

POLICY BRIEF

SUSTAINABLE ENERGY TOPICS: AN OVERVIEW FROM CENTRAL AMERICA

Sustainable energy issues are highlight on the policy research review carry out at the Economics and Environment for Development Program (EEfD) for Central America region.

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The Economics and Environment for Development Program (EEfD) carry out a review of policy relevant documents and countries initiatives on environment and development topics in Central America. The policy review addresses the issue of sustainable energy from two different perspectives. One approach considers energy in its broad spectrum and as a national sector of relevance, while the other one focuses on the relevance of implementing sustainable energies under a climate change context (EEfD 2016)¹. Despite the difficulty of separating these two perspectives, this brief focus first on energy as an independent sector and the implications it has at national and regional levels while describing the diversification of the energy matrix and electrification of rural areas. Then, we address the relevance of implementing renewable energies under the context of extreme weather events. We conclude the brief with an example of the implementation of EEfD research in Costa Rica.

Diversification of the energy mix

Central America displays large dependency on fossil fuels and fuelwood for energy production (Programa Estado de la Nación, 2011). According to UNEP (2012), 26% of the region's greenhouse gas emissions are CO₂ from energy generation. However, there is a potential and increasing use of "clean energy sources" in the region, mainly based on hydropower (GWP, 2011), which as fivefold between 1970 and 2009 (UNEP, 2012).

The need to diversify the energy mix also comes as a strategy to address climate change (SICA, 2009). Some countries in the region have committed to implement international and regional agendas, seeking for energy efficiency and the development of new and renewable energy sources (UNEP, 2012). However, the highly inefficient use of energy (Programa Estado de la Nación, 2011) and lack of electricity saving (UNEP, 2012) are issues affecting the entire region.

In Costa Rica, 75% of the energy consumption depends on fossil fuels, 60% of which is used in the transportation sector. However, when it comes to the use of energy to produce electricity, the numbers vary. According to GIZ (2015), between 80% and 90% of Costa Rica's electricity comes from renewable sources, well above the Central American average of 53%. Geothermal energy is also a significant source in the country, while wind energy is rapidly growing. In addition, the country's latest development measures plan to provide 97% of the national electricity from renewable sources by 2018.

¹ For example, the diversification of the energy matrix is analyzed as a key component for the reduction of air pollution, but also as an area of concern because of the generation of GHG emissions and its impacts on climate change.

This expansion in the electricity generation from renewable sources is however very dependent on hydropower, which represents a risk for the country because of the vulnerability water resources face under the context of climate change (GIZ, 2015). Therefore, the need to incorporate alternative energy sources becomes crucial (MIDEPLAN, 2015). In this regard, Costa Rican agricultural policies are also including the relevance of this sector in diversifying the energy mix through biomass production (SEPSA, 2015; MAG, 2014; SEPSA, 2014).

Another country interested in diversifying its energy matrix is Nicaragua, which created a national Policy for Energy Infrastructure in 2007. By 2011, the country had already achieved a national record of generating 35% of its electricity from renewable sources (Gobierno de Nicaragua, 2011). Expenditures in this sector are planned to continue, as the National Human Development Plan 2012-2016 has destined USD \$1,719 million to this field (Gobierno de Nicaragua, 2011). In addition, through its “Country Strategy for Nicaragua 2013-2017”, the Central American Bank for Economic Integration (BCIE) plans to spend 21% of its total budget for Nicaragua in energy (BCIE, 2010).

In Honduras, the situation seems more difficult. In 2001, 65% of the country’s energy generation came from fuelwood, which is one of the most GHG emitting sources (República de Honduras, 2001). Therefore, the government elaborated a national Program for Rural Electrification and the program “Solar Towns”, which aim to diversify Honduras’ energy matrix and increase the electricity coverage in rural areas.

Rural electrification

Around 50 and 65 million people live without electricity in Latin America, with electrification rates being below 30% in Honduras and Nicaragua (UNEP, 2012). This topic is thus recurrent in national documents, mainly when concerning poverty reduction strategies and rural populations. In Honduras, for instance, only 20% of the rural population has access to electricity at their places, while in urban areas it amounts 85% (República de Honduras, 2001). This inequity between rural and urban populations has encouraged the creation of the Electrification National Fund, which plans to extend electricity coverage in rural areas through the “Solar Towns” initiative (República de Honduras, 2001).

The government of Guatemala is also following this line of work, as it has been detected that more than half of its poor population, mostly residing in rural areas, lacks of electricity access (Gobierno de la República de Guatemala, 2001). Therefore, the government created the Program for Rural Electrification, which planned to bring electricity to 280,000 people in 2,600 rural communities during the period 2000-2004. Expectations are that access to this public service will improve their quality of life and productivity at work, among other positive repercussions (Gobierno de la República de Guatemala, 2001).

Lastly, Nicaragua is also giving priority to the broadening of rural electricity coverage and energy infrastructure in its poverty policies (Gobierno de Nicaragua, 2011). According to the United Nations Environmental Program (2005), much of Nicaragua’s poverty is due to the lack of access of its inhabitants to basic services, mainly in the energy and health sectors. However, through the implementation of several projects concerning access to drinkable water, dwellings and rural electricity, rural poverty is said to have decreased from 45,8% in 2005 to 42,5% in 2009 (BCIE, 2010). The Nicaraguan government planned to spend USD \$19 million to subsidize the electricity rate in 2012 (Gobierno de Nicaragua, 2011).

Renewable energies under the context of extreme events

Water is the channel through which most effects of climate change are evident. Therefore, although many natural resources and productive sectors are identified as victims of climate change, water resources are probably the most frequently mentioned. The increase in the population, which rises water demand, and the vulnerability of water infrastructure to climate change also put at risk water availability (SICA, 2010). El Salvador, Honduras and Nicaragua are the countries in which water resources will be more harm (Programa Estado de la Nación, 2011).

Public health and the energy sector, mostly because of hydropower generation, will be also affected because of the reduction in water availability due to climate change (IPCC, 2014; SICA, UICN and GWP, 2002). Identified solutions and adaptation measures include the implementation of a regional strategy for integrated management of water resources, such as joint watershed management (SICA, 2010).

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In Costa Rica most energy is generated using hydro-electrical plants, however the fact that energy consumption is lumped in peak hours forces the use of fossil fuel (mostly diesel and bunker) based electricity generation. In this scenario, at any given day there is surplus of renewable energy at off-peak hours, and a heavy reliance on fossil fuels –more expensive and polluting– to be able to meet the consumption in peak hours. The addition of new sources of renewable energy has reached a limit, and so far public policies and energy prices do not promote incentives for a better management of electricity demand.

The project “Improving energy efficiency in Costa Rican households: the effect of pecuniary and non-pecuniary incentives in shaping the timing of consumption” analyzes the role of monetary and non-monetary incentives to reduce overall electricity consumption, and specially to promote a reduction in electricity consumption in peak hours.

The project was implemented in an urban setting of Costa Rica. The analysis focused on household customers of the second largest electricity company (CNFL). This provider has started a pilot project using differentiated tariffs and “hourly meters” to increase energy use efficiency, however there is no systematic impact evaluation of its effectiveness.

Results show that households who voluntarily obtained contracts with “hourly meters” consume more than those who did not request it. This is a major concern in order to be able to measure the impact of the program on the electricity consumption, since there could be a bias of very strong self-selection that prevents comparing the two groups. It is necessary, therefore, to incorporate an experimental or quasi-experimental design to the environmental policies in the electrical sector in order to be able to evaluate the impact of sustainable energy policies.

Future EEfD research related to sustainable energies will be carried out at household level with the purpose of studying the role of implementing efficient technologies and other incentives, in order to mitigate and adapt to climate change. This research is of relevance for the region since it will deal with various energy sources that are highly vulnerable to climate change.

ABOUT THIS BRIEF

This brief is based on EEfD. 2016. *Strategic review on environment and development: towards a national research agenda*. Economics and Environment for Development Research Program (EEfD) - CATIE, ed. Turrialba, Costa Rica; and from the results of the EEfD research project “*Improving energy efficiency in Costa Rican households: the effect of pecuniary and non-pecuniary incentives in shaping the timing of consumption*”.

Types of metering devices:

- i. Basic meter: records total electricity consumption
- ii. Hourly meter: records electricity consumption differentiating by time of day
- iii. Smart meter: measures hourly consumption and reports it live to the power company
- iv. Smart meter with in-house displays: provides feedback on electricity consumption to both the power company and the user

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