

NICARAGUA

RENEWABLES
READINESS
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EXECUTIVE SUMMARY



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The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

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About the Ministry of Energy and Mines (MEM) of the Republic of Nicaragua

We are an institution that, among other responsibilities, formulates, proposes, coordinates and implements the strategic plan and public policies for the energy sector, geological resources, mineral resources, geothermal resources, hydropower and hydrocarbon resources.

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RENEWABLES READINESS ASSESSMENT, NICARAGUA

Nicaragua has been involved from the very beginning of the formation of the International Renewable Energy Agency (IRENA). In 2013, the Government of Nicaragua asked the IRENA to facilitate a Renewables Readiness Assessment (RRA) in Nicaragua. This evaluation is part of the Sustainable Energy for All Initiative (SE4All) launched by the Secretary-General of the United Nations in 2012.

Nicaragua joined SE4ALL in early 2013. It suggested that the RRA process in Nicaragua should be considered the main planning mechanism for SE4ALL's pillar no. 3 doubling the use of renewable energy in the global energy mix, for which IRENA is the SE4ALL technical hub.

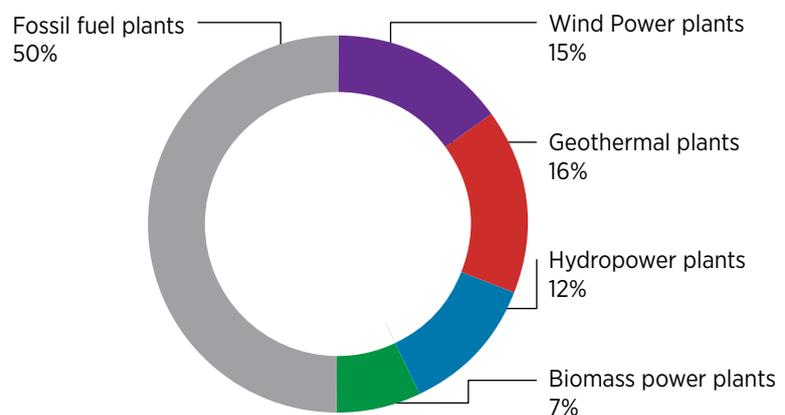
In November 2013, the first RRA Expert Workshop marked the public launch of Nicaragua's RRA along with the SE4ALL Nicaragua Country Action Plan. These have been conducted under the Minister of Energy and Mines of Nicaragua, H. E. Emilio Rappaccioli, and the Vice- Minister of Energy and Mines, H. E. Lorena Lanza.

The event assembled more than 100 players in the renewable energy sector. These included senior representatives of the Inter-American Development Bank (IDB), IRENA, the United Nations Development Program (UNDP), the Central American Integration System (SICA), the World Bank and prominent civil society and energy sector actors in Nicaragua.

Nicaragua's RRA takes place at a key moment in the development of the country's energy sector. Historically, Nicaragua has depended on fossil fuels for electricity generation and transport. Since country is not an oil producer, it has had to put up with high oil imports.

However, renewable sources play an increasingly important role in the Nicaraguan energy sector. They have a current share of nearly 75% of the gross domestic primary energy supply, and about 50% of the total electricity supply, according to the Nicaraguan Energy Institute (INE) (INE, 2014). Nicaragua has set a goal of generating 91% of its electricity from renewable sources by 2027.

Gross electricity production by technology, 2013



Source: INE, 2014

In 2006-2012, Nicaragua attracted total clean energy investment of over USD 1.5 billion (Bloomberg New Energy Finance, 2013), this is the largest such investment per capita in Latin America. The government is also conducting a review of Law 532 for the Promotion of Electricity Generation with Renewable Sources. This means feedback from local policy makers, regulatory and market stakeholders is taken into account. The aim is to devise a joint plan supporting the national strategy of energy diversification and matrix transformation towards more renewables.

However, Nicaragua’s recent successes still do not benefit the entire population because about 1.5 million Nicaraguans still lack access to the national grid and reliable electrical services (SE4ALL, 2013). In this context, Nicaragua aims to further develop the use of all renewable energy sources and tap into its vast unfulfilled potential. The background to this is the substantial socio-economic development benefit, energy independence, respect for the environment and the need to respond to populations living in energy poverty.

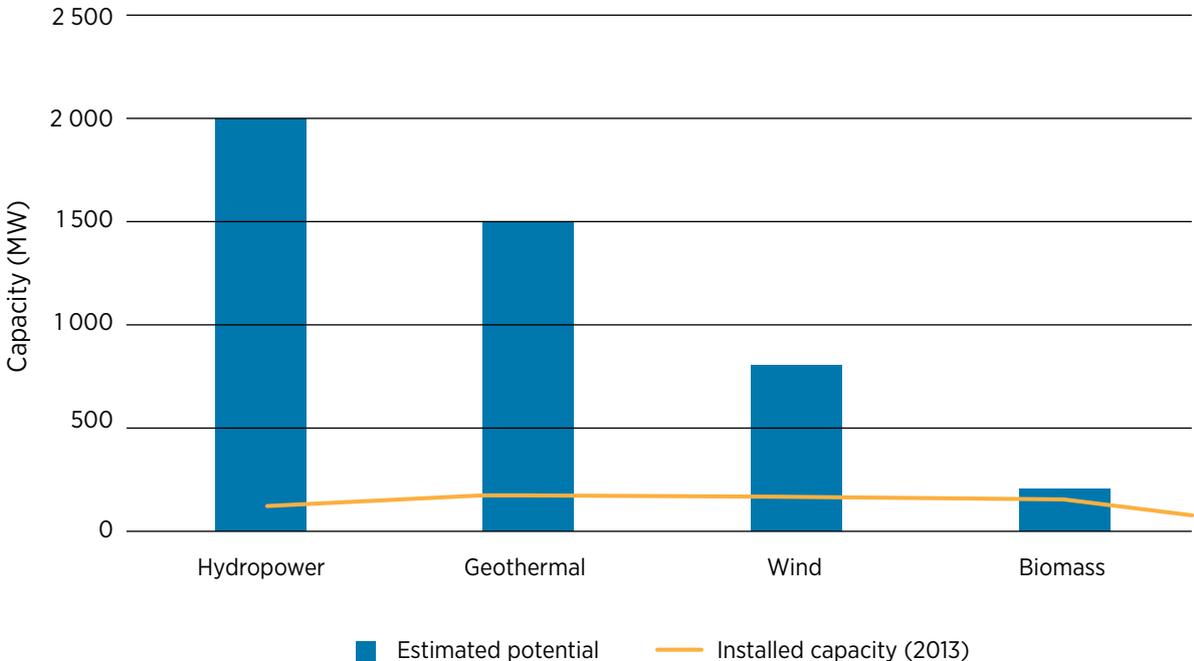
Renewable energy provides a modern, healthy solution for cooking and viable, clean options

for transport. In the power sector, it has been estimated that renewable energy could add 4 500 megawatts (MW) to the country’s capacity - more than three times the current installed capacity - without counting photovoltaic (PV) potential.

PV integration should consider adaptations and improvements to the grid, built at a time of high conventional source use. The grid is now facing a growing share of intermittent renewables energy capacity, and experiencing stability and congestion problems. There is also potential to stimulate distributed generation through regulations and tariff structures that create an enabling environment for small and medium-sized clean energy producers. Distributed renewable energy in remote areas is also a huge unfulfilled market, especially for rural off-grid applications.

The full Nicaragua RRA report provides an introduction to the country, followed by a description of its energy sector, including the electricity subsector. Subsequent chapters describe Nicaragua’s renewable energy potential, current projects and barriers to implementation, and the opportunities to accelerate renewable energy deployment.

Renewable energy potential compared to installed capacity



Source: Hydropower (IECO-LAHMAYER, 1980); Geothermal (CNE, 2010); Wind (SWERA, 2008, Biomass (Bionato,2004); Installed Capacity: INE, 2014

SHORT-TERM (2020) ACTION PLAN

Nicaragua's renewable energy sector has a bright future, both for utility-scale and small-scale projects, due to the country's largely untapped renewable resources. The eight opportunities identified here are the basis for the RRA recommendations presented in the action plan to 2020 to accelerate the deployment of renewable energy in the country.

Opportunity 1: Evolution of the policy framework

In recent years, renewable energy implementation worldwide has experienced major changes as a result of rapidly diminishing renewable energy costs. In Nicaragua, Law 532 will expire in 2015. The legal reform due as a result offers an opportunity to further accelerate cost competitive renewable energy integration into the national system. This will require the private sector to interact with the government. The law's revision may yield regulations, preferential tariffs, project approval rules and tax exemptions in accordance with Nicaragua's national capacities, energy matrix goals and current technological developments.

Opportunity 2: Increased access to modern energy services

Access to electricity, mostly in rural areas, represents opportunities to deploy isolated PV systems. To ensure off-grid solar energy becomes widespread, the public and private sectors must work closely with local communities to include all the design, planning and rural electrification players. This will increase the chances of success. Small hydropower plants are another key alternative for access to modern energy services in isolated areas.

Opportunity 3: Promotion of small hydropower

Nicaragua only has the opportunity to exploit small hydropower potential if adaptations and adjustments are made to a legal and regulatory framework originally designed for large hydropower. Four success factors have been identified. They include an appropriate tariff structure, end user participation, and technical and commercial training on a broad range of topics related to electrical services. Finally, local communities need a stronger sense of ownership and identification with projects.

These adjustments will also give the opportunity to improve the quality of rural power grids. Small hydropower plants depend on medium voltage networks to sell their surplus, so the lack of operational quality of these networks compromises the amount of electricity that can be sold.

Opportunity 4: Training and capacity building

Local availability of a critical mass of qualified people is essential to ensure a smooth transition towards a sustainable energy future increasingly dominated by renewable energy.

MEM therefore decided during the RRA that an initial analysis of the country's skills was necessary. It said it would carry out a Capacity Needs Assessment (CNA) with IRENA to design key actions to strengthen the national human resource.

Opportunity 5: Expanding and strengthening network infrastructure

The expansion of power generation capacity in Nicaragua offers an opportunity for renewable energy deployment. However, it is necessary to expand and develop the network infrastructure. The regional electricity market is fully operating and capacity is available in the regional grid, known as the Central American Electrical Interconnection System (SIEPAC). This means significant energy cost reductions are anticipated as well as greater security and increased system reliability.

The Programa Nacional de Electrificación Sostenible y Energías Renovables (National Programme for Sustainable Electrification and Renewable Energy) (PNESER) project has designed investments in the network infrastructure already under way, especially in rural areas. However, more investment will be needed to meet the generation additions required by growing electricity demand and to reach 100% coverage.

Distributed generation is another opportunity for deploying and integrating the national grid in Nicaragua. Small interconnected renewable systems could help meet growing demand for electricity, reduce transmission and distribution losses, and strengthen system reliability and flexibility.

Opportunity 6: Geothermal energy promotion

In early 2000, the Government of Nicaragua launched a programme to promote the accelerated development of geothermal energy. This required significant support from the private sector. However, due to high risks associated with the geothermal development, the resulting legal dispositions for geothermal resources failed to attract the expected foreign investment.

It would thus be appropriate to continue the reform of Law 443 on the Exploration and Exploitation of Geothermal Resources, and conduct geophysical surveys. These would identify new areas with low enthalpy and assess the possible direct uses of geothermal energy by industry and tourism.

Opportunity 7: Wind power promotion

Wind power capacity in Nicaragua amounts to 183 MW and is entirely located in the department of Rivas, south-eastern Nicaragua. Like other intermittent renewable energy technologies, wind power differs from conventional generation, and its integration into the grid creates challenges.

The network is being strengthened by the SIEPAC and PNER projects, which favour the integration of more wind power capacity.

Opportunity 8: Harnessing biomass potential

Encouraging the more widespread penetration of improved cookstoves and sustainable wood value chains would modernise the sustainable use of biomass sources more quickly in Nicaragua.

This would mean starting large-scale, self-sufficient business programmes for improved cookstoves, and considering viable business models. These feature design, customer identification, financing, marketing, distribution strategy and organisational structure. This would build a firmer structure for biomass use in Nicaragua and provide the population with viable options.



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RECOMMENDED ACTIONS

The table that follows identifies eight recommended actions that can be taken to scale up renewable energy in Nicaragua, as revealed by RRA consultations.

#	Action	Steps
1	Strengthen the legal and regulatory framework of renewable energy	<ul style="list-style-type: none"> • Establish a working group of technical, legal, tariff and tax experts to revise Law 532 and if necessary seek review by international experts analysing and comparing other models. • Propose the amendment of Law 532 stipulating more favourable conditions for wind, solar and biomass at all scales for accelerated deployment. • Specify a regulatory framework for isolated PV and biomass systems which takes regulations, quality standards, control and recycling costs into consideration.
2	Enact a framework for distributed generation	<ul style="list-style-type: none"> • Clarify and streamline the administrative procedures for grid connection. Create more accessible pathways to information. • Undertake technical studies to estimate the present hosting capacity on distribution grids. • Enact the economic and regulatory requirements for distributed generation. These must specify, for instance, system characteristics (size, technology etc.) and purchase/sale tariffs. • Establish the interconnection contract structure. • Conduct feasibility studies.
3	Make preparations for grid operation with high shares of variable renewable energy	<ul style="list-style-type: none"> • Investigate the possible impact of different levels of variable renewable generation on the grid. • On the basis of these studies, update the Indicative Plan for Electricity Generation Expansion 2013-2027 with an increase in the share of renewable sources.
4	Review renewable energy and energy access strategy	<ul style="list-style-type: none"> • In coordination with private actors, finalise PLANER, the 2014-2024 rural electrification plan, and make it available. • Develop an action plan and strategy for universal access to energy services that includes gender issues. • Develop a regulatory framework for off-grid solar PV and biomass technologies that considers quality standards and recycling costs.
5	Update the geothermal master plan	<ul style="list-style-type: none"> • Update the master plan for geothermal development in Nicaragua. • Conduct geophysical studies to identify new areas with lower enthalpy. Conduct an assessment of the direct uses of geothermal energy by industry and tourism.

#	Action	Steps
6	Increase sustainable use of firewood and charcoal	<ul style="list-style-type: none"> • Support the pre-investment and investment projects of the National Programme for Sustainable Energy Use of Wood and Charcoal in Nicaragua 2015-2020
7	Develop the local capacities of Nicaragua's renewable energy workforce	<ul style="list-style-type: none"> • Conduct a Capacity Needs Assessment (CNA) for Nicaragua. • Develop a strategy to strengthen capacity gaps it identifies. • Propose alternative training topics identified in the study. • Raise implementation, monitoring and evaluation funds
8	Biofuels for transport	<ul style="list-style-type: none"> • Support pre-investment and investment projects for formulating the Nicaragua National Programme for Liquid Biofuels for transport 2015-2020.



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