

ASSESSMENT OF THE PERUVIAN MARKET FOR SUSTAINABLE ENERGY FINANCE

Executive Summary



This report was prepared by CINYDE in 2011, as part of a study commissioned by the International Finance Corporation (IFC), in partnership with the Finnish Ministry for Foreign Affairs.

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IFC office in Lima, Peru

Av. Miguel Dasso 104, Piso 5

San Isidro, Lima, Peru

Tel: +51 1 611 2500

Web: www.ifc.org/lac

I. Introduction

This report was conducted by the CINYDE S.A.C. consulting company at the request of International Finance Corporation (IFC), a member of the World Bank Group. The report identifies key market players related to sustainable energy (renewable energy and energy efficiency) in Peru, analyzes the views of market players, and assesses barriers to the expansion of sustainable energy finance, as well as lessons learned. The report also proposes marketing channels for sustainable energy and initiatives to enhance the role of market players; with the intent of increasing interest and financing for sustainable energy in Peru.

II. Energy in Peru

Energy demand

Energy demand in Peru is growing 9% per year, roughly equivalent to bringing online a new 500 MW generation plant each year¹. Accordingly, it has been estimated that from 2012-2020, total required energy capacity is expected to increase to 6,140 MW, requiring investments in the range of US\$10,830 to US\$13,320 million, a portion of which must be funded by the private financial sector.² The Ministry of Energy and Mines (MINEM) has set a goal for a 33% renewable energy share in the energy matrix³ by 2021⁴. Furthermore, the government has a 15% energy savings goal for the period 2009-2018, relative to projected demand for 2018, in the residential, industrial, services, public, and transportation sectors.

According to energy analysts, the price of energy is expected to rise in future. Peru is currently experiencing artificially low prices for natural gas since pricing for the block currently in use (Block 88 of the Camisea project) does not include the exploration costs it incurred, creating market distortions and barriers to the promotion and implementation of renewable energy and energy efficiency projects. When current sources are depleted (in roughly 20-30 years from now), natural gas from other blocks will command a much higher price that includes the full cost of exploration.

Regulatory framework and policies

MINEM has published a series of legal provisions to promote sustainable energy, creating a legal framework that aims to provide safety to investments in the sector⁵. The main provisions are:

Law on the promotion of investment in electricity generation through the use of renewable energies (Legislative Decree 1002 of 2008): Establishes the promotion of renewable energy as a national priority and sets targets for the percentage contribution of Renewable Energy Resources (RERs) to total domestic electricity consumption, giving renewable energy priority dispatch in the system, power purchase agreements of up to fifteen years, and a firm off-take tariff that is applicable throughout the entire term of the concession.

Regulations for the generation of electricity from renewable energies (Supreme Decree N° 012-2011-EM): Regulates the provisions of Legislative Decree N° 1002 (described above) and

¹ Vásquez, R. (2011). Legal framework in the Promotion of the Use of Renewable Energies and Projections. Presentation at the forum "Assessment of the Peruvian Market for the Financing of Renewable Energies", April, Lima.

² Econergy International Corporation and Deuman. 2009. Estudio de factibilidad para una línea de crédito para energías renovables y eficiencia energética a través de COFIDE. Report prepared for KfW.

³ Eslava, J. (2011). Legal framework of Efficiency Energy and Projections. Presentation at the forum "Assesment of the Peruvian Market for the Financing of Renewable Energies", May, Lima.

⁴ Renewables currently account for 29% and are primarily composed of hydro power and bagasse.

⁵ <http://www.minem.gob.pe/legislacionSector.php?idSector=12>

establishes the administrative procedure for RER tenders and for the award of concessions for RER electricity generation.

Peru's National energy policy for the period 2010-2040 (Supreme Decree N° 064-2010-EM): Sets energy policy objectives, including the plan to rely on a diversified energy matrix; promote energy from renewable sources and energy efficiency, and develop an energy sector with minimum impact on the environment and low carbon emissions.

Regulations to the law on the promotion of efficient energy use (Supreme Decree N° 053-2007-EM): Defines a broad range of activities such as (i) increasing awareness about efficient energy use in the public and private sectors, (ii) sector programs and activities for energy efficiency in the residential, industrial, service, public, and transportation sectors, (iii) energy efficiency standards and labeling, and (iv) dissemination of energy efficiency practices.

The 2009-2018 Reference plan for the efficient use of energy (Ministerial Resolution N° 46-2009-MEM/DM): Establishes a 15% energy savings goal for the period 2009-2018, relative to the reference projected demand scenario to 2018, in the residential, industrial, services, public, and transportation sectors.

III. Renewable Energy in Peru

Renewable Energy Resources, such as solar, wind, biomass, hydro energy, and others, have significant potential in Peru. However, only 4.7% of the hydro energy potential, 0.65% of the wind potential, 6.1% of the biomass potential, and less than 1% of the solar potential is currently being exploited. Accordingly, there is high potential to increase the use of renewable electricity and to decrease dependence on fossil fuels (in 2010, 56% of electricity generation came from with hydropower, and 44% from natural gas and oil derivatives). Doing so will diversify the energy matrix and contribute to the mitigation of climate change, for which the Government of Peru has made international commitments.

Renewable energy could also play an important role in the efforts to meet Peru's energy demand growth, as the table below demonstrates.

*Table 1
Generation Potential with Renewable Energy – Projection from 2012 to year 2020*

Renewable Energy Source	Potential Cumulative Demand (MW)	Installed Investment Costs (Million US\$/MW)	Total Investment Potential (Million US\$)
Photovoltaic	540	2.5 – 3.0	1.350 – 1.620
Wind	1,800	1.8 – 2.0	3.240 – 3.600
Hydropower	2,000	1.5 - 1.8	3.000 – 3.600
Biomass	1,800	1.8 – 2.5	3.240 – 4.500
TOTAL	6,140	N/A	10.830 – 13.320

Source: CINYDE analysis, based on information from the MINEM, KFW study (cited in footnote 3), and projections of future energy auctions.

Peru has limited experience financing renewable energy investments. Nonetheless, RER tenders were recently successfully implemented by MINEM (see results in Table 2). These enabled local financial institutions, including Scotiabank, Banco Interamericano de Finanzas (BIF) and Interbank, to become involved in these new investment opportunities.

Table 2
Results of the First Renewable Energy Tender (2010) – 411.7 MW awarded
(Prices expressed in Cents of US\$/kWh)

Energy Type	Minimum Bid Price	Maximum Bid Price	Average Offer Price	Reserve Price fixed by OSINERGMIN ⁶	% Savings of offers over reserve price
Biomass	5.20	11.00	6.35	12.00	- 47
Wind	6.55	8.70	8.04	11.00	-27
Solar	21.50	22.50	22.11	26.50	-18
Hydroelectric	5.50	7.00	6.03	7.40	-18
TOTAL WEIGHTED AVERAGE PRICE			8.12		

Source: OSINERGMIN

Mapping of the Renewable Energy market

There are currently 26 project developers with technical capability to manage renewable energy projects in the Peruvian market. In addition, there are 24 companies that supply renewable energy technologies, from turnkey systems to individual pieces of equipment.

There are four business associations composed of individuals and entities working on or developing renewable energy projects. These associations sometimes provide information on projects being developed and their potential financing needs. They include the *Asociación Peruana de Energías Renovables* – APEGER (Peruvian Renewable Energy Association); *Asociación Peruana de Energía Solar* – APES (Peruvian Solar Energy Association); *Sociedad Nacional de Minería, Petróleo y Energía* – SNMPE (National Society of Mining, Petroleum and Energy), and; *Asociación de Consumidores Intensivos de Energía* – ACIDE (Association of Intensive Energy Users).

Several governmental entities are active in renewable energy and relevant to the promotion of investments and investment opportunities. These entities are: MINEM, as regulatory body; the Supervisory Body of Energy and Mining Investment – OSINERGMIN (*Organismo Supervisor de la Inversión en Energía y Minería*), as supervisory body; *Corporación Financiera de Desarrollo* – COFIDE (Development Finance Corporation), as a second-tier bank; *Fondo Nacional del Ambiente* – FONAM (National Fund for the Environment), as the focal point of the Clean Development Mechanism (MDL) in the country; the Ministry of the Environment (MINAM), as environmental regulatory entity; PROINVERSION, as the entity promoting investments; and Regional Governments and Municipalities, as entities with administrative functions.

Below are the financial entities with largest presence in the market and/or a potential interest in granting credits to renewable energy projects:

⁶ OSINERGMIN is the supervisory body for mines and energy investment.

- International Finance Corporation (IFC): IFC participated in financing the Cheves hydropower plant (168 MW) developed by SN Power, and the bioethanol project developed by Maple.
- BBVA Bank: Through a Green Line of financing from the IFC, BBVA has channeled funding for two small hydropower plants of 5.9 MW and 9.6 MW.
- Four local banks, Scotiabank, Banco Interamericano de Finanzas (BIF), Interbank, and HSBC, have also funded projects under the first RER auction.
- COFIDE: *Kreditanstalt für Wiederaufbau* (KfW) is negotiating a 65 million Euro credit line with COFIDE for the “Bionegocios” (Biobusiness) program to finance renewable energy and energy efficiency projects. In coordination with the Ministry of Economy and Finance, COFIDE is also trying to secure a US\$ 100 million credit line from JICA of Japan to fund the same sectors. In addition, COFIDE plans to participate in the financing of small hydroelectric generation plants with Interbank. At present, COFIDE is also in discussions with the Dutch Development Bank (FMO) regarding funding for wind energy generation projects.
- *Corporación Andina de Fomento – CAF* (Andean Development Corporation): Provided funding for the Las Pizarras hydropower plant, and granted a US\$ 65 million loan to Maple to build a biofuels plant.

Renewable Energy Market Barriers and Recommendations

Several obstacles inhibit growth of the renewable energy market. These include an artificially low price for natural gas used in thermal power generation plants, unclear environmental standards, in some cases, overlapping responsibilities of regulatory agencies, and lengthy procedures for the award of concessions. Priorities for addressing these barriers include:

- Measures need to be taken at a local and regional level to streamline the initiation of approval activities following the award of temporary and final concessions; the technical and legal clearing of property must be expedited for the accreditation of rural property where projects are to be implemented.
- Current standards provide too much discretion in approvals on the part of regulators, making it less clear for project developers and causing additional, unnecessary delays in the delivery of permits and authorizations imposing a cost of entry for project developers and investors.
- Delays and difficulties have arisen when applying the early refund of value-added tax (VAT), and time-consuming procedures must be completed. It is important to establish mechanisms to speed up the early refund of the VAT.
- There are some barriers for investments in renewable energies, such as what occurred related to the promotion of biofuels when MINEM postponed (on two separate occasions) the application of the effectiveness of Gasohol⁷ in Lima and Callao, due to logistics problems in the marketing chain).
- The approval of Environmental Impact Assessments requires time-consuming multi-sectoral reviews by; *inter alia*, MINEM, MINAM, the National Water Authority, and the General Directorate

⁷ Gasohol is a blending of gasoline with anhydrous ethanol at 7.8% of volume.

of Environmental Health, which slow down the approval and development of projects. Delays in the commissioning and subsequent sale of energy decrease overall financial returns.

- Financial institutions are resistant to assessing renewable energy projects due to lack of experience in the area; they also tend to lack awareness of the importance of environmental issues and do not have staff to assess the environmental benefit derived from projects. Because of this, there is a need to develop tools to assist financial institutions in making technical and environmental assessments of renewable energy projects. Financial institutions need technical assistance to establish internal expertise to accelerate the assessment of projects.
- An energy investment fund should be created and made available to local banks so as to provide the needed equity for projects that are a part of the RER tenders in the future and other possible RER projects.

IV. Energy Efficiency in Peru

Energy efficiency is important for improving business productivity, rationing scarce national energy resources, as well as lowering emissions of CO₂ and mitigating the effects of climate change.

It is estimated that there is a potential market of over US\$ 1,000 million in investments in efficient technologies that may be exploited in the short, medium and long term (see Table 3).

Table 3
Estimate of the Sustainable Energy market in Peru, 2009-2020

Technology	Investment Million US\$	Assumptions
Energy efficiency	500	Based on an original evaluation by the IDB of US\$ 429 million for 2009-2018
Replacement of boilers	60	1,200 boilers, at US\$ 50,000 each
Co-generation	450	MUS\$ 295.5 industrial sector (197 MW, 1.5 MUS\$/MW); MUS\$155 sugar sector (80 MW, 1.94 MUS\$/MW)
Total	1,010	

Source: Ecomergy International Corporation and Deuman (2009).

Energy efficiency market mapping

There are approximately 22 consulting firms in Peru with expertise in energy efficiency available to work with companies, banks and technology providers. There are also approximately 90 suppliers of efficient technologies that operate in the sector. Many of the suppliers grant credit using a range of instruments. These suppliers are generally willing to provide funding to their clients based on trust and past records of repayment, assuming potential risks themselves.

Several government entities are active in energy efficiency. MINEM promotes energy efficiency through diagnostics, programs, dissemination of technologies, technical assistance to public and private institutions, and coordination with organizations of consumers and business entities. In joint efforts with companies, FONAM identifies projects that may be eligible to obtain carbon credits. The National

Institute for the Defense of Free Competition and Intellectual Property Protection (INDECOPI) approves the Peruvian Technical Standards which specify equipment manufacturing characteristics, procedures for installation and testing, operating requirements, efficiency and labeling ranges, and other standards. As of September 2011, 47 standards related to energy efficiency have been approved.

There are a number of important business associations that are important with respect to energy efficiency: SNMPE includes 173 associated companies, of which 49 are in the energy sector. SNI consists of more than 1,000 industrial companies and has an Energy Commission that evaluates energy-related issues relevant to the industrial sector. ACIDE consists of about 20 industrial and mining companies. These associations also have active channels (magazines, newsletters) that could be used for the dissemination of energy efficiency related information.

Several financial institutions are active in energy efficiency, in developing sustainable energy projects, technical assistance projects, or in establishing energy efficiency credit lines. There are four commercial banks with the largest presence in Peru that have some experience in granting loans for energy efficiency projects: *Banco de Crédito del Perú* (BCP), Interbank, Scotiabank, and BBVA. BCP, Interbank and Scotiabank offer an Environmental Credit Line (ECL) established by the Swiss Cooperation Agency (SECO). The ECL, which began operating in 2004, is directed at clients seeking to invest in cleaner production technologies and reduction of pollution in the productive process (including energy efficiency). BBVA was a pioneer in the energy efficiency market and has financed energy projects for US\$ 30 million with a credit line it obtained from IFC in 2007; it has another new sustainability related line of credit with IDB.

The largest energy consumers are the industrial and mining sectors, where approximately 100 companies consume close to 80% of the electricity in Peru. Efforts to achieve electricity savings should be focused primarily on these companies, at least as a starting point. That said, opportunities for reducing energy use still exist in other companies with lower energy consumption as well.

Peru has educational offerings to satisfy the demand for professionals in the field of energy. Six higher education entities offer specializations related to energy and energy efficiency: *Universidad Nacional de Ingeniería* (National Engineering University - UNI); *Universidad Nacional Mayor de San Marcos* (UNMSM); *Universidad del Callao*; *Universidad Nacional del Santa*, *Universidad Peruana de Ciencias Aplicadas* (UPC) and *Universidad ESAN*.

In terms of multilateral entities, it is worth mentioning the following:

- IFC has a Sustainable Energy Finance program that seeks to increase access to financing for sustainable energy projects, including renewable energy and energy efficiency. The focus of the work is helping financial institutions build a portfolio of sustainable energy.
- The Inter-American Development Bank (IDB) is supporting a project with FONAM to promote the use of clean technologies and energy efficiency in small and medium enterprises (SMEs).
- CAF has created the Special Financing Program for Clean, Alternative Energy and Energy Efficiency Projects (PROPEL) to try to address problems of access to long-term financing currently faced by small and medium-scale energy projects.

Energy efficiency Market Barriers

- Low energy prices, which do not encourage the efficient use of energy: Electricity tariffs in Peru are slightly below the average in Latin America, providing less incentive for energy efficiency, or the conversion of single-cycle gas or diesel plants to combined-cycle plants. Furthermore, the current low price for natural gas further erodes incentives for energy savings.

- Insufficient local capacity to develop energy efficiency projects: From 1995 to 2002, the “Energy Saving Information Campaign” raised awareness regarding energy saving and its impact on the environment. Increased awareness as to the effects of climate change over the last decade, including more media coverage, has helped increase understanding among the population about the importance of utilizing energy and other resources more efficiently. However, this awareness-raising effort has not been sufficient to achieve radical improvements in energy use, at least in the industrial sector, and additional awareness and training efforts are needed.
- Absence of Energy Services Companies (ESCOs): ESCOs could be an important component of increasing energy efficiency in the economy. They could allow companies to implement large-scale energy efficiency improvements without financing through their own balance sheets. However, the small size of the Peruvian market, the weakness of consulting firms that have tried to transform themselves into ESCOs, and the lack of confidence of banks in lending to the sector have inhibited developments in this area.
- Insufficient interest of commercial banks in funding energy efficiency projects: Although some incipient efforts have been made, in general, financial institutions are still somewhat reluctant to engage in energy efficiency lending, mostly due to lack of information on the subject, concern about the risks, and lack of technical support.
- There are other factors that commonly inhibit the development of energy efficiency projects, that also apply in Peru including:
 - Rational purchasing: Users can be reluctant to invest in efficient machinery and technology because they do not take into account all economic aspects of the purchase, but rather focus on the initial cost and not the potential cost of energy throughout the useful life of the equipment chosen in comparison to a more efficient one. This could be overcome by labeling the equipment and specifying its level of efficiency.
 - Uncertainty and irreversible investments: Investments in energy efficiency savings are often irreversible, since they are not likely to be recovered if they do not turn out to be profitable. Furthermore, there might be uncertainty about the savings that can be verified and the future price of energy. Such uncertainty can be reduced with good energy diagnostics and long-term economic assessments.
 - Savings and energy efficiency measures are often not a priority: Since energy savings and efficiency measures are not usually core activities for most companies, they are normally postponed for actions of greater interest for users to carry out (for example, investing in a new production line).

Specific recommendations for the energy efficiency market

- Promote and disseminate energy efficiency extensively among local energy consumers (in addition to what is already being done by MINEM), through courses, lectures, newsletters, etc. Consider working through industrial associations such as SNI, SNMPE, ACIDE, and their dissemination channels. These activities should remain ongoing.
- Train energy consultants to improve their abilities to prepare economic-financial analyses of energy efficiency measures and make energy diagnostics more “bankable”.
- As suggested by COFIDE, consider creating a guarantee fund for energy efficiency. This could alleviate the costly loan guarantees that banks require to lend for SEF projects.

- Credit lines for energy efficiency projects must consider an energy consulting component external to the banks, in addition to training for their own personnel, so that financial institutions have the necessary technical capacity for the funding provided.

V. Overall Recommendations

The following are recommendations for the development of the sustainable energy finance market in Peru according to stakeholder type:

A. Financial institutions:

Product financing and development: Structure attractive credit lines and financial products with FIs (commercial banks, financing entities, micro financing entities, COFIDE) that are better tailored to clean energy projects.

Training: Strengthen the financial sector' interest in renewable energy and energy efficiency, which should include training of credit executives and officials in identifying opportunities for sustainable energy financing and assessing energy efficiency/renewable energy projects for financing.

Risk administration: To facilitate the assessment of SEF projects, financial institutions could adopt standardized procedures for financing approval, developing an internal management process that facilitates the assessment of such projects with specialized support in technical, environmental and financial aspects.

B. Government entities:

To eliminate administrative barriers which hinder the progress and financing of energy projects , the local authorities (MINEM, ANA, should refine the procedures for obtaining authorizations for temporary and final electric generation concessions to reduce lag times, costs and barriers to entry.

C. Energy consultants and project developers:

In order to improve consultants' and developers' ability to prepare financial analyses of energy efficiency projects to help make them more "bankable", consultants should be trained through economic-financial courses and tools.

