



Use of and access to **renewable energies** in rural territories

Methodological Guide





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**renewable
energies**
in rural territories

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Inter-American Institute for Cooperation on Agriculture (IICA), 2015



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List of acronyms

AG/Dec.	Declaration of the General Assembly of the Organization of American States
AGECC	Advisory Group on Energy and Climate Change (United Nations Secretary General)
CELAC	Community of Latin American and Caribbean States
CR	Costa Rica
ECLAC	Economic Commission for Latin America and the Caribbean
EU	European Union
FAO	United Nations Food and Agriculture Organization
FAR	Fourth Assessment Report (IPCC)
FCCC	Framework Convention on Climate Change
FonTC	Competitive Fund for Technical Cooperation (IICA)
G20	Group of 20 (industrialized and emerging countries)
GCARD	Global Conference on Agricultural Research for Development
GHG	Greenhouse gases
IDB	Inter-American Development Bank
IEA	International Energy Agency
IICA	Inter-American Institute for Cooperation on Agriculture
IPCC	Intergovernmental Panel on Climate Change
MIDIS	Ministry of Development and Social Inclusion (Peru)
MIES	Ministry of Economic and Social Inclusion (Ecuador)
RSB	Roundtable on Sustainable Biomaterials
TAR	Third Assessment Report (IPCC)
USA	United States of America

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Introduction

The purpose of this document is to provide a methodological guide to the collection, systematic organization and dissemination of experiences and lessons learned in relation to the use of and access to renewable energies in the rural territories of the Andean Region, so the information can be used as input for public policies or possible forums or groups for stakeholder engagement in each beneficiary country.

The guide contains a conceptual framework comprised of:

- i. Starting point and definition of concepts
- ii. Methodology
- iii. Survey form
- iv. Eligibility and verification criteria
- v. Path of analysis for validation of the guide

The process begins with the raft of aspirations expressed in different regional and global forums and with the definition of concepts. These are the two key elements used to prepare the eligibility and verification criteria, based on a comprehensive approach to renewable energies.

The aforementioned sets of criteria provide a means to verify that the lessons and experiences about which information is gathered are related to the aspects established in the title of the project of the Competitive Fund for Technical Cooperation. They involve/contribute to:

- Agroindustrial and agricultural activities
- Rural territories
- The generation of conditions of competitiveness
- The mitigation of the effects of climate change

This guide is not an end in itself. It is a tool for compiling an inventory of innovations in renewable energies for the Andean Region. Many other rural territories outside the region could benefit from the findings obtained through the implementation of this guide.

The aim is to continue to improve the guide with regard to “topics that contribute further knowledge of the potential of nonconventional renewable energy sources and facilitate stakeholders’ access to the information, including the implementation of demonstration projects or projects geared to increasing energy efficiency¹.”

In broad terms, the aim in producing this guide was to help “promote the design and implementation of sustainable development strategies, considering the correlations among agriculture, climate change, food security/sovereignty, natural resources management and renewable energy sources².”

1. Summary record of the First Meeting of the Steering Committee of the Energy and Environment Partnership (EEP) with the Andean Region. Lima, 8 March 2011.
2. Regional Andean Priority for Crosscutting Coordination (PRCTr2), defined at the workshop on the Regional Andean Strategy for the Management of Technical Cooperation. Lima, 27-28 September 2011.





1. Starting point for the conceptual framework

At the Fifth Summit of the Americas, the countries recognized that energy was a key resource for improving the living standards of our peoples, and that access to energy was of crucial importance for economic growth with equity and social inclusion. The goals set included the following³:

We will aim to develop cleaner, more affordable and sustainable energy systems, to promote access to energy and energy-efficient technologies and practices in all sectors.

We will aim to diversify our energy matrices by increasing, where appropriate, the contribution of renewable energy sources, and will encourage the cleaner, more efficient use of fossil fuels and other fuels.

On 16 January 2012, in Abu Dhabi, UN Secretary General Ban Ki-moon emphasized that energy was central to everything we do, from powering our economies to achieving the Millennium Development Goals: “it is the golden thread that connects economic growth, increased social equity and preserving the environment.”

Furthermore, in its resolution 67/215 the United Nations General Assembly declared 2014-2024 the Decade of Sustainable Energy for All. In the same resolution, it called upon all Member States to galvanize efforts to make universal access to sustainable modern energy services a priority, along with the use of renewable energy and the implementation of energy efficiency projects⁴.

In her statement as part of the Lecture Series of the Americas of the Organization of American States, given in Washington D.C. on 13 May 2011, Christiana Figueres, Executive Secretary of the United Nations Framework Convention on Climate Change, affirmed that:

There are clear dangers inherent in ignoring mitigation opportunities in the energy sector. If opportunities for renewables are not explored and supported, developing countries in the Americas will increase the carbon intensity of their fossil-fuel based power generation capacity, as they rapidly build up infrastructure.

At their meeting in Paris from 22-23 June 2011, the ministers of agriculture of the G20 countries reached agreement on the Action Plan on Food Price Volatility and Agriculture, in which they established the following international policy for coordination:

³ *Fifth Summit of the Americas. Declaration of Commitment of Port of Spain. “Securing our citizens’ future by promoting human prosperity, energy security and environmental sustainability.” Port of Spain, Trinidad and Tobago. 19 April 2009. Download link: http://www.summit-americas.org/V_Summit/decl_comm_pos_en.pdf*

⁴ *Resolution adopted by the General Assembly of United Nations 67/215. Promotion of new and renewable sources of energy <http://www.se4all.org/wp-content/uploads/2013/10/GA-resolution-A-67-215-SE4ALL-DECADE.pdf>*

41. We will continue to address the challenges and opportunities posed by biofuels, in view of the world's food security, energy and sustainable development needs... We also recognize the importance of research and development on biofuels, including those produced through new processes or new feedstocks, non-food feedstocks and other vegetal materials, and on energy efficiency.

During the meeting of the Inter-American Board of Agriculture held in October 2011, the ministers and secretaries of agriculture of the Americas committed to:

25. Stimulating innovation in different types of agroenergy that contribute to the diversification of the energy matrix and the reduction of negative environmental impacts.

At their meeting in Los Cabos, from 18-19 June 2012, the G20 Leaders adopted a declaration in which they committed to achieve long-term prosperity by means of inclusive, green growth that would:

... promote low-carbon development strategies in order to optimize the potential for green growth and ensure sustainable development in our countries and beyond. We therefore welcome the report on clean energy and energy-efficient technologies and acknowledge the G20 countries' efforts to foster investment in these technologies through the sharing of national experiences regarding challenges for technology deployment.

The Final Document of the United Nations Conference on Sustainable Development contains the Declaration of Rio+20, "The Future We Want"⁵, in which energy is considered one of the thematic areas and intersectoral issues included under the framework for action and follow-up of the sustainable development strategies.

The countries recognized that access to energy services was indispensable for sustainable development. Accordingly, they called for support for the implementation of policies, strategies and initiatives aimed at improving energy efficiency, increasing the share of renewable energy and using cleaner, energy-efficient technologies, among other important elements for sustainable development, including addressing climate change.

The Declaration of the Initiative of the Summits of Latin America and the Caribbean - European Union (CELAC–EU) of January 2013 established that⁶:

⁵ Agenda item 10 of the final document of the Conference, Rio de Janeiro (Brazil), 22 June 2012. A/CONF.216/L.1 27 12-38167.

⁶ COUNCIL OF THE EUROPEAN UNION. Santiago de Chile, 27 January 2013 5747/13. Presse 31, Santiago Declaration. Council of the European Union. Santiago de Chile, 27 January 2013 5747/13. The download link for the official version in English is: http://eeas.europa.eu/la/summits/docs/2013_santiago_summit_declaration_en.pdf.

44. We support productive investments that increase participation and sustained growth of renewable energy sources in national and regional energy grids, in accordance with each country's development views and policies, needs, conditions and resources, as well as investments that provide technology transfer and improve energy efficiency and energy savings.

The document prepared by the thematic group of the Regional Process for the Americas (RPA) for the 6th World Water Forum (6th WWF), held in March 2012 in the city of Marseille, France, included the following observation with regard to the harmonization of water and energy:

In affecting the availability of water, climate change has an impact on water uses—including energy generation, agriculture, industry and domestic supplies—and, through them, on society as a whole.

In recent years, there has been growing interest in the complex connections between energy and water, usually referred to as the energy-water nexus. During most of the 20th century, these two vital resources were managed separately, with different tools, institutions and objectives. However, there are very important links between water and energy, and in the long run the sustainable use of these resources calls for comprehensive management actions. The energy sector has a big impact on the availability and quality of the water resources of countries in the region, many of which are transboundary resources.

The Declaration of Buenos Aires, launched within the framework of the 13th World Forestry Congress: Forest Development: A Vital Balance, held in Argentina from 18-23 October 2009, contains the following findings and strategic actions:

Sustainable development requires sustainable energy supplies. Forests are an important part of the solution. Bioenergy has two dimensions: home heating and cooking; and commercial energy production. Well-managed forests, both native and planted, will be vital as a sustainable supply of biomass for home use.

Forest biomass is increasingly seen as an alternative feedstock to fossil fuels for commercial energy production. This is a global opportunity, but with significant risks such as increased deforestation, competition with other wood products, and pressures to shift land uses away from food production.

Good governance practices are needed to enable interested parties to participate in decisions on the appropriate balance of forest uses to serve local, regional, and national needs, and more broadly, on the roles of forests in landscapes with agricultural and other land uses.

The strategic actions agreed within the framework of this World Forestry Congress were:

- Develop energy forests within the context of a sustainability framework to minimize the risk of unintended consequences across the forest, agriculture and energy sectors.
- Implement good governance policies for sustainable bioenergy development.
- Develop and improve technologies for more efficient production and diverse use of biomass for energy including second generation technologies.





2. Definitions



Renewable energies

These sources and technologies include solar and wind power, hydropower and mini-hydropower, tidal power, biomass energy (including biofuels) and geothermal energy^{7 and 8}.

Renewable energy is any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use. It is obtained from the continuing or repetitive flows of energy occurring in the natural environment and includes low carbon emission technologies such as solar energy, hydropower, wind, tidal and wave power and ocean thermal energy, and renewable fuels such as biomass⁹.

Agroindustrial and agricultural activities

A concept that encompasses the group of interdependent sectors closely linked to the primary agricultural sector (crops and livestock)¹⁰. These interdependent, interconnected sectors include those linked to agriculture because of the latter's need for inputs, and to the economic activities based on primary sources in rural areas and primary agriculture. For example, the food processing industry, the garment industry (which depends on cotton), and the furniture and paper industries, which depend on timber.

Agriculture is not an isolated sector but it is interrelated with other sectors and contributes to growth through the absorption of (mainly unskilled and rural) labor; the generation of foreign exchange; the use and conservation of natural resources; the generation of investment capital; and strong linkages, for example with commerce and financial services, transportation and storage, among others.

Rural territory

Regarded as a social and historical product—which gives it a unique social fabric—endowed with a specific base of natural resources, certain forms of production, consumption and exchange, and a network of institutions and forms of organization that give cohesiveness to the other elements.

7 *International Conference for Renewable Energies. Bonn, Germany, in June 2004. Download link: http://www.renewables2004.de/pdf/conference_report.pdf.*

8 *Declaration of Panama: Energy for Sustainable Development. AG/DEC. 52 (XXXVII-O/07) Approved in the Fourth Plenary Session, held on 5 June 2007, of the Thirty-seventh Regular Session of the General Assembly of the OAS. Download link: http://www.summit-americas.org/vp/ag_52_dec_pan_en.pdf.*

9 *IPCC 2011: Special report on renewable energy sources and climate change mitigation. Report of Working Group III of the Intergovernmental Group of Experts on Climate Change (IPCC). Box SPM.1 Renewable energy sources and technologies considered in this report. Download link: https://www.ipcc.ch/pdf/special-reports/srren/SRREN_FD_SPM_final.pdf*

10 *Interagency Group on Rural Development - IICA, IDB, ECLAC, IFAD, GTZ, World Bank, USAID. 2003. More than food on the table: agriculture's true contribution to the economy. Download link: <http://repiica.ica.int/docs/B0751i/b0751i.pdf>*

Competitiveness

In the context of this guide, competitiveness is thought of as the dynamic capacity of rural territories to maintain, expand and improve, in a continuous, sustained manner, their use of, and access to, renewable energies through their energy supply systems (electricity generation and distribution, heating and refrigeration networks, gas network, solid and liquid fuel distribution, and autonomous systems), as well as systems for the deployment of energy services to the end user (transport and vehicles, buildings and homes, industry, agriculture, forestry and fisheries)¹¹.

The following are some of the main determining factors for the creation of conditions and the development of competitive advantages:

- The capacity for innovation.
- The use of the renewable energy resources available in situ (endogenous resources).
- The supply of appropriate technology alternatives suited to the local conditions.
- The technological path adopted for renewable energy conversion.
- Continuous access to or supply of energy for smallholders, whose isolation creates difficulties that affect their productivity levels.
- The removal of legal and institutional bottlenecks or barriers to the insertion of renewable energies into the energy matrix of rural territories or communities.

Territorial competitiveness

Concept consisting of four components that combines differently in each territory: social competitiveness, economic competitiveness, environmental competitiveness and global competitiveness (the fourth component will not be considered in this methodological guide)^{12 and 13}.

The human capital and endogenous characteristics of rural territories are conditions that are necessary but insufficient in themselves to create competitive advantages. Agents in rural territories also need to acquire socioeconomic and environmental capabilities.

In the following table, the integrated analysis of the socioeconomic and environmental components shows the set of endogenous factors of a rural territory required for the acquisition of capabilities and the creation of conditions of competitiveness.

¹¹ Based on Rojas, P. and Sepúlveda, S. 1999. *¿Qué es la competitividad?* San Jose, C.R.: IICA, xi, 24 pp.; 28 cm. -- (Technical Notebooks Series / IICA; no. 09. Download link: <http://www.iica.int/Esp/Programas/Territorios/Publicaciones%20Desarrollo%20Rural/CUADERNO%20TECNICO%209.pdf>.

¹² Sepúlveda, S.; Rodríguez, A.; Echeverri, M. (2003). *El enfoque territorial de desarrollo rural*. San Jose, C.R.: IICA, 2003. Download link: <http://www.iica.int/Esp/organizacion/LTGC/DesRural/Publicaciones%20Desarrollo%20Rural/ENFOQUE%20TERRITORIAL%20DRS.pdf>.

¹³ Farrell, Thirion and Soto, 1999. Cited by Rafael Echeverri Perico, Editor. In: *La concurrencia como eje de las políticas de desarrollo rural sustentable en México* / IICA. San José, C.R.: IICA, 2013. Download link: <http://www.iica.int/Esp/regiones/norte/mexico/Publicaciones%20de%20la%20Oficina/LIBROPEC2013.pdf>.

Table 1. Schematic presentation of the acquisition of capabilities and the development of competitive advantages in renewable energies in rural territories

Conditions of competitiveness	Components of rural competitiveness		
	Social competitiveness	Economic competitiveness	Environmental competitiveness
Acquisition of capabilities	Agents' capacity for concerted, joint action	Agents' capacity to produce and maintain maximum value added.	Agents' capacity to appraise their environment, and the conservation and renewal of natural and resources and assets
Potential competitive advantage in renewable energies	Improvement of living conditions in rural territories through access to energy and the creation of healthier spaces and lifestyles	Rural electrification, micro-hydropower plants, solar panels, wind power and other renewable energy sources impact the improvement of the infrastructure and services that underpin the rural economy	Positive impact on the economies and development of rural territories, in tandem with the mitigation of climate change, without compromising access to food or the natural resources platform ^{1/}

Note: 1/ The term “natural resources platform” refers to the elements of biodiversity, surface or ground water (in any of its forms, such as watersheds, lakes, rivers, seas, reservoirs and glaciers), forests, soils and air. None of which could be tapped without scientific and traditional or ancestral knowledge for their corresponding valuation, conservation and sustainable use.

Source: Prepared by the author based on Sepúlveda, S.; Rodríguez, A.; Echeverri, M. (2003). El enfoque territorial de desarrollo rural. San Jose, CR: IICA 2003.

Sustainable development

The concept was described in the Final Document of the United Nations Conference on Sustainable Development as:

... sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion, and promoting the integrated and sustainable management of natural resources and ecosystems that supports, inter alia, economic, social and human development while facilitating ecosystem conservation, regeneration and restoration and resilience in the face of new and emerging challenges¹⁴.

In the same document, energy was considered one of the cross-sectoral issues of the institutional framework for sustainable development and poverty eradication.

14. Based on Rojas, P. and Sepúlveda, S. 1999. *¿Qué es la competitividad?* San Jose, C.R.: IICA, xi, 24 pp.; 28 cm. -- (Technical Notebooks Series / IICA; no. 09. Download link: <http://www.iica.int/Esp/Programas/Territorios/Publicaciones%20Desarrollo%20R>

Renewable energies can contribute to several important objectives of sustainable development, namely:

- Social and economic development
- Access to energy
- Energy security
- Mitigation of climate change and reduction of its impact on environment and health

Principles of sustainable development in rural territories ¹⁵

- (i) Social cohesion. Process aimed at the integration of different social groups. Designed to strengthen the social fabric by means of activities based on the sociocultural dynamics of equity, solidarity, social justice and a sense of belonging and attachment.
- (ii) Territorial cohesion. Integration process aimed at strengthening the cultural, political and social ties among the different groups in a given territory and among territories.
- (iii) Productive and social inclusion. The integration of the inhabitants of a territory into the economic life of the countries by means of the job market and social policies that contribute to both access to income and the key basic services such as education, health, electricity, water and sewage systems, and modern communication, among others¹⁶.

Social inclusion is also achieved by capacity development and the structural inclusion of disadvantaged groups such as rural women, rural youth and indigenous populations.

The deployment of adaptation and mitigation measures that, for example, promote the inclusion of groups vulnerable to climate change, is a way to facilitate inclusive, sustainable rural development.

Furthermore, the economic inclusion of smallholders is achieved by distributing costs and benefits throughout the value chain, providing the local population with adequate working conditions and ensuring that people are able to exercise their human rights and rights of ownership and use.

Other countries have fashioned institutions whose specific task is to implement social inclusion policies. Two Andean Community countries are cases in point: Ecuador, which established the Ministry of Economic and Social Inclusion (MIES) in 2008, and Peru, which created the Ministry of Development and Social Inclusion (MIDIS) in 2011¹⁷.

15. Sepúlveda, Sergio. *Agroenergía e Desenvolvimento de Comunidades Rurais Isoladas* / Carlos Miranda, Breno Tiburcio (organizers); Sergio Sepúlveda... [et. al.] (authors) -- Brasília: IICA, 2008. (Série Desenvolvimento Rural Sustentável; v. 7) Download link: <http://repiuca.iica.int/docs/B0849p/B0849p.pdf>.

16. *Estratégias de inclusão socioprodutiva: VI Fórum Internacional de Desenvolvimento Territorial* / Carlos Miranda e Breno Tiburcio (organizers) -- Brasília: IICA, 2012. (Desenvolvimento Rural Sustentável; v.18). Download link: <http://repiuca.iica.int/docs/B2995P/B2995p.pdf>.

17. ECLAC, FAO, IICA. *The Outlook for Agriculture and Rural Development in the Americas: A Perspective on Latin America and the Caribbean* – Santiago, Chile, FAO, 2012. Download link: <http://www.fao.org/3/a-as167e.pdf>

These initiatives are enabling the countries to move away from temporary poverty alleviation programs and to focus instead on the implementation of intersectoral actions designed to improve the population's access to economic opportunities and quality services. Other LAC nations will undoubtedly replicate them.

Innovation

Priority response to new ways of managing knowledge for the improvement of the prevailing situation, opportunities to establish links with markets, climate change adaptation and the sustainable use of natural resources¹⁸ and ¹⁹.

Innovation is the basis for all sustainable economic growth and development. It is a process whereby new knowledge or a new idea is used successfully for commercial or social purposes. In other words, it is the appropriation by society of something new, new knowledge, technologies and practices, and their utilization by producers and the different actors in the value-added chains.

Innovation has many facets that are not always applied linearly: local experimentation, research and development, education, extension, dissemination, diffusion and training.

The concept of innovation involves a combination of technological, organizational, institutional and environmental aspects:

- (i) Technological: technological paths or processes that have been widely adopted and used because they make it possible to achieve significant increases in productivity and produce economic, social and environmental benefits.
- (ii) Organizational: Development or strengthening of value-added chains that has resulted in effective linkages with the different actors and stakeholders throughout the chain.
- (iii) Institutional: facilitation mechanisms and public-private partnerships that facilitate access to inputs, services or markets, and clear benefits with a long-term impact.
- (iv) Environmental: New forms of water and soil management that have resulted in improvements in the efficiency of the use of natural resources, and in the conservation and management of biodiversity.

18. IICA technical note for GCARD 2012 – *Second Global Conference on Agricultural Research for Development, Prospectiva y Alianzas para la Innovación e Impacto en la Agricultura Familiar*” Download link: http://www.iica.int/Esp/Programas/Innovacion/Documentos%20de%20Tecnologia%20e%20Innovacin/Boletin%20GCARD2_es.pdf.

19. IICA, BID, 2013. *Innovaciones de impacto: lecciones de la agricultura familiar en América Latina y el Caribe* / Editado por Priscila Henríquez; Hugo Li Pun -- San José, C.R. Download link: http://infoagro.net/archivos_Infoagro/Infotec/biblioteca/ES_Innovaciones%20de%20Impacto.pdf.

Climate Change

In the usage of the Intergovernmental Panel on Climate Change (IPCC), climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that contained in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

Mitigation

The Intergovernmental Panel on Climate Change defines mitigation²⁰ as an anthropogenic intervention to reduce the sources of greenhouse gases²¹ or enhance their sinks. For the key energy sector, almost all the scenarios for the stabilization of mitigation and concentration of GHG entail the introduction of efficient technologies for the use and supply of energy, with little or no carbon. The use of sustainably produced timber instead of energy-intensive construction products or biomass instead of fossil fuels constitutes a biological mitigation strategy.

Various options exist for reducing GHG emissions in the energy system. In the Fourth Assessment Report (FAR) of the Intergovernmental Panel on Climate Change (IPCC), the experts evaluated some of these options, such as those related to:

- energy conservation and efficiency
- substitution of fossil fuels
- renewable energies
- carbon dioxide capture and storage

The use of renewable energies is a mitigation option when avoided greenhouse gas emissions exceed the sum of direct and indirect emissions. Technologies, when combined with renewable energy supply options and improvements in energy efficiency, have the potential to reduce GHG emissions.

In April 2014, the Intergovernmental Panel on Climate Change (IPCC) published a summary for policymakers prepared by Working Group III entitled Summary for Policymakers: Mitigation of Climate Change. The summary is subject to the line-by-line approval of the delegates of all the participating governments (approximately 120 countries)²².

20. *Third Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC), prepared by Working Group III: Climate Change 2001: Mitigation. Summary for Policymakers and Technical Summary.* Download link: https://www.ipcc.ch/pdf/special-reports/srren/SRREN_FD_SPM_final.pdf

21. *According to the IPCC's Fourth Assessment Report (FAR), anthropogenic GHG emissions are composed of CO₂ (caused by fossil fuel use, deforestation, decay of biomass and other actions such as change of soil use and savannah burning), methane, nitrous oxide and fluorinated gases.*

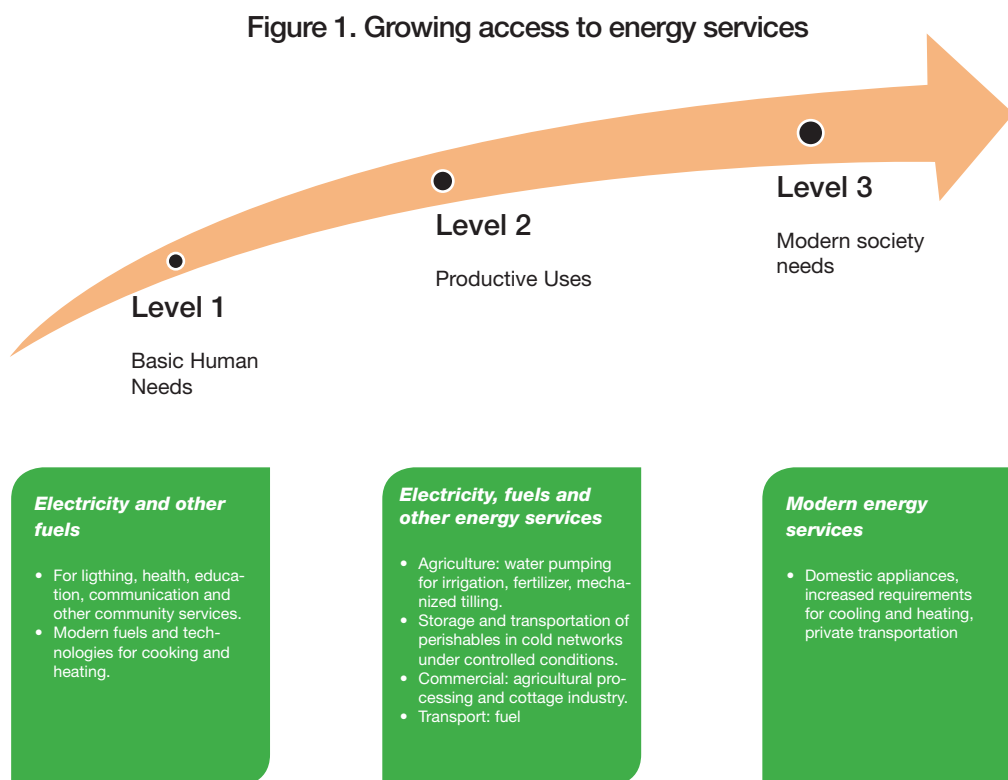
22. *Download link: http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policymakers_approved.pdf.*

However, the key messages concerning agriculture are:

1. The sector composed of agriculture, forestry and other land uses accounts for around 25% of net anthropogenic GHG emissions, mainly from deforestation, agriculture (soil and nutrient management) and livestock.
2. Policies governing agricultural practices and forest conservation and management are more effective when they involve both mitigation and adaptation.
3. Bioenergy can play a critical role in mitigation, but there are various issues to consider, such as the sustainability of practices and the efficiency of bioenergy systems.

Access to energy

People are provided the ability to benefit from affordable, clean and reliable energy services for basic human needs (cooking and heating, lighting, communication, mobility) and productive uses. (see Figure 1).



Source: The Secretary-General's Advisory Group on Energy and Climate Change (AGECC). Energy for to Sustainable Future. Summary Report and Recommendations. 28 April 2010. New York. <http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGECC%20summary%20report%5B1%5D.pdf>

Barriers to access to renewable energy


In the IPCC's Fourth Assessment Report (FAR), a barrier is defined as “any obstacle to reaching a goal, adaptation or mitigation potential that can be overcome or attenuated by a policy, programme or measure.”

In the context of this analysis guide, the following types of barriers to access to renewable energy will be considered:

- (i) Legal, institutional and structural barriers to the insertion of renewable energies into the energy matrix of rural territories, such as:
 - a. The effectiveness of the raft of public policies related to the development of the energy sector, particularly where renewable energy sources are concerned.
 - b. Pricing and regulatory aspects for access to renewable energy when fossil energies are subsidized.
 - c. Logistical aspects involved in supplying nonconventional and renewable energy to isolated rural communities or territories.
 - d. Small scale of the energy consumption market, particularly in isolated rural communities or territories.
 - f. The energy sources available and the structure of the prevailing energy matrix.
 - g. Lack of training programs in renewable energies to enhance the capabilities of decision-makers.

- (ii) Conditions in the environment that make it possible to implement innovative renewable energy projects on a semi-commercial or commercial scale and have a bigger impact on access to renewable energy in rural territories or communities, such as the following:
 - a. International commitments for the reduction of GHG emissions.
 - b. The stability and continuity of long-term energy policies for the sustainable development of renewable energy sources.
 - c. The economic and social situation of the countries, and in particular, the link between annual economic growth and future demand for different types of energy.
 - d. The trend in fossil fuel prices.
 - e. The size of the portfolio of investment possibilities and the country risk.
 - f. The scale of the investment required to expand renewable energy sources.
 - g. Knowledge of energy conversion technologies suited to the region or territory.





3. Conceptual framework of the guide



Energy is a key factor in the global efforts to promote sustainable development. It is the world's biggest industry and the services it provides are an essential element of practically all the goods and services in the global economy.

Box 1: Link between energy and sustainable development

Poverty and growth

Energy inputs such as electricity and fuels are essential to generate jobs, industrial activities, transportation, commerce, micro-enterprises and agriculture outputs. Most staple foods must be processed, conserved and cooked, requiring heat from various fuels.

Education

To attract teachers to rural areas electricity is needed for homes and schools. After-dusk study requires illumination. Many children, especially girls, do not attend primary schools in order to carry wood and water to meet family subsistence needs.

Gender equality and empower women

Lack of access to modern fuels and electricity contributes to gender inequality. Women are responsible for most household cooking and water boiling activities. This takes time away from other productive activities as well as from educational and social participation.

Health

Diseases caused by un-boiled water, and respiratory illness caused by the effects of indoor air pollution from traditional fuels and stoves, directly contribute to infant and child disease and mortality. Women are disproportionately affected by indoor air pollution and water- and food-borne illnesses. Lack of electricity in health clinics, illumination for nighttime deliveries, and the daily drudgery and physical burden of fuel collection and transport all contribute to poor maternal health conditions. Health care facilities, doctors and nurses, all require electricity and the services that it provides to deliver effective health services.

Climate change and environmental sustainability

Energy production, distribution and consumption has many adverse effects on the local, regional and global environment including air pollution, particles emissions, land degradation, acidification of land and water, and climate change.

Source: Steering Committee for the Global Thematic Consultation on Energy and the Post 2015 Development Agenda. The future we want. Framing Paper for the Global Consultation on Energy. <http://www.worldwewant2015.org/file/317334/download/345155>

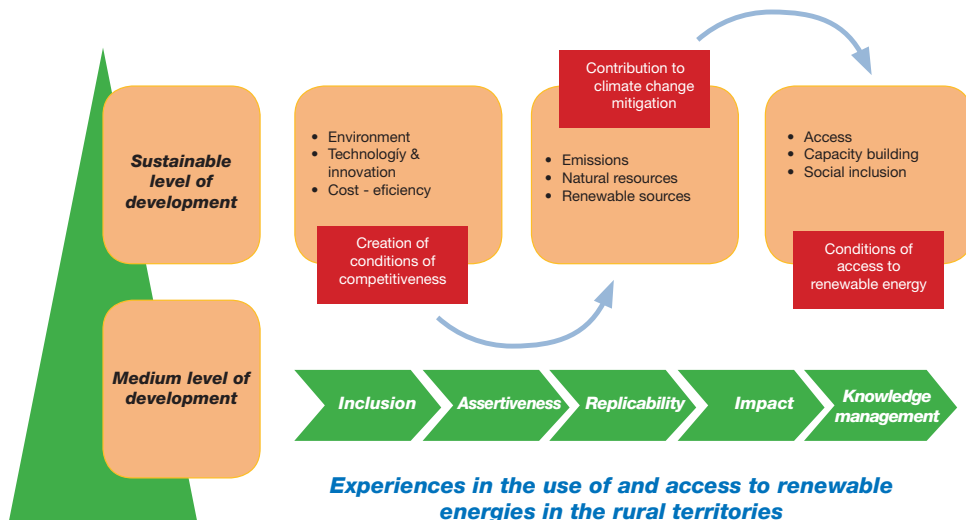
The benefits of renewable energies include an opportunity to contribute to social and economic development, greater access to energy sources, a safe energy supply, the mitigation of climate change and a reduction in the negative impact on environment and health.

This perspective provides the basis for the organized and coherent conceptual framework of this methodological guide, underpinned by the definitions given in the previous section.

Delivering renewable energy services in rural territories makes it possible to achieve a medium level of development in aspects such as inclusion, assertiveness, replicability and knowledge management.

However, it is possible to achieve a sustainable level of development through the adoption of renewable energies, creating conditions of access and competitiveness and contributing to climate change adaptation, among other aspects, as can be seen in the following figure.

Figure 2. Conceptual framework for the guide to the analysis of experiences in the use of and access to renewable energies in the rural territories



Source: Prepared by the author.

Each of the elements that make up the medium and sustainable levels will be expanded with the eligibility and verification criteria, respectively, in accordance with the following sections of this guide.



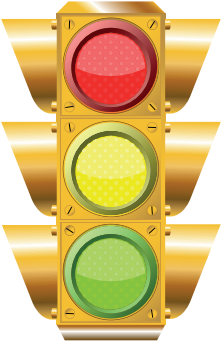


4. Analysis methodology



It consists of a logical sequence of levels of analysis for the characterization, selection, verification and documentation of experiences and lessons learned that will contribute to the scope of the purpose established in the introduction to this document (See Table 2).

Table 2. Methodological scheme of analysis of the experiences and lessons learned in the use of and access to renewable energies.

Level of analysis	Methodological stage	Situation of the experience or lesson learned
	I. Start of characterization process	Characterized
	II. Eligibility criteria	Selected
	III. Verification criteria	Confirmed
	IV. Tabulation of the information and preparation of report	Documented

Source: Prepared by the author.

At the first level (I), consideration is given to the potential cases of renewable energies that could be characterized by means of a survey form designed to capture information about the profile of the experience or lesson learned.

The next level (II) involves an analysis of the eligibility of each case, the application of a grid or matrix of criteria to establish the quality of the experience to be subjected to the next levels of analysis. Based on the starting point and the conceptual framework of this document, a total of five eligibility criteria have been designed.

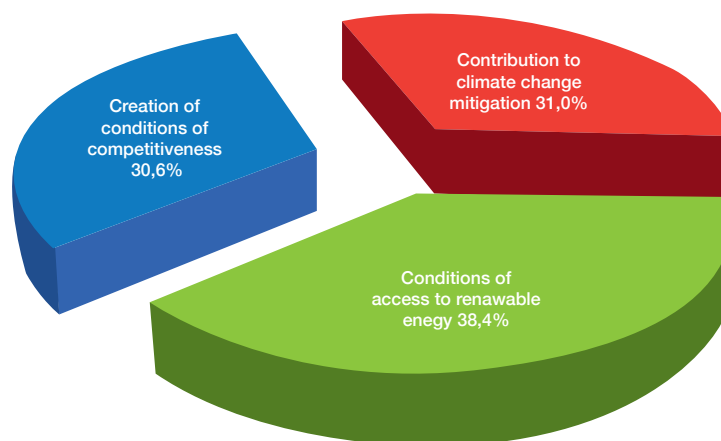
The experience or lesson learned is rated for eligibility (totally meets criteria, partially meets criteria or does not meet criteria). If it fails to meet any of the criteria, the process of analysis is aborted.

If the previous level of analysis (II) is successful, the process continues to level III, which entails the verification of a total of nine criteria that correspond to a comprehensive approach to sustainable development with regard to:

- Creation of conditions of competitiveness (3)
- Contribution to climate change mitigation (3)
- Conditions of access to renewable energy (3)

The above verification criteria are weighted to give a profile of the experience or lesson learned that will be included in the final report.

Figure 3. Consideration of verification criteria



Note: Weighting of criteria obtained from the survey of public policymakers and renewable energy entrepreneurs in the Andean Region, and IICA staff stationed in the region involved in the environment, energy and agriculture sectors.

Source: Prepared by the author.

The analysis level (IV) of this methodological guide includes the systematization of each experience or lesson learned for presentation in a final report, with the content structured as follows²³:


- Descriptive title
- Origin of the experience
- Description of the experience
- Amount invested and results
- Participating entities
- Principal contacts
- Sources of information

A synthesis of the experiences selected and verified is included in a final report. The experiences are set out in a table and linked to the set of verification criteria elaborated and weighted in this guide.


The report also provides information in the form of figures and graphs.

²³ IICA, 2009. *Experiencias exitosas nacionales para el mejoramiento de la agricultura y la vida rural / IICA,-- San José, C.R.:* Download link: <http://www.iica.int/Esp/organizacion/DORI/horizontal/Publicaciones%20Cooperacion%20Horizontal/Catalogo%20de%20Experiencias%20Exitosas%202009.pdf>.





5. Survey form and eligibility criteria



**FORM FOR THE CHARACTERIZATION OF EXPERIENCES AND LESSONS LEARNED
IN THE USE OF AND ACCESS TO RENEWABLE ENERGIES. ANDEAN REGION**

1. BASIC INFORMATION FROM THE REPORTING INSTITUTION OR ORGANIZATION

1.1. Name of the institution or organization: _____

1.2. Web page (if applicable): _____

1.3. City or municipal district where it has its headquarters: _____

1.4. Department/Province: _____

1.5. Country: _____

1.6. Type of organization or institution:

Government Academic International Agency NGO Foundation

Other Specify _____

1.7. Contact data or focal point of the institution or organization:

1.7.1. Name of the person: _____

1.7.2. Department or office: _____

1.7.3. Phone: _____ Email: _____

2. CHARACTERIZATION OF THE EXPERIENCE OR LESSON LEARNED:

2.1. Renewable energy topic(s):

Solar Wind Hydro²⁴ Bioenergy²⁵ Geothermal

Other Specify _____

2.2. Indicate the geographical coverage and period of execution of the experience or lesson learned

2.3. Describe the strategic objectives of the experience or lesson learned

2.4. List the performance indicators or important results

2.5. Request details of the size of the investment involved (both the amount budgeted and the amount executed)

Amount budgeted (in thousands of USD) _____ (according to official exchange rate)

Probable date of termination of the project _____

Amount executed _____ (according to official exchange rate)

Fecha de corte _____

2.6. Describe briefly the energy conversion technology that was / is being used and the technological

2.7. Verify the following eligibility criteria of the experience or lesson learned

Table 3. Eligibility criteria for experiences or lessons learned with renewable energies in rural territories

No.	Criterion	Totally meets criterion	Partially meets criterion	Does not meet criterion
I.	Inclusion: Development of abilities and skills related to the efficient use of and access to renewable energies with the participation of both the rural communities and the local authorities, in order to align interests, generate synergy and ensure the sustainable management of energy projects.			
II.	Assertiveness: In identifying obstacles and proposing alternatives to improve the conditions of access to renewable energies.			
III.	Replicable: The results obtained make it possible to replicate the experience for other potential beneficiaries.			
IV.	Impact: The experiences have had a: a. <u>Technological impact</u> on the body of knowledge created for the improvement of the conditions of use of and access to renewable energy.			
	b. <u>Socioeconomic impact</u> on the effectiveness, viability and sustainability of a specific energy solution for the improvement of the quality of life of the beneficiaries.			
	c. <u>Environmental impact</u> for the improvement and sustainable use of renewable energy sources, together with their corresponding contribution to the reduction of greenhouse gas (GHG) emissions.			
V.	Knowledge management: Development and harnessing of opportunities for the transfer of technology, skills, experiences and innovations in renewable energies.			
	Total			

INSTRUCTIONS FOR COMPLETING THE FORM FOR THE CHARACTERIZATION OF EXPERIENCES AND LESSONS LEARNED IN THE USE OF AND ACCESS TO RENEWABLE ENERGIES. ANDEAN REGION

OBJECTIVE AND PURPOSE

The purpose of this survey is to identify and select experiences related to the use of and access to renewable energies that could contribute to the knowledge available and the management of international technical cooperation in the rural territories of the Andean Region.

Specifically, the aim is to compile information about technical management models that other initiatives on the subject could draw upon. The ultimate goal is to provide the beneficiary countries with details of experiences in the use of and access to renewable energies that contribute to the creation of conditions of competitiveness and the mitigation of climate change in the rural territories of the Andean Region.

The experiences will be verified using the five eligibility criteria developed for the purpose, to ensure that the initiative is relevant and, insofar as possible, avoid any eligibility bias.

The process of gathering the information does not necessarily call for interviews or personal contact. The data could be garnered from documentation or reports, where available, and entered in the form citing the corresponding source.

The information will be systematized from a national perspective and then scaled up to the regional level. Thus, the emphasis of the experiences and lessons learned will be much more on rural territories rather than individual countries.

The end result could contain references to some successful extra-regional experiences (inventory (+), at no additional cost to the project, if they contribute to the result proposed for the exercise).

For the inventory to be used as input for the stakeholder engagement groups, it should be presented in the form of a report, with the data being tabulated and a publication prepared.

INSTRUCTIONS

1. BASIC INFORMATION

- 1.1 Write in the name of the institution or organization. If it does not fall into any of the categories, select “Other” and explain.
- 1.2, 1.3, 1.4, 1.5 Write in the name of the city or municipal district, department, province and country where it has its headquarters.
- 1.6 Determine and select the type of organization or institution.
- 1.7 Write in the contact data—preferably, the person who would serve as the focal point between the institution or organization and the Office of the Inter-American Institute for Cooperation on Agriculture. .

2. CHARACTERIZATION OF THE EXPERIENCE OR LESSON LEARNED

- 2.1 Mark with an X the type of renewable energy. If none of the options is appropriate, select “Other” and give further details.
- 2.2 Describe the geographical region in detail. In the cases of Peru and Ecuador, highlands, coast and rainforest are the geographical regions recommended. In Colombia, llanos, coast and highlands could be used. In the case of Bolivia, highlands, valleys, the chaco and tropical and Amazon regions would be appropriate. In Venezuela, the Caribbean, Andean, llanos and Amazon region could be used.
- 2.3 Give details of the strategic objectives (request information from the contact person or focal point).
- 2.4 The indicators are qualitative or quantitative variables (or relationships between those variables) designed to measure a result, provide evidence of the achievement of the result, or signal the level of progress made toward the achievement of the result. They should be expressed in terms of quality, quantity and timeliness. The impact analysis may be used, detailing the change(s) generated by the joint effort of the actors in a given rural territory in the conditions of the use of and access to renewable energies.
- 2.5 Establish the amount invested to date and the estimated total amount that will have been invested at the end of the project horizon. The figure should be shown in thousands of USD.
- 2.6 Write up a brief reflection with the contact person or focal point and include it in this section. Present the eligibility criteria separately on a printed sheet and begin by mentioning them one by one. Explain to the contact person or focal point that the eligibility criteria must be met in all cases, inasmuch as they have been established for baseline scenarios involving the use of, and access to, renewable energies. Verify whether the experience or lesson learned dovetails with the description of each criterion.

It is recommended that you express your appreciation to the contact person or focal point.



6. Verification criteria



Table 3. Verification criteria.

#	Criteria for creation of conditions of competitiveness	Totally meets criterion	Partially meets criterion	Does not meet criterion	Observations regarding noteworthy
1	<u>Environment.</u> The initiative or experience in the use of and access to renewable energy is being implemented with the appropriate supporting policies and regulatory frameworks.				
2	<u>Technology and innovation.</u> The initiative or experience is promoting the acquisition of knowledge and supports technology transfer.				
2	<u>Cost-efficiency.</u> The initiative or experience is helping to improve the conditions of competitiveness in industrial and agricultural processes throughout the value chain.				
	Total criteria verified				

Source: Prepared by the author.

Explanatory notes for the criteria for conditions of competitiveness²⁶

Criterion 1. Environment. This refers to the creation of conditions that contribute to the harnessing of opportunities in the rural territories of the countries, through the establishment of a clear vision, national targets, policies, regulations and incentives that link energy to human development, while strengthening the provision of energy services based on renewable sources. Institutional frameworks have to be put in place to ensure transparency and a high degree of predictability as a precondition for attracting private investment and promoting competitiveness and social inclusion. Local and regional governments should also create enabling conditions, building on existing national plans to advance access to renewable energy and promote efficiency, in ways that respond to national circumstances and priorities. Environmental subsidies or externalities in public policies do not distort the opportunity cost of fossil fuels.

Criterion 2. Technology and innovation. Knowledge is acquired through demonstration projects, continuous improvement, learning by experience and efforts to foster partnerships and share information. Transfer occurs when technology is appropriated by society, knowledge is passed on to the beneficiaries and the new developments or changes are translated into responses to the needs of people in rural territories.

Criterion 3. Cost-efficiency. Conditions of cost-efficiency that could improve the relative competitiveness of renewable energies in rural territories are: the use of renewable energy to supply electrical power at peak times at the same cost as the external costs of the conventional energy supply; innovations and the learning curve of technologies that result in an even bigger reduction in cost and enhance the competitiveness of renewable energies; the distribution over a long-term horizon of the capital costs of technological investment in renewable energies; renewable energy technologies that are economically viable because they make it possible to implement smaller autonomous systems and mini-networks in isolated rural areas. In the case of agriculture, it is possible to identify measures that have an impact on efficiency through the conversion of waste to energy, cogeneration systems (heat and energy combined) and efficient irrigation pumps, among other measures. It also refers to improvements in the energy efficiency of business operations and product design; the capture and recycling of waste; improvement of the availability and reliability of energy supplies for productive uses and the delivery of services. Other aspects that could be considered are the reduction of consumption and wasteful energy practices along the value chain, from the production of primary energy through to the use of energy services.

26. Based on The Secretary-General's High-Level Group on Sustainable Energy for All. April 2012. Sustainable energy for all. A Global Action Agenda. Pathways for Concerted Action toward Sustainable Energy for All. United Nations, United Nations Plaza, New York 10017, USA. <http://www.se4all.org/wp-content/uploads/2014/01/SEFA-Action-Agenda-Final.pdf>

**Table 3. Verification criteria.
(continued)**

#	Criteria for conditions of access to renewable energies	Totally meets criterion	Partially meets criterion	Does not meet criterion	Observations regarding noteworthy
4	<u>Access.</u> The initiative or experience provides options for rural territories that contribute to access to and the use of renewable energies.				
5	<u>Capacity building.</u> Development of human and institutional capabilities related to access to and the use of renewable energies in rural territories.				
6	<u>Social inclusion.</u> The service or productive use of the energy is geared to social and economic development.				
	Total criteria verified				

Source: Prepared by the author.

Explanatory notes for the criteria for conditions of access to renewable energies²⁷

Criterion 4. Access. Access to energy services from renewable energy sources and efficient equipment such as stoves and renewable fuels. Access to electricity through off-grid, micro- and mini-grid solutions, including targeted applications for productive uses. The electricity grid is extended and the efficiency of energy generation, transmission, and distribution increased. Increased share of renewables in the fuel supply for transportation, both for passenger vehicles and freight transport. Improved energy efficiency through the proper design, insulation and retrofit of rural dwellings, and incorporation of renewable self-generation options where feasible, together with more energy efficient consumer appliances and equipment, both for rural housing and productive uses in rural territories.

Criterion 5. Capacity building. Refers to efforts to enhance the capabilities of policymakers and the beneficiaries of renewable energy undertakings. Examples of capabilities acquired include the development of operational tools and a technical assistance facility for developing energy access plans and projects; development of new approaches to overcome barriers that have impeded the deployment of sustainable energy services and technologies in the past. Capabilities acquired for the creation of (public and private) partnerships, consortia and other forms of agribusiness organization that help to consolidate energy undertakings and the right conditions for the scale of operation.

Criterion 6. Social inclusion. The use of renewable sources of energy in industrial and agricultural processes is helping to narrow the gap in access to rural/urban energy. Special attention is paid to the needs of the poor and women and it is possible to create links among energy, water, health and food. It reduces the time that women have to devote to chores, cooking and heating, thus permitting them to engage in other productive, educational or social activities. Vulnerable groups in rural territories are benefiting from the deployment of energy services to health and educational facilities.

27. Based on The Secretary-General's High-Level Group on Sustainable Energy for All. April 2012. Sustainable energy for all. A Global Action Agenda. Pathways for Concerted Action toward Sustainable Energy for All. United Nations, United Nations Plaza, New York 10017, USA. <http://www.se4all.org/wp-content/uploads/2014/01/SEFA-Action-Agenda-Final.pdf>

**Table 3. Verification criteria.
(continued)**

#	Criteria for contribution to the mitigation of climate change	Totally meets criterion	Partially meets criterion	Does not meet criterion	Observations regarding noteworthy elements or additional findings
7	<u>Environment</u> . The initiative or experience in the use of and access to renewable energy is being implemented with the appropriate supporting policies and regulatory frameworks.				
8	<u>Natural resources</u> : The initiative or experience prioritizes mitigation of the impact of climate change on water, forest and soil resources.				
9	<u>Renewable sources</u> : The initiative or experience contributes to the increased share of renewable sources as an alternative to the use of fossil energy sources.				
	Total criteria verified				

Source: Prepared by the author.

Explanatory notes for the criteria for conditions of competitiveness ²⁶

Criterion 7. Emissions²⁸: The initiative or experience contributes to a positive greenhouse gas (GHG) emissions balance, thanks to the optimal reduction and offsetting of emissions achieved compared to the fossil energy baseline. A combination of technologies, renewable energy options and improvements in energy efficiency make it possible to reduce GHG emissions. Most bioenergy systems can contribute to climate change mitigation if they replace traditional fossil fuel use and if bioenergy production emissions are kept low. Other mitigation options for the combustion of coal and traditional biomass in rural dwellings include improved cookstove, ventilation and building design, and changes in consumption patterns. Bioenergy (from perennial crops, forest products and biomass residues and waste) and advanced conversion technologies have significant potential to mitigate GHG if resources are sustainably developed and efficient technologies are applied. Most biofuels produced through new processes (also called advanced or next-generation biofuels) can provide GHG mitigation if the effects of land use changes are reduced. The main GHG emission from geothermal operations is CO₂, although it is not created through combustion but emitted from naturally occurring sources. However, improved geothermal power plants are likely to be designed as liquid-phase closed-loop circulation systems, with zero direct emissions. Emissions from electricity generated using renewable energy technologies are, in general, significantly lower than those associated with fossil fuel options.

28. Based on the Intergovernmental Panel on Climate Change (IPCC). 2011. Special report on renewable energy sources and climate change. [edition prepared by O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer, C. von Stechow], Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA. Download link: https://www.ipcc.ch/pdf/special-reports/srren/SRREN_Full_Report.pdf

Criterion 8. Water resources^{29 y 30}: *The initiative promotes sustainable interdependence between water and energy, i.e., the implementation of practices designed to improve the reliability of water and energy supplies by means of mechanisms that create synergy and “seasonal complementarity” between wind power generation, biomass and hydropower, where periods of less rainfall (unfavorable to hydroelectricity) correspond to the harvesting of crops and periods of stronger winds. It is making a major contribution to reducing the intensity of the demand for water and energy efficiency through the generation of wind and solar PV power that requires significantly less water than fossil fuel-based and nuclear power plants – e.g., mini and micro water power facilities that harness small water flows to produce electricity and, preferably, return the flows to source with minimum losses from evaporation or transportation and in an optimum condition. The raw materials for the production of bioenergy obtained, preferably, from rain fed crops or crops that make less intensive use of water, or from harvest waste that could contribute water in the energy conversion process. Other technologies that harness renewable sources and use little or no water to produce energy and have a minimum impact on water quality compared to alternatives that dump large volumes of refrigerated, heated or polluted water into the environment. Concentrating solar power (CSP) and geothermal technologies that require little water, depending on the particular generation technology and of the system of cooling used.*

Forest resources³¹: *Forest biomass in rural territories is seen as an alternative feedstock to fossil fuels for commercial energy production within the context of a sustainability framework, avoiding unintended consequences for the forest sector (such as competition for other wood products), the agriculture sector (for example, pressures to shift land uses away from food production and appropriate soil use and forest resource practices), and the energy sector (such as the use of timber for home heating and cooking and commercial energy production).*

Soil resources³²: *The operations and area covered by the renewable energy experience or initiative avoid impacts on biodiversity, ecosystems and other conservation values; the initiative includes measures for sustainable land use (the long-term stability of the soil and its organic matter), protection of buffer zones and ecological corridors.*

Criterion 9. Renewable sources. *The initiative includes sources and technologies for the use of solar and wind power, hydropower and mini-hydropower, tidal power, biomass energy and geothermal energy. It improves the production and utilization of biomass for energies that include second-generation technologies.*

29. Based on: International Energy Agency (IEA), 2012. *World Energy Outlook 2012. Special Topics: Water for energy*. P. 501 – 513. Download link: http://www.iea.org/publications/freepublications/publication/WEO2012_free.pdf

30. Based on: Americas' Water Agenda: Targets, solutions and the paths to improving water resources management. February 2012. Document prepared for the thematic group of the Regional Process for the Americas (RPA), for the 6th World Water Forum (6th WWF) held in March 2012, in Marseille, France. Download link: http://www.unesco.org/uy/phi/fileadmin/phi/infocus/Agenda_del_Agua_de_las_Americas-1.pdf

31. Based on: *The Declaration of Buenos Aires. Findings and Strategic Actions. XIII World Forestry Congress. Forest Development: A Vital Balance*. Buenos Aires, Argentina. 18-23 October 2009. Download link: <http://www.fao.org/docrep/meeting/019/k8766e.pdf>

32. Based on: Roundtable on Sustainable Biomaterials. *RSB Principles & Criteria for Sustainable Biofuel Production. Version 2.1*. Download link: <http://rsb.org/pdfs/standards/11-03-08%20RSB%20PCs%20Version%202.1.pdf>

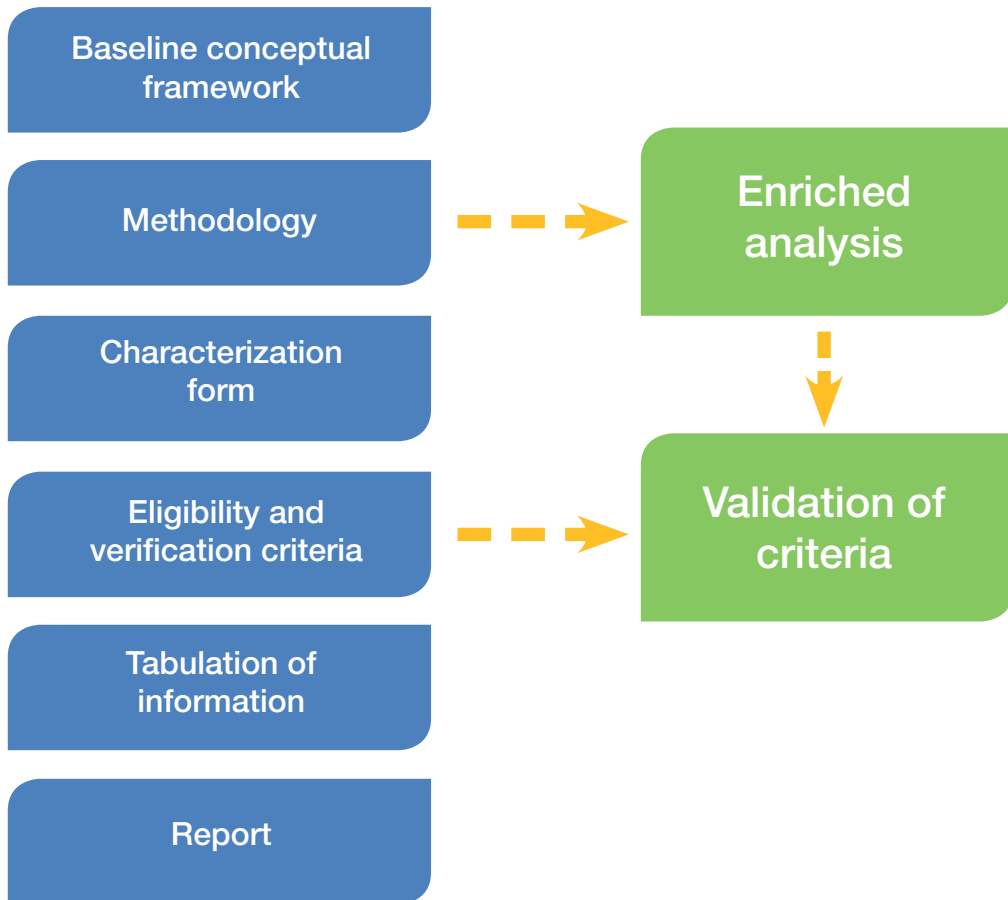
Annex I. Path Analysis

This methodological guide will be subject to validation and contextualization, and its coherence will also be assessed. This will be done by means of a short, simple path analysis designed to improve and enrich the guide with the ideas, knowledge and conceptual positions of qualified experts from the agricultural, energy and environment sectors.

This methodological tool will also be circulated for feedback among the technical team in II-CA's offices and the partners, collaborators and beneficiaries of the Institute's technical cooperation in the Andean Region.

The expected outcome of this consultation is the consolidation of a path for establishing criteria related to competitiveness and the mitigation of climate change based on the experiences and lessons learned in the use of and access to renewable energies in this region.

Figure 4. Path for analyzing the methodology and establishing eligibility and verification criteria for renewable energies.



Source: Prepared by the author.

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