted successfully from freshly new elected governments, and secondly, the sequencing of the various steps is vital for their good outcome. Bacon and Besant-Jones quoted an internal (and unpublished) World Bank study that indicated the following as the optimal sequence:

1. Launch of liberalization / privatization program;
2. Enact of electricity act permitting unbundling and divestiture;
3. Establish an independent regulatory authority;
4. Approve a new market structure;
5. Unbundle the power utility;
6. Privatize or close on concession for some private distribution
7. Privatize some generation

In this optimal sequencing the entry of IPPs could have been done at any stage, if not creating obstacles the other reforms steps. A panel of countries surveyed in 2000 showed a great variety of sequencing paths, from the optimal sequencing in Bolivia and almost optimal in Argentina, to very bad in Georgia and almost the worst possible in Kazakhstan.

As noted before, an important part of the reform packages was about removing the country cross subsidies to the electricity and let the consumers pay for the marginal costs of electricity, as unbiased price signals are essential for the correct functioning of a marked based system. Naturally, the removal of subsidies and the raise in tariffs, even if necessary to make investments, ameliorate the services and re-establishing right price signals, has not been particularly popular around the world, especially because this happened many times before that consumers could see any quality advantage in the new system. The worldwide rise in oil prices has not eased the things for the supporters of the reforms. To this regard Julian Lampietti, a senior World Bank official that analysed in a World Bank working paper the reforms in East Europe and Central Asia, concludes that:

*Undertaking simple ex ante simulations of reform impacts will allow better identification of potential reform benefits and costs. Placing more emphasis on outcome-based indicators of service quality would help ensure that future operations produce the intended end-user benefits. In many cases, tariff increases can and should be explicitly timed to coincide with service quality improvements. Yet, this may not be always possible. Where it is not, the adverse impact of tariff increases, especially for low-income consumers, should be mitigated by improving access to and efficiency in the use of clean alternatives.*

The current Bank vision about subsidies in the electricity sector is that they should be implemented only if specifically targeted to the poor. Provision of generalised subsidies favours the part of the population that is already connected to the grid, the richest part, and absorbs huge financing resources that could be spent in poverty reduction programs; moreover, cheaper electricity has not been proved to boost economic development in the lack of other necessary infrastructures. To this regard, the OED, in a paper analysing the highly subsidized Bank's Rural Electrification programs in Asia, found that most of the direct benefits from rural electricity go to wealthier people, that RE reduces poverty only through the general raise in income obtained by productive uses and that, with the noticeably exception of irrigation-pumping, these productive uses come up only when other factors are already raising the national income. The conclusion of the OED is that subsidizing RE should be justified only if it is able, after a start-up phase to generate sufficient level of consumption at economic price. Otherwise, it will absorb too much of the scarce government finance that could be instead used to raise rural living standards in alternative and more effective ways.

In a recent paper, Jamal Saghir, vice-president of World Bank and chief of the Energy and Mining Sector Board, suggests to design subsidies for capital costs for rural electrification and not for operating costs and to develop off-grid rural electrification and use low cost technologies solutions. Also, Saghir points that cross subsidies could be used when necessary moving resources from wealthier consumers to the poorest ones, not only in rural areas but also for the poor urban consumers and that they should be used also to
lower the up-front costs of connecting to the grid, spreading it over the years, for example with micro-credit solutions. There is a lot of debate both inside and outside the Bank on the role of subsidies, and on their outcomes and Saghir himself recognises that subsidy design is an area where more work is needed.

In the same paper Saghir points that, even well meaning energy reforms that will probably benefit the poor in the long run can cause them intense difficulties in the short run because they cannot stand even a little increase in energy expenditures. Moreover the World Bank vice president affirms that private service providers need incentives to serve the poor households or otherwise the benefits of reform will accrue mainly to wealthier households that already have service. Thus it is vital to protect the interest of the poor during the reforms (emphasis added by the author).

Even if some aspects of the reform approach have been vividly criticised inside (and outside) the Bank, the Operations Evaluation Department points anyway that it should not be inferred from these poor sector outcomes, however, that better results would have been achieved by perpetuating the pre-1990s public monopoly model. Overall, the successful implementation of reforms and Private Sector Development in Electricity (PSDE) have been constrained by (i) a lack of country commitment, (ii) macroeconomic and political crises, (iii) lack of experience by PSDE practitioners, particularly with political-economy factors, and (iv) insufficient operational guidance to staff on the implementation of the 1993 policy. Moreover the Bank did not fully understand the size of the technical and financial resources required to reform the power sector- resources, that few developing country possess. (...) many of the Bank's clients are still undecided or are considering which reform route to follow, many have stalled in their attempts of reform and few have reversed their privatizations plans. With some noticeable exceptions in Latin and Central America and Eastern Europe, the power sector of developing countries continue to be in crisis, particularly in terms of their financing and their ability to meet demand, at least-cost, on an environmentally sustainable basis.

The OED suggested many things in its report on PSDE, between them that there is not "one size fits all" reform, but that they should be tailored to national needs and situations, and that the lack of poverty reduction and environmental mainstreaming components of the reforms ("doing good" in addition to "doing no harm") undermined the local and international support for them.

Despite the efforts in the reforms, the great challenge of providing electricity to the poor remains unmet. As World Bank President Paul Wolfowitz said in the opening of the Energy Week 2006:

*The current forecasts are that in 30 years there will still be 1.4 billion people without electricity and there will be many businesses that lack sufficient and reliable energy services that could be providing jobs for the poor. That’s just not satisfactory.*

*We have to do better.*

### 5.2 World Bank and Extractive Industries.

The passage between the XXth and the XXIth century has been characterised, among
other things, by a wave of anti-globalisation protests that hit the streets of the cities where International Summits were held. The protesters in the streets asked for many different things like fairer trade agreements, respect for the environment and for human rights, respect for the needs of developing countries, a stronger effort to fight poverty, HIV-AIDS, and a general pro-poor, more democratic and transparent functioning of international institutions. The World Bank summit of September 2000 in Prague was one of the many that were characterised by a high degree of criticism outside and inside the delegates’ rooms. One of the issues that have been raised in that occasion was about the consequences of extractive industries projects in developing countries on the poor and on the environment, and if these kind of activities would be justifiable for the World Bank Group mission. During the meeting, WB president James Wolfensohn, to respond to criticism announced that he would have appointed an independent review of the Bank’s involvement in extractive industries projects. In June 2001, Dr. Emil Salim, former environment minister of Indonesia, was asked to lead this process and after two years the Extractive Industries Review report “Striking a Better Balance” was ready.

5.2.1 Striking a better Balance, the Extractive Industries Review, 2001-2003.

The Extractive Industries Review has been a two years process designed to involve all stakeholders, governments, NGOs, labour unions, local communities, industry, academia, international organization and of course World Bank staff. There have been five regional workshops (Brazil, Hungary, Mozambique, Indonesia and Morocco).

The principal question to be answered was if the projects in extractive industries could be compatible with the objectives of sustainable development and poverty alleviation of the WBG. In few words EI projects considered for World Bank support should be evaluated to ensure that their expected benefits – especially for the poor – are sufficiently higher than their estimated costs, including environmental and social costs.

If it’s obvious that there cannot be any poverty reduction without economic development it’s not so obvious that economic development by itself reduce poverty, especially when it is generated by large scale industries whose revenues are concentrated in few hands and that often do not have many links with the existing local economies. It's not even obvious that development policies based on the exploitation of natural resources are successful in generating economic growth. On the contrary the evidence found is that resource-rich developing countries between 1960 and 2000 had an increase of real GDP per capita two or three times slower than developing countries with few natural resources. The great majority of the countries that did not manage to achieve sustained economic growth are heavily dependent on extractive industries, many experienced conflicts and disorders.

Also the volatility of commodity prices is a big issue for natural resource exporting economies that may experience a great vulnerability to external price shocks. Anyway nothing is inevitable, and there exist developing countries that achieved good and sound management of natural resources and good governance, and successfully channelled these resources in poverty reduction policies.

The EIR identifies three kind of challenges for extractive industries, at the project, at the country and at the global level.
Deliverable 1

The project level challenges are essentially the environmental and social problems that may arise in the site of the project. Often extractive industries have strong negative effects on the environment, and the communities that are living in the affected areas might be seriously compromised and constrained to emigrate or to live in a degraded condition.

Moreover, in a number of countries, severe human rights violations have been connected to extractive industries, and several armed conflict are direct or indirect consequence of the extractive industries activities.

The country level challenges refers to the fact that in the case of extractive industries, the benefits are not dispersed in the local economy but are concentrated in few sectors, the revenues are channelled to the central government and they might represent the main source of government financing. The challenge is how to assure that the money generated by extractive industries is used for poverty alleviation, how to assure the rule of law, transparency, and fight corruption. Corporate governance plays also a central role in this process.

The global challenge is about two things. First climate change caused by green house gases is already in act, and we should maximize all the efforts in order to develop clean and renewable energy sources. Second, extractive industries are integrated highly capital intensive industries. Governments of developing countries may often negotiate with big extracting industries on an unequal position, not only for the relative size of the two entities, but also for the asymmetries in information between the two partners.

The role of the World Bank in extractive industries has changed over the years. Until the '80s the bank mainly supported exploration and production, while in the late '80s and '90s it concentrated on privatizations of state-owned enterprises, private sector involvement and capacity building, together with market and structural reforms.

Some accounts that more than 100 countries reformed their mining codes and in many cases the regimes that regulates the foreign direct investments and WBG was an important part of this process. The influence of WBG on the sector anyway is mixed, from one side there is the fact that the involvement of WB is in many cases necessary to mitigate political risk, so there are certain projects that cannot be conceived without World Bank support, even if the financial support of the Bank is relatively modest. Especially in these cases the influence of the Bank as a mediator between governments, oil industries and civil society is crucial. Anyway the Bank generally do not manage the projects that finances and so its influence is limited to loan conditionality and political pressure. The Bank may play an important role in promoting best practices and international environmental and social standards and to assure that the extractive projects promote sustainable development of the country and poverty reduction. But which are the conditions to be met in order to justify the involvement of the Bank in EI?

After two years of consultation and research the EIR concluded that the WBG has been mostly successful in his role of helping in reforming the legal and regulatory framework, promote private investments and privatization and commercialisation of public-owned enterprises. On the contrary EIR judges that the efforts to improve public governance in order to protect social and environmental issues have not been sufficient and that increased
Deliverable 1

Investments have not necessarily helped the poor, on the contrary often the poor and the environment have been further threatened by the expansion of EI. Considering also the Climate Change issue, **EIR recommends that WBG phase out investment in oil production by 2008**, to address its scarce resources to sustainable energy projects and support Kyoto protocol.

Anyway, EIR do not deny that the WBG has still a role to play in extractive industries but affirms that this is true only if it contributes to poverty reduction through sustainable development. And that can only happen when the right conditions are put in place in the following areas:

1. Pro-poor public and corporate governance, including proactive planning and management to maximise poverty alleviation through sustainable development.
2. Much more effective social and environmental policies.

The measures recommended by EIR to the World Bank management are the following:

**Pro Poor Public and Corporate Governance.**

EIR recommends that the WBG:

- **Tailor and Sequence Interventions to a Country’s ability to ensure that Extractive Industries will contribute to Poverty alleviation through sustainable development.** On public Governance EIR stress the point of the transparent management of revenues, independent audits, revenue sharing, rule of law, the absence of armed conflicts, respect for labour standards and human rights, protection of the international guaranteed rights of the indigenous people. On corporate Governance, EIR recommends effective social and environmental protection (including the existence of an independent environmental agency), meaningful and fully informed participation of affected communities, participatory process, capacity to link activities with regional development plans and economic diversification.

- **Focus first on Good Governance.** Good governance has always been one of the cornerstones of WBG policies. In this specific sector this is judged *a condition sine qua non* to further develop private investments in EI.

- **Regain Leadership for Best Practice and encourage improved corporate governance.** WBG should promote corporate responsibility, international norms of codes and conducts, highest social and environmental standards, and respect for human rights.

- **Push pro poor benefits from Extractive Industries.** The Bank should use a precautionary principle in evaluating its participation in EI projects and evaluate if this is the best option to promote sustainable development and should assist governments in creating linkages between EI and local and regional economies, integrating infrastructures and promoting local industries able to generate added-
value activities.

- **Ensure that local communities receive benefits from projects.** WBG should support only projects that benefit all affected local groups, including vulnerable ethnic minorities, women and the poorest. Free prior and informed consent must be reached and the local communities have to be in condition to negotiate with companies and see clearly the advantage of the project in discussion. Revenues from the project activities should be shared between local, regional and national governments, local and regional poverty alleviation should be mandatory and measurable, there should be put in place public health components and dispute settlement mechanisms.

- **Help Artisan and Small Scale miners.** WBG should recognize the specificity of small scale mining, help legalizing and regulating these activities, integrating them in the formal sector and fighting child-labour.

**Strengthen Environmental and social components of WBG Interventions in Extractive Industries**

- **Require Integrated Environmental and Social impact assessments.** Unless there are not strong reasons to do the contrary, EI projects should be classified as category A projects, i.e. projects likely to have significant adverse environmental impacts.

- **Update and fully implement the natural habitat policy as a basis for clear no-go zones.** The Bank should not finance projects that affect World Heritage sites, protected areas, or critical natural habitat.

- **Update and fully implement the resettlement policies.** WBG would only participate in voluntary resettlements, not forced ones.

- **Revise the disclosure policy.** Much of the WBG disclosure policies should be revised. In particular production-sharing agreements, host-country agreements, power purchase agreements, economic, financial, environmental and social assessment should be disclosed to the public, together with monitoring and evaluation.

- **Develop sector specific guidance for tailings disposal, waste management and use of toxic substances.** The Bank should make particular attention to tailings, and develop a list of criteria (including social and cultural). The Bank should not support any projects with riverine tailings disposal.

- **Develop guidelines for integrated closure planning.** Funds and criteria for closure planning should be integrated to the project from the beginning, and disclosed to the public.

- **Develop guidelines on emergency prevention and response.** Best practice on emergency and safety procedures should be applied, with stringent inspections.

- **Address the legacy of the past.** WBG should help the governments to address the
negative effects of past EI projects, including socio-economical, environmental and human rights issues.

Respect of Human Rights

Respect of human rights is a cross-cutting issue, as both the World Bank and the national states are obliged to respect human rights under current international law. In the context of EI it is particular important that WBG address the following aspects.

- **Adopt Core Labour Standards for programs and projects.** IBRD and IDA should adopt CLS as contractual requirements. IFC and MIGA should adopt all four CLS and not just two.

- **Recognize Indigenous People and their land rights.** WBG should continue and improve the dialogue with freely chosen indigenous leaders. Moreover WBG should revise its safeguard policy and assure that it is consistent with indigenous people rights in international law.

- **Integrate human rights in safeguard policies relevant to EI, with special attention to women's rights.** WBG should make explicit the human rights basis for each Safeguard Policy. Gender issues will comprehend not only non-discrimination but also protection from gender based human rights violations.

The Extractive Industries Review makes also several suggestions on the changes to be made inside the Bank in order to better address the issues exposed above, in particular about staff composition and incentives, coordination, monitoring, evaluation etc.

### 5.2.2 The World Bank Group Management response

In September 2004 the Management of the World Bank issued its response to the Extractive Industries Review. The management of the WBG welcomed the Review and accepted the majority of its recommendations (*but not the one to stop financing oil projects by 2008*). In particular the World Bank management welcomes the fact that, following certain criteria, EI can contribute to sustainable development and therefore there is still a role of the WBG, if these criteria are applied.

So the management accepted to revise its policies in the following areas:

**Strengthening governance and transparency**

- Country assistance Strategies (CAS) for resource rich countries will address EI issues;

- The sequencing of activities on EI will be based upon governance capacity and risks; and
• Transparency will be required as a condition for new investments.

Ensuring that extractive industries benefits reach the poor
• The Bank strongly support the principle that communities should benefits from projects that affects them and will work with governments, sponsor and communities to assure that.
• The Bank agree to develop indicators, establish independent monitoring mechanisms.

Mitigating environmental and social risks
• The bank supports the principle of non-go zones, due to high value of biodiversity;
• IFC safeguard policies are being updated; and
• The bank will expand disclosure of relevant information.

Protecting the rights of people affected by EI
• The Bank *strongly* support the principle of protecting the rights of those affected by EI projects.
• Free, prior and informed consultations will be required.
• The Bank accept the EIR recommendation on security of EI sites and human rights.

Promoting Renewable Energy and efficiency to combat climate change
• The Bank Strategy is to promote economically and financially viable renewable energy projects; and
• The bank commit to increase its portfolio in renewables and energy efficiency by 20% each year, and will publicly report on annual basis.

The position of the WB management is that, even if EI are risky operations, for some developing countries they are valuable assets, often one of the few available that should be exploited in a careful and responsible way. Moreover the engagement of the bank in the EI can have an influential role to ensure the sustainability of the industry, and that the best environmental and social practices are followed.
5.3 The WBG Renewable Energy Policy

The World Bank Group recognizes the importance of renewable energy and it is actively involved in its development. The WBG acts with several partners, the more important being the Global Environmental Fund (GEF) established in 1991, the United Nations Development programme (UNDP), the Global Village Energy Partnership (GVEP) and other regional and international organizations.

In the period 1990-2006 the total World Bank Group lending for renewable energy projects (IBRD (International Bank for Reconstruction and Development), IDA (International Development Association), MIGA (Multilateral Investment Guarantee Agency), IFC (International Finance Corporation), including GEF co-financing and Carbon Finance) accounted to 7.2 billions of USD, around 12% of all energy sector commitments,31 this value is the half of the finance allocated to fossil fuels development (oil and gas accounted for 19%, coal for 3%). To this value it has to be added 2.8 billions of USD committed to Energy Efficiency (another 5% of the total), as the World Bank account together renewable energy and energy efficiency projects, the reason being that they both produce savings on Green House Gases (GHGs) emissions.

In 2004, at the International Conference on Renewable Energies (Bonn - Germany) the World Bank committed itself to increase its financial involvement in renewable energy and energy efficiency by an average 20% per year in the period 2005-2009 (from a baseline of 209 USD m.). World Bank affirms that it more than met this target so far, with a total investment of 680 USD millions in 2005 and 871 USD millions in 2006, as shown in Table 3. It has to be noted that the majority of these funds (490 USD m.) refers to energy efficiency, while the rest is equally divided between Hydro projects of a capacity greater than 10 MW and other new renewable projects. More than the half of these funds comes directly or indirectly from International Finance Corporation, the rest from IBRD and IDA. The average per year commitment of the IBRD/IDA on new renewable energy has been of 82 USD millions in the period 1990 - 2003, compared to a value of 131.4 USD millions in 2006.

Table 3: Renewable energy and energy efficiency commitments in 2006 (source: World Bank Right on target, 2006).

<table>
<thead>
<tr>
<th>Source of fundings (USD millions.)</th>
<th>New - RE</th>
<th>Hydro &gt;10 MW</th>
<th>EE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank (IBRD and IDA)</td>
<td>131.4</td>
<td>118.6</td>
<td>121.9</td>
<td>371.9</td>
</tr>
<tr>
<td>World Bank (GEF and Carbon Finance)</td>
<td>37.8</td>
<td>6</td>
<td>2.2</td>
<td>46</td>
</tr>
<tr>
<td>IFC (own funds)</td>
<td>17.4</td>
<td>67</td>
<td>344</td>
<td>428.4</td>
</tr>
<tr>
<td>IFC (GEF and other trust funds)</td>
<td>3.3</td>
<td>0</td>
<td>20.1</td>
<td>23.4</td>
</tr>
<tr>
<td>MIGA (investment guarantee)</td>
<td>0</td>
<td>0</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>189.9</td>
<td>191.6</td>
<td>490</td>
<td>871.4</td>
</tr>
</tbody>
</table>

The 20% increase in Renewable Energy and Energy Efficiency per year for the period 2005-2009 is part of the strategy that the World Bank group has issued for RE and EE. Jamal Saghir, director of Energy and Water at the World Bank, affirms that Renewable Energy...

energy and Energy Efficiency can contribute significantly to achieving the Millennium Development Goals - in fact, they offer a double dividend - meeting the essential energy needs of countries for sustained growth and poverty reduction while at the same time preserving or enhancing the environment. Moreover renewable energies and energy efficiency, also through the leverage of carbon financing, are one of the pillars to achieve the transition to a Low Carbon Economy and to respect Kyoto targets and prepare for the period after 2012. The strategy of the World Bank is based on the following principles:

- Economically and financially viable renewable energy and energy efficiency investments become an essential element in the energy choices of its member nations, not marginal considerations.
- Increase of 20% per annum of portfolio in the period 2005-2009 in RE and EE.
- Promote policy dialogue on renewable energy.
- WBG will report annually its performance on RE and EE.
- WBG will provide sector specific information.
- WBG will increase staff capacity and resources.

The concept that economically and financially viable RE projects should be an essential part of energy choices means that renewable could be the mainstream choice for a large majority of off grid or isolated grid applications, because their costs (cfr: Chubu Electric Power Co et al. 2005, WB discussion papers) can be significantly lower than fossil fuel solutions. This may have a large repercussion on the hundreds of millions of people that still lacks access to electricity, as the majority of them live in rural areas. Anyway considering that conventional fossil fuel energy generation is being heavily subsidized and with no transparent measures, and including also the negative externalities, Renewable Energy Technologies highly increase their economic and financial viability. The World Bank is committed to level the playing field between conventional and renewable energy sources, not only with financing instruments but also with policy and regulatory reforms.

The Independent Evaluation Group of the World Bank has in 2006 published an evaluation of New Renewable Energy Projects financed by WBG, as standalone projects or as component of other projects. The review evaluated 56 projects (out of a total of 65 projects financed since 1990). Of these 56 projects, 27 were closed and 38 still ongoing at the time of the review. The majority of the projects have been co-financed by GEF. The IEG found that the Bank started mainly promoting solar PV and that later added a much broader choice of technologies. In many cases projects supported also Technical Assistance (90%), studies (70%) and pilot activities (60%). In many cases the NRE component limited to these three components. Also the IEG found that the sector reforms implemented in the 90's did not seriously took into account the potential of NRE but that the situation has been improving recently.

IEG critics that the majority of the NRE projects evaluated had poor or absent monitoring and Evaluation components, and therefore the poverty reduction impacts are largely non-valuable. Partial evidence suggests very mixed results, highly dependent from project and national issues. From an overall point of view two thirds of the closed and evaluated
projects had satisfactory outcomes. Environmental benefits and private Sector Participation in NRE projects has also been judged satisfactory.

IEG concluded affirming that the Bank's activities have helped to promote NRE and led to improved design projects. Nevertheless the Bank's should improve its activities in many areas: 1) it should internalize analytical and advisory assistance, that is a key activity for NRE developing, and should internalize its costs; 2) it should improve monitoring and evaluation component; 3) it should better integrate NRE with the energy sector reforms creating objective, transparent and non-discriminatory regulatory mechanisms; 4) Development of NRE only very recently has been quoted into Country Assistance Strategies (CASs) and for still few countries. IEG also stress the importance of forestry projects and projects for sustainable biomass that are not classified as energy project but as community or forestry projects. Traditional fuels are anyway of crucial importance for the poorest in the poorer areas of the planet, especially in Sub Saharian Africa where the traditional energy accounts for more than 60% of the total energy consumed, with peaks of 80% or more in certain countries.

5.4 Carbon finance at the World Bank

Carbon Finance is the set of financial instruments, funds, and actions explicitly targeted at developing the market of greenhouse gas emissions from developing and transition countries. Emission generated by Clean Development Mechanism (CDM) or Joint Implementation (JI) projects are internationally traded under the Kyoto protocol's agreement but, under its rules, Official Development Assistance (ODA) funds cannot be diverted for financing emission-reducing projects. So a new set of specific instruments was necessary for this scope: carbon funds. This kind of funds are created by OECD Governments and private companies and are used, unlike other WB funds, not to lend or grant financial resources to developing countries, but to buy emission reductions certificates produced by JI and CDM projects, and so promoting cleaner technologies. The types of projects interested are in large part new renewable energy projects and waste to energy projects, but there is also a share of fuel switching, and other projects directly reducing emissions (like reducing of gas flares and leakings). World Bank participates to several funds:

1. **Prototype Carbon Fund** - It was the first one ever, started in 2000 and pioneered the market. It has a capital of 180 USD millions.

2. **Bio Carbon Fund** - It is specialised on activities that sequester or conserve carbon with forestry or agricultural activities. Started in 2004 with a capital of 53.8 Usd m.

3. **Community Development Carbon Fund** - It is the fund that focuses its activities in projects in the poorest areas of the world in projects that are not only of GHGs emissions but also of local sustainable development. It was designed together with the United nation framework convention on Climate Change (UNFCC) and the International Emission Trading Association (IETA). It started in 2003 with a capital of 128.6 USD millions.

4. **The Italian Carbon Fund** - Started in 2003 in collaboration with the Italian
Government. The ICF is open for the participation of Italian public and private sector and amounts 155.6 USD millions.

5. **The Netherlands CDM Facility** - in collaboration with the Dutch Government has a capital of 264.7 USD millions and is dedicated only to CDM projects.

6. **The Netherlands European Carbon Facility** - is just for credits generated by Joint Implementations projects, with a capital of 53 USD millions.

7. **The Danish Carbon Fund** - established by Danish public and private sector in 2005, it has now a capital of 68.5 USD m.

8. **The Spanish Carbon Fund** - was created in 2004 in collaboration with the Spanish government and comprehends large Spanish private industries. It has currently a capital of 278.6 USD m.

9. **The Umbrella Carbon Facility** - is a special scaling-up fund, for 75% private, that adds other resources together with the ones already available through the other carbon funds, in order to buy emissions generated by large projects. The first tranche of the fund has been approved in 2006 to be used to perform the largest emission reduction transaction ever: a 1 billion dollar contract has been signed to stop the emissions of HFC-23 (Trifluoromethane) in the atmosphere by two plants in China. HFC-23 has a warming potential 11700 times greater than carbon dioxide.

10. **The Carbon Fund for Europe** - has been established by WB in collaboration with the European Investment Bank (EIB) to assist European countries to meet their commitments under the Kyoto protocol and by the European Trading Scheme.

Carbon Finance may be an important part of a project and increase its profitability, and it is supported not only financially but also with other kind of actions, like capacity building, technical assistance, resources for project developers, for service providers and national state.

To this regard the Bank has issued the CF-Assist program that provide assistance for establishing national focal points and Designated National Authorities, to give technical assistance to project developers and to integrate carbon financing in mainstream project financing.

### 5.5 The United Nations Energy Strategy

The United Nations, through the mother organization and its various agencies, extensively deal with energy issues and participate to the formulation of international energy policy and to advocate policies to and for developing countries. The focus on energy, and its linkages with poverty has strengthened in the latest years, and now it has become one of the pillars in the development policies aimed at achieving the Millennium Development Goals, while probably in the past has been under evaluated. The activities of the UN in this matter can be dived in two groups: first the organization of several International
Conferences during which stakeholders, Heads of States and International Organizations agreed on certain principles and found consensus on policies and strategies and, second, the research and cooperation activities of each UN branch and agency on this matter. Here follows a brief and non-exhaustive description of the principal activities of the two types.

5.5.1 International Conferences and related programmes


The Conference that opened in Rio in 1992 was the first of a series that happened in the decade after. It was unprecedented both in terms of size and presence of Heads of State. The focus of the conference was the relation about environment and development and on the necessary strategy to achieve both economic development and environment protection. The Rio message was that both excessive consumption and, on the other hand, poverty, put much stress on the environment. The Rio conference dealt both with energy and poverty issues but not specifically on their mutual linkages. On energy the focus was on environment degradation, greenhouse gases emissions, climate change and sustainability of energy systems. On poverty the focus was essentially on the linkages between local environment degradation, biodiversity, on the necessity of eradicating poverty and reducing disparities in living standards. The Rio final Declaration did not explicitly mention energy. The summit anyway was the base for several initiatives that focused much more on energy, like the United Nation Framework Convention on Climate Change, Agenda 21, the statement of Forest Principles and the Commission of Sustainable Development (CSD).

5.5.1.2 Agenda 21

Agenda 21 is a comprehensive blueprint of actions developed by the UN and presented and approved in Rio, in order to carry out the Rio principle with action at the international, national and local level. Energy is extensively discussed in Agenda 21, in particular for its linkages with environment and natural resources: for example in Chapter 4 - Changing Consumption Patterns - A21 recommends increasing energy efficiency and the use of renewable energy sources and internalization environmental costs. In chapter 6 Agenda 21 deals with the environmental consequences of energy production and in chapter 7 - promoting sustainable human settlement development - A21 deals extensively with energy policies in the household and transport sectors.

5.5.1.3 The UN Commission on Sustainable Development (CSD).

CSD has been created following the recommendations contained in chapter 38 par 11 of Agenda 21 as a way to follow up and monitoring the progress towards Agenda 21 implementation and sustainable development. It is a functional body of the UN Economic and Social Council and its works are organized in thematic sessions. The 5th session dealt with the progress report of the Rio Conference, the 9th Session and the 14th Session (in 2000 and 2006 respectively) focused an important part of their works on energy and, this time, more specifically on the energy-poverty linkages.

5.5.1.4 The World Summit on Sustainable Development, Johannesburg
2002 (WSSD - Rio +10)

Ten years after Rio, another great conference evaluated the progress made and proposed new actions. At WSSD energy was approached not only on its environmental aspects, but also for its role in combating poverty. Energy is quoted in the Johannesburg declaration as a basic need, together with clean water, sanitation, adequate shelter, health care, food security and the protection of biodiversity. The action to be taken to perseve this and other objectives are contained in the Johannesburg Plan of Implementation JPOI.

5.5.1.4 The Johannesburg Plan of Implementation JPOI.
The Johannesburg Plan of Implementation highlighted the role of energy services to promote sustainable development and to facilitate the achievement of the Millennium Development Goals and called for maximum efforts from the international community to promote:

a) Increased energy access to all population,

b) Fostering the implementation of modern biomass technologies,

c) Management programs for sustainable use of biomass,

d) Implementation of actions plans focused on the transition to the cleaner use of liquid and gaseous fossil fuels,

e) Development of sound national energy policies and regulatory frameworks,

f) Enhance international and regional cooperation,

g) Developing mechanisms to provide financial and technical assistance for the poor to access to these programs.

One important aspects of the JPOI is the possibility of establishing partnerships in order to carry on projects and programs to achieve the objectives indicated at WSSD. Partnerships gather together international organizations, regional organizations, NGOs, Think-tank, national and local government, and other stakeholders. In the field of energy some of the most important WSSD Partnership are: Global Network for Energy and Sustainable Development (GNESD), the Global Village Energy partnership (GVEP), the Renewable Energy and Energy Efficiency Partnership (REEEP), the EU Energy Initiative.

5.5.2 UN institutions and main projects

5.5.2.1 UN-Energy

The UN in 2004 created a brand new inter-agency dedicated on the theme of the Energy and with the scope of coordinating the Work of the UN Agencies on the theme, to assure

33 The members of UN-Energy are the followings: Economic Commission for Africa, Economic Commission for Europe, Economic Commission for Latin America and the Caribbean, Economic and Social Commission for Asia and the Pacific, Economic and Social Commission for Western Asia, Food and
the participation of non-UN stakeholders to the process established at WSSD on energy, and to highlight the importance of Energy in achieving Sustainable Development Goals. One of the first publications of UN Energy is a report on the importance of Energy in achieving the Millennium Development Goals and the strategy to be followed. Other work is being done to map and coordinate UN Agencies projects and dissemination activities.

5.5.2.2 Other UN Agencies

Each UN agency has its specific focus and competences and approach Energy - a cross cutting issue by excellence - with specific sector or regional projects. In this context the activity of the various Regional UN Economic Commissions is devoted to the peculiar Energy needs of each region while the Food and Agriculture Organizations has activities in the field of biofuels and food security. The International Atomic Energy Agency produces energy models, assistance to countries for the civil use of nuclear energy and acts as the most important forum on Atomic Energy Security. UN-Habitat on the contrary works on energy for households and urban transportation. One of the major players in the UN- system is the United Nations Development Program that is very active in capacity building, promoting rural energy and clean energy development, increasing investments and advocating operations. Another major player are the United Nations Environment Program (UNEP) and the United Nations Industrial Development Organization (UNIDO). The United Nation Framework Convention on Climate Change (UNFCCC) is responsible for the implementation of the Kyoto protocol on the reduction of GHGs, in the atmosphere and in this process the emissions from energy production are crucial, as well as energy conservation initiatives. The World Health Organization finally has many projects and programmes related to the health consequences of energy, especially indoor pollution and security.

5.5.2.3 The Millennium Project of the United Nations

Concluding this brief review few words have to be spent on the Millenium Project, leaded by Jeffrey Sachs. The Millennium Project was commissioned in 2002 by UN secretary general Kofi Annan to develop concrete action plan to achieve the Millennium Development Goals. The Millenium project prepared specific analysis tools and developed guidelines and worked with national governments to prepare MDG based Poverty Reduction Strategy Papers. The importance of MP for Energy Policy is that it seriously advocated the importance of making energy one of the pillars of the MDGs strategy and developed a series of conceptual tool (like the MDG energy gap, i.e. the energy necessary to achieve the MDGs) that helped to refocus international policy on energy and on the energy needs of the poor.

6 Analysis and evaluation

The tables in this section summarize some important policies related to poverty alleviation, electrification and renewable energy in Ecuador and Peru.

Table 4 present the goals and indicators relative to *Eradicate extreme poverty and hunger* for Ecuador and Peru, which are part of the UN Millennium Development Goals.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Indicator</th>
<th>Status</th>
<th>Year</th>
<th>Goal</th>
<th>Will goal be reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ecuador</strong></td>
<td>Goal 1: To reduce by a half between 1990 and 2015 the percentage of people with income lower than one dollar</td>
<td>Percentage of population with income lower to the line of national poverty</td>
<td>15.48%</td>
<td>1999</td>
<td>7.74%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coefficient of separation of poverty for one dollar per day</td>
<td>6.06%</td>
<td>1999</td>
<td>2.47%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proportion of income that accounts for the fifth poorest part of the population</td>
<td>3.5</td>
<td>1999</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>Goal 2: To reduce by a half, between 1990 and 2015, the percentage of people that suffer hunger</td>
<td>Share of children younger than 5 years old with a coger than normal weight</td>
<td>17.2%</td>
<td>1999</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percentage of population below the minimum level of food energy consumption.</td>
<td>81%</td>
<td>1991</td>
<td>40.5%</td>
</tr>
<tr>
<td><strong>Peru</strong></td>
<td>Goal 1: To reduce by a half between 1990 and 2015 the percentage of people with income lower than one dollar</td>
<td>Extreme poverty, taking consumption as the base for analysis</td>
<td>23.9%</td>
<td>2002</td>
<td>11.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total poverty, taking consumption as the base for analysis</td>
<td>54.3%</td>
<td>2002</td>
<td>27.3%</td>
</tr>
<tr>
<td></td>
<td>Goal 2: To reduce by a half, between 1990 and 2015, the percentage of people that suffer hunger</td>
<td>Share of children younger than 5 years old with a lower than normal weight</td>
<td>7.07%</td>
<td>2000</td>
<td>5.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percentage of households below the minimum level of calories consumption.</td>
<td>35.8%</td>
<td>2002</td>
<td>n.d.</td>
</tr>
</tbody>
</table>
Table 5 presents the energy goals relative to renewable energy and electrification for Ecuador.

**Table 5: Main Energy Goals Ecuador**

<table>
<thead>
<tr>
<th>Objective</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>... it is supported and financed by FERUM resources the projects of generation that are exclusive for marginal urban and rural areas; and specially those that use non conventional renewable energy resources. (ERSE cited in CONELEC 2006)</td>
<td></td>
</tr>
<tr>
<td>... wind, solar, geothermal, and biogas generation should be produced up till 2% of the national power, being paid in prices that incentives its development… (ERSE cited in CONELEC 2006)</td>
<td></td>
</tr>
<tr>
<td>90% of electrification in rural areas in 10 years from 2005 (CONELEC 2005 cited in Peláez-Samaniego 2007)</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 summarizes the main policies of Peru in the context of energy and rural electrification.

**Table 6: Main Energy Goals Peru**

<table>
<thead>
<tr>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru’s energy policy focuses principally on promoting development and the rational, efficient, and competitive use of energy resources, within a context of decentralization and regional development, in which priority is attached to private investment, demand satisfaction, and the use of renewable sources of energy in rural electrification.</td>
</tr>
<tr>
<td>The Rural Electrification Plan seeks to incorporate renewable sources, where economically viable, into extended distribution lines. Higher priority is given to projects located in regions where electricity supply is most deficient.</td>
</tr>
<tr>
<td>Peruvian Government launched an aggressive campaign to promote private investment in hydrocarbons. Elements of this campaign include a reduction in royalties payable to the Government, less rigid terms and conditions for petroleum exploration and extraction contracts, and a refund of the general sales tax on exploration, among other measures. Its objectives are to make Peru an attractive destination for private investment.</td>
</tr>
</tbody>
</table>

Table 7 presents a selection of main energy-poverty policies and instruments for Ecuador; Table 8 presents the same information for Peru.

**Table 7: Policy (instruments) related to energy and poverty in Ecuador**

<table>
<thead>
<tr>
<th>Policy (instruments)</th>
<th>Potential Beneficiaries</th>
<th>Access Focus</th>
<th>Budget</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG Subsidy</td>
<td>Population with access to LPG and LPG equipment 85% of the population in Ecuador uses LPG for food cooking.</td>
<td>Economic</td>
<td>Around 3 million USD in subsidies for all fuels (not only LPG or transport fuels)</td>
<td>Since it is not focused, it does not allocate properly resources to the poorest part of the population. However it has positive effects related to the more affordability of LPG towards traditional domestic energy. Smuggling problems arise with neighbouring countries.</td>
</tr>
<tr>
<td>Transport fuels subsidies</td>
<td>Population with</td>
<td>Economic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 79 -
<table>
<thead>
<tr>
<th>Policy (instruments)</th>
<th>Potential Beneficiaries</th>
<th>Access Focus</th>
<th>Budget</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity tariff subsidy (“tarifa de la dignidad”)</td>
<td>Poor people with physical access to electricity</td>
<td>Economic</td>
<td>USD 64.9 millions 2007 - 2008</td>
<td>focused, it does not allocate properly resources to the most needed part of the population</td>
</tr>
<tr>
<td>Creation and operation of FERUM for rural and urban marginal electrification.</td>
<td>Rural and marginal urban population without physical access to electricity</td>
<td>Economic and physical</td>
<td>1997 – 2006 around 346 million USD</td>
<td>Poor people with physical access to electricity</td>
</tr>
<tr>
<td>Installation of PV systems by Ministry with own funding and/or cooperation with NGOs and international donors</td>
<td>Rural communities distant from grid.</td>
<td>Economic and physical</td>
<td>Some of the systems have been abandoned, there is lack of appropriation by users</td>
<td>Poor people with physical access to electricity</td>
</tr>
<tr>
<td>Exclusivity of distribution companies electricity supply in concession areas</td>
<td>All the population</td>
<td>Economic and physical</td>
<td>Commonly the approach of distribution companies is to focus on communities close to the grid</td>
<td>Poor people with physical access to electricity</td>
</tr>
<tr>
<td>Law for the promotion of renewable energy</td>
<td>All the population</td>
<td>Economic and physical</td>
<td>The increase of the hydropower base would lower the price of electricity</td>
<td>Poor people with physical access to electricity</td>
</tr>
</tbody>
</table>

Table 8: Policy (instruments) related to energy and poverty in Peru
productive use of energy. Criteria for investment in electrification are based in economic viability and sometimes social. For grid extension the limit for investment is 901 US$ per household. Non conventional isolated energy systems have a higher limit.

<table>
<thead>
<tr>
<th>Law for the promotion of non conventional renewable energy for rural and isolated areas</th>
<th>Population in rural and isolated areas</th>
<th>Economic and physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canons. Regional and local governments can make projects that benefit at the population of zones where exploit non renewable resource.</td>
<td>Population close to Mining Activity.</td>
<td>Economic, physical and rural development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benefit at the regional and local governments and the public universities in Ayacucho, Huancavelica, Ica and Lima.</td>
</tr>
</tbody>
</table>

6.1 Organisation

One of the first noticeable issues was that both countries, respecting their differences, does count with the same policy in the energy sector, where the development of the renewables does take a central point in the medium to long term actions, and the safety of supply is one of the key drivers on the local level actions. Renewables do not seem a central point of actual policies

There are a strong polarization between the north and the South regions in Peru, and between, coast and sierra in Ecuador; for both countries, the Amazon region does constitute a challenge for the electrification.

In both countries there is a non inclusive policy for the renewables in small scale to be connected to the grid, (at least 1 MW in Ecuador and at least 1 % of installed power capacity in Peru).

6.1.1 Public

It is in this level that there are the most significant differences between the two target countries, where Peru does have a more decentralized structure on the management and draw of development strategies for the energy related sector than Ecuador. This can be
exemplified by the big partial ownership of the electricity distribution and generation companies by the Solidarity Fund (the State).

Yet, when comes to control the available budget both countries restrain the management and decisions on where to invest the funds available at the National Level Organization (i.e. Minister).

### 6.1.2 Private

One of the things that were raised by the private participants coming from the private sector during the event in Guayaquil was the willingness to update the knowledge and the need for formation within the actors involved in the energy sector, and yet Peru does count with a more consistent profile within its members, there is a general sense of lack of continuous formation of the personnel.

In this specific point, for Ecuador, was made a suggestion on the use of the Innovation Fund (CEREPS), to support the capacity building and the development of a national industry in the field of the renewable energy. It was suggested that special attention be paid to the need of merging the pure technical (i.e. mechanical and electrical engineering), with other less technical carers such as sociology, economy etc, in order to cover the necessary multidisciplinary issues involved in the energy project design.

One key for Ecuador is the deficit on the payments and the equal treatment of the available power for dispatch disregarding the nature and efficiency of the system, leading for the installation of low cost, rapid return on the investment, technical options.

### 6.2 Sector

#### 6.2.1 Hydrocarbons

Oil in Ecuador is one of the main concern for the Government as it is one of the biggest the source of revenue for the country, in Peru, there are yet some reserves been assessed but the main actions are focused in the south region and yet few have been done in this field.

A partnership have been build in the better use of the refining capacity of Peru to process the oil from Ecuador, one of the week points of the oil related structure on the country.

As there is a significant difference on the retail price of the oil based fuels (gas and fuels), there is constant illegal transportation of those fuels from Ecuador to Peru to be sold in a up to 300 % interests.

Peruvian Government launched an aggressive campaign to promote private investment in hydrocarbons. Elements of this campaign include a reduction in royalties payable to the Government, less rigid terms and conditions for petroleum exploration and extraction contracts, and a refund of the general sales tax on exploration, among other measures. Its objectives are to make Peru an attractive destination for private investment. In contrast current Ecuadorian government would increase the presence of the State in all energy
investments.

6.2.2 Electricity
The deficit on the account on the Ecuadorian Electrical Market (specially caused by the Distributors), are one of the biggest threat to the system, as limit the possible capital that could be used in the revamp of the units as well as the investment on more efficient technology. The biggest economical contribution for the financial equilibrium of the Generators comes from the payment for the power available for dispatch, and not base on the selling price of the energy.

This is a reflex of the Marginal Model, and once this payment is redraw, there is a general understanding that some of the units that now are vital for the equilibrium of the system (i.e. diesel units operating in boats near the main cities) could just go away and the country would face a collapse in the energy supply, or event need to relay on energy imported from Colombia and/or Peru, what would make even more severe the financial crisis. The prices of imported electricity are very high. It should be noted that the boat-generators charge for installed capacity ready to be online.

6.2.3 RES and Energy Efficiency
On the regulatory aspect, the technology has seen some important evolution and the technical limit of 1 MW minimum of installed power for connection with the main grid in Ecuador and at least 1% of installed power for Peru, is unreal, and has a severe impact on the development of small renewable energy projects (specially those that are sponsored by individuals and small communities).

For Ecuador, one common sense seem to raise on the fact that the lack of a National Energy Matrix is critical lack of tools to developed the energy system, as does not support the long term vision, as the formulation of a clear policy for specific sectors of the economy, like the diesel water pumping in the Banana crops and shrimps farming. In this sense, it is necessary to provide training for the Government personnel as well as for the medium to high level workers in many of the Energy related companies that operate in the country.

In both countries the Rural Electrification seeks to include distributed renewable sources when it is better than grid connection from an economic perspective. Higher priority is given to projects located in regions where electricity supply is most deficient.

6.2.4 Environment
This is one area where the two countries does diverge, as the Mining activities does hold a huge attention on the environmental related institutions in Peru (i.e. NGOs and associations), and in Ecuador is the energy related projects, where in the document we talk about this?
6.3 Energy and poverty

Both countries count with programs and funds for the fight against poverty and the extension of the energy services in rural zones, and yet they are yet unknown (or poorly reported to the general population), on its use.

Tables 7 and 8 present the some policies for Ecuador and Peru. As it can be seen in the context of electrification FONER and FERUM funding is used in similar way. Both are directed to support the supply of electricity to areas that do not count with the service at this moment. Specifically in Ecuador, due the lack of a more regionalized structure (as found in Peru), there is a general lack of understanding on the mechanism available for accessing those funds, i.e. the FERUM. Specially on the projects focused in giving access to the electrical services, the FERUM funds are seen as a resource that is poorly managed, and that is inserted in a vicious cycle, as follows: from the distributors revenues to the Government (i.e. Mines and Energy Ministry), that does the allocation and analysis of the request they receive from the communities (using projects design by the distributors), and this money then gets back to the Distributors that are responsible to install the project and the equipment (i.e. invested capital), would return to the Distributors (that are property of the Solidarity Fund, part of the Government).

This circle, and the eventual no possibility of any other use of this fund for other uses (i.e. capacity building and awareness raising campaign), than those related to increase the capital of the companies owned by the state, creates and nurse a sensation that those funds are not been used in the best interest of the population.

It is important to notice that there are in position the legal instruments to make those funds available for other institutions (i.e. communitarian energy providers companies), as the article 64 of the Anti-Monopoly Law that allows the use of the FERUM funds on areas where the Distribution Company does not want / can supply the energy services. But yet the Country Government still reassure the right of the company in the exploration and yet no progress is seen at local level (i.e. like the Silae Initiative supported by the European Community).

Other issue is that at least part of the funds have been used to cover operational deficit and the population has no way to access to proof on how those funds are been used.

Tables 7 and 8 also show that Ecuador has currently a State supply approach for providing economic access to energy for the population (especially the poorest). Subsidies for LPG and transport fuels are instruments that are present in the Ecuador policy framework but not in the Peru. Currently the official price of the 15 kg LPG bottle is 1,60 US$ in Ecuador (although it is usually sold up till 2 US$), while the price of the 10 kg bottle is between 10 and 11 US$ in Peru, thus Ecuadorian domestic price of LPG is around 0,12 US$ per kg while in Peru is around 1 US$ per kg (around 8 times the Ecuadorian price). In this sense there is a significant difference in Ecuador and Peru State approach. The price difference (with the non-adequate control) has stimulated the smuggling of Ecuadorian subsidized bottles.

It is also worth mentioning that one the main lessons from past isolated electrification projects is that the lack of appropriation of users has been a common element in this type of project failures.
6.4 Best Practices

During the many interviews, visits to case studies, and analysis of the actors present on both energy systems, one key element was the performance of the dispatch system/operator, and the effort of some companies and bodies to secure the proper formation of their professionals, yet there is a general lack of available models in the field of best practices in the Energy sector that could be generalized for both countries.

Within the experiences during the field trip, one that was most interesting was the local dissemination and capacity building event, as there seems to have very few forums where the energy issues could be discussed, especially one that could congregate the many involved stakeholders (NGOs, associations, Companies and the Governments).

One of the most interesting conclusion of the local event held was to notice how eager were the audience for this kind of event, as there seems to be very few forums were the issues of energy planning, energy policy and what are the main forms to achieve the proposed policy (in this case the increased use of renewable energy sources, specially by small local population).

Within the many issues discussed, some key actions were raised as a common sense among the participants; this was a valuable moment where the Andenergy Team had the opportunity to corroborate many of the ideas and suggestions that have been developed during this first year of work.

In the policy perspective in Ecuador it seems that the new proposal for efficient use of energy has promising aspects. Although it is a draft in this moment the new proposal includes aspects like, opportunities for financing, support for capacity development at different levels (technical capacity, education and research) and standards (see section 2.4.1.1). It must be taken into account that according to GNESD (2007) it has been found that some of the main aspects for the success of renewable energy projects for poverty alleviation are finance and the existence of an institutional framework. The institutional framework should include formal capacity development at all levels. It is also concluded that attitudes regarding new technologies are of great importance.

In the context of national power capacity, in Ecuador the demand is projected to increase. The capacity is also projected to increase with the inclusion of the San Francisco and Mazar Projects. The San Francisco hydropower project was the first working plant to be financed by the FEISEH. It is hoped that the FEISEH would have success to push the inclusion of new power capacity in Ecuador.

At the moment of the last review of this document, the current Government of Ecuador has reorganized the energy administration. The Ministry of Energy and Mines does not longer exist. In its place two new State Ministries have been created, the Ministry of Electricity and Alternative Energies and the Ministry of Petroleum and Mines. In an Ecuadorian open television morning news show the new Minister of Electricity and Alternatives Energies, Eng. Alecksey Mosquera, said that his main task would be to push the extension of the Ecuadorian hydropower capacity because the price of electricity in Ecuador is too high.

The challenge for Peruvian's policy makers is to manage an energy sector that is increasingly
dependent on oil and natural gas and may face spiralling energy prices, potential supply shortages, and an inadequate and aging energy delivery infrastructure, especially for rural Andean communities. Energy demand in all sectors will continue to rise meanwhile country demand for transportation fuels has increased the last 20 years and continues to grow at an alarming rate despite record high gasoline and diesel prices. The state's dependence on fossil fuels to generate electricity is escalating along with the demand for natural gas in the residential and commercial sectors.

Despite improvements in power plant licensing, enormously successful energy efficiency programs, and continued technological advances, development of new energy supplies is not keeping pace with the state's increasing demand. Construction of new power plants has lagged and the number of new plant permit applications has decreased. In addition, the development of new renewable resources has been slower than anticipated, due in part to the state's complex and cumbersome policy management process.

We believe that an important alternative to building large new power plants is distributed generation, which is electricity produced on site or close to load centers that is also connected to a utility's distribution system. The most efficient and cost-effective form of distributed generation is cogeneration or combined heat and power. By recycling waste heat, these systems are much more efficient than systems that separately serve thermal and electric loads.

Finally it is important to notice the different paths regarding energy investment that Ecuador and Peru would take in the near and mid term future. While Peru would go into a direction of promotion of private investment, Ecuador would try to expand its capacity mainly by State investment especially in hydropower.
References

**Section on Ecuador**


Section on Peru

Ministerio de Minas y Energía “Balance Nacional de Energía” Lima, Peru, 2001

Ministerio de Minas y Energía “Balance Nacional de Energía” Lima, Peru, 2005

References Section 4


References Section 5 – International Energy policy:


the World bank Group's experience with private participation in the electricity power sector.


World Bank, 2006. An investment framework for clean energy and development: a progress report


Annex A

Petroecuador holding companies

1. **Petroproducción**: Was created September 26 1989 with the objective of exploring, exploiting the hydrocarbon fields, and operate the fields assigned to PETROECUADOR, that is, it is the body responsible for the activities of exploration and exploitation of hydrocarbons. Its infrastructure includes 1.100 km of roads, 3.150 km of pipelines, of high pressure, water re-injection and secondary oil pipelines, 290.000 HP in engines for power generation, 443 km of power transmission and distribution lines for 70 MW installed capacity (turbines, generators stationary and mobile) and 50 buildings and three warehouses (Lago Agrio, Coca and Guarumo). It has a refinery in Lago Agrio that processes 1.000 barrels of oil per day to produce fuels for its own consumption (diesel, gasoline, JP-I y reduced oil). Infrastructure includes nine air fields, including two for medium capacity planes that transport personnel and the remaining for interconnection of the oil fields.

2. **Petroindustrial**: This Company is dedicated to refining activities. It has three industrial complexes: The Esmeraldas State Refinery, The La Libertad Refinery and the Shushufindi Industrial Complex.

   - **The Esmeraldas State Refinery** was built between 1975 and 1977 to process 55.000 barrels of crude oil per day. In 1999 its processing capacity reached 110.000 barrels per day with an expansion that allow it to process heavier and lower quality oil, and that included new units to improve the quality of the oil products and minimize the environmental impacts. In 2005 the refinery processed 33.123.008 barrels of crude oil and produced 30.593.907 barrels of oil products.

   - **The La Libertad Refinery** has a processing capacity of 45.000 barrels per day. It is componed by the infrastructure of the former Anglo Ecuadorian Oilfields Ltda. refinery and the former Repetrol refinery. The state took over the operation of these refineries at the end of the contracts the companies held with the state. Until December 31, 2005 the La Libertad complex processed 14.056.907 barrels and produced 12.287.549 barrels of oil products.

   - **Shushufindi Industrial Complex**: It is composed by the Amazonas Refinery which as of 1995 had the capacity to process 20.000 barrels per day; and by the Shushufindi Gas Plant that was built to process 25 millions cubic feet of gas. Afterwards, complementary installations were built to capture natural gas from the oil fields and transport it together with the liquids for its processing. To December 2005, this industrial complex processed 6.779.779 barrels of crude oil and produced 2.822.147 barrels of oil products.

   Petroindustrial has a total nominal production capacity of 175.000 barrels per day and the estimated gross production is 158.486 BPD.

   Including the three refineries, Petroindustrial had programmed a total load as of June 2006 of 28.175.100 barrels, out which 26.016.016 were actually loaded (96.62% of the goal for the first semester of 2006.

3. **Petrocomercial** is in charge of all the activities of transportation and commercialization of oil products for the internal market.
6 Annex B

Interviews

The following people were interviewed for the development of this document.

Ecuador

- Alvaro Morales, at that moment Engineer of DEREE MEM. Current Internal Director of DEREE.
- Rafael Drouet, Electroquil, a subsidiary of Duke Energy y member of the Directory of CENACE.
- Juan Saavedra, Technical Manager Hidronación, Former Director of Planning of INECEL
- Rafael Hidalgo, Former Manager of Commercialization of Empresa Eléctrica Milagro, Member of Empresa Eléctrica Regional Guayas Los Ríos EMELGUR

Perú

- Eng. Luis Moran, Assistant Manager of Major Clients for ElectroNoreste (ENOSA), Piura
- Eng. Gonzalo Urday, Director of Mirhas Peru NGO (project of life quality improvement in Piura region)
- Eng. Patxi Garmendia, Manager of AMALUR, solar electrification company in Loreto
- Eng. Wilder Parrilla, SILENEC, wind and solar commercialization company in the north of Peru