

# Energy Efficiency Measures

Subjects: Engineering, Civil

Contributor: Fabiana Silvero

Nowadays, the importance of implementing energy efficiency (EE) measures is growing significantly worldwide, based on its potential to reduce energy demands and mitigate climate change effects.

Keywords: climate change ; energy efficiency ; buildings ; Paraguay ; policies

---

## 1. Introduction

The 20th century sustained increase in energy demand lead to an oil crisis in the 70s resulting in a world which was more concerned with the future depletion of natural resources and with energy diversification processes. Influential factors of energy demand rising will continue progressing (such as population growth, higher comfort requirements, etc.); that, coupled with the mismanagement of natural resources and imminent Climate Change, has forced humanity to consider a new approach to development <sup>[1]</sup> and the concept of sustainable development arisen as “the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs” <sup>[2]</sup>.

At a global level, the biggest challenge is to find a balance point that achieves a sustainable energy future, covering the growing energy demand, taking care of the environment and achieving better living standards simultaneously, considering the right to live in a healthy and pollution-free environment <sup>[3]</sup>. To accomplish this goal, renewable energies were considered. In front of the inefficiency of most industrial/domestic/etc. appliances and the incorrect habits of the population concerning energy consumption, another reliable alternative is Energy Efficiency (EE). This approach refers to producing the same amount of services with a lower energy consumption through the optimisation of production processes and prioritising practices that help to reduce the energy consumption without affecting people’s living standards <sup>[4]</sup>. With the EE promotion and with renewable energy use, many governments have created their EE policies, encouraging energy savings to keep economic growth, achieving an energy intensity decrease. Worldwide, most of the countries are also creating their energy policies prioritising actions aiming climate change effects mitigation. Along with this, the use of clean energy supply technologies and the promotion of energy efficiency is growing significantly <sup>[5][6]</sup>.

The European Union is one of the EE main precursors. To ensure the supply, competitiveness and environmental protection, its energy policymakers strongly promote EE measures and renewable energy production, considered indispensable tools to guarantee the security of energy supply, competitiveness and environmental protection. In Latin American countries, according to Lutz <sup>[7]</sup>, policymakers are still focused on economic and social development, promoting the energy market liberation to attain lower fares and better access to commercial energy. Nonetheless, these countries are developing many actions and programs to change this situation, and it is important to mention that, since the 1970s, the Latin American countries represent around 5% of total energy consumption in a global context.

However, since many countries in the region are developing countries, they have favourable conditions to implement a clean development mechanism, aiming to leverage the economic value of the regional environmental assets, and demonstrating on a worldwide level that sustainable development is a source of opportunities, not representing only costs <sup>[8]</sup>. In this context, it is important to highlight that the decisions of developing countries’ energy policymakers’ will affect future living conditions, impacting the environment, social progress and, obviously, the energy trends <sup>[9]</sup>.

Consistent with Honty et al. <sup>[9]</sup>, there are two ways to face the growing energy demand in the Latin American region: to develop other energy sources or to build a future based on less energy dependence. In the first case, the challenge requires greater investment and technological development (change in the energy matrix), while the second option offers a model oriented towards a change in consumption habits and less intensive energy production. It should be noted that the option of reducing energy dependence, through the demand reduction, represents an important alternative, mainly for developing countries, which have limited financial resources and too many essential sectors to invest in. This option would

contribute to solving the energy sector problems through lower investment costs, assuming that the implementation of EE measures represents lower investment costs than the development of new energy production sources, including the change of the energy matrix or the investment in infrastructure for energy distribution.

In the last years, the energy intensity of Latin American countries and the Caribbean have shown a slight decrease since, as previously mentioned, several EE programs are being implemented in the region, such as programs with different scopes and priority levels, which have attained diverse levels of success. Analysing the region, energy market integration is being developed with the most concrete steps in Southern Common Market (Mercado Común del Sur, MERCOSUR), the main free-trade zone in South America, which includes Argentina, Brazil, Paraguay, Uruguay, Bolivia and Venezuela as states members, including also other associated states <sup>[7]</sup>.

Although the energy reforms promoted by MERCOSUR represent significant advances for the region, the results are diverse among the countries <sup>[8]</sup>. Due to differences in population growth, technology development, economic structure, etc., each country of the region has implemented EE programs with different characteristics and development degrees, according to its own needs and situation. Thus, analysing results and progress levels, Brazil is ranked as advanced, Chile in development and Paraguay at a preliminary stage <sup>[9]</sup>.

## **2. Suggestions to Energy Efficiency Measures in Paraguay**

Nowadays, worldwide, has been left behind the trend of energy abundance and are experiencing a period of restrictions. Certainly, energy is vital for human wellbeing and the development of the world, but it is important to emphasise that the rationalisation in use leads to a better quality of life, greater economic growth and greater competitiveness. Considering this, there is no doubt that energy availability, its cost and its environmental impact should be part of the policies and actions of all country leaders. More specifically, a policy with actions focused on EE can be achieved, using techniques capable of promoting the intelligent use of energy, reducing costs by producing profits and aiming towards sustainable development. For this reason, the challenge for Paraguay is to install an EE culture that integrates different segments of society to achieve significant changes regarding the use of available resources <sup>[10]</sup>.

Paraguay has a not-so-sustainable energy matrix and to reverse this situation the country's policy is mainly focused on widening the use of national clean energy sources, increasing the use of renewable energies and increasing energy efficiency in all economic sectors <sup>[11]</sup>. Achieving this objective requires a well-defined national energy plan coupled with a well-targeted energy transition strategy. Paraguay's National Development Plan from 2014 to 2030 foresees a 20% decrease of fossil fuel consumption with a corresponding increase of renewable energy consumption of 60%. This change could be obtained by the exploitation of sustainable energies like solar, wind, and biomass <sup>[12]</sup>. The Energy Policy Paraguay 2040 could be considered as the basis of the strategic plan, where the objectives were clearly defined. However, a well-structured energy transition roadmap is still required. The concept of energy transition refers to the action of transforming the energy mix to a more sustainable one, giving priority to renewable energy sources <sup>[13]</sup>. A suitable energy transition requires changing the approach of the energy system, whereby more integrated and smarter energy systems must be created, capable of balancing and managing the changing behaviour of the energy supply and demand. As a starting point, a safe, resilient, clean and sustainable energy system must be able to minimise the energy demand, diversify energy sources, provide affordability and offer different choices to consumers <sup>[14]</sup>. As exploited by Sauer et al. <sup>[15]</sup>, sustainable electric mobility could represent a keystone in the Paraguayan sustainable development, leading the Country to be a leading worldwide actor in this field. After reviewing two guidelines and analysing the most suitable and profitable energy transition roadmaps, the following key factors can be considered as cornerstones to initiate a process of energy transition <sup>[14][16]</sup>:

- Developing reliable regulatory frameworks that lead the roadmap clearly and strongly;
- Raising awareness of consumers and businesses about the need to change the energy model;
- Involving consumers and businesses in the new energy model to achieve change in consumption habits;
- Allowing consumers and businesses to benefit from the market opportunities created, e.g., offering discounts on municipal taxes for companies working for the energy transition or people who participate in projects promoting it;
- Supporting and promoting professional training, since the transition process requires qualified technicians to evaluate the efficiency of the process.

One cannot consider energy transition without considering energy efficiency since the efficient use of energy represents the second pillar of the energy transition, where the first pillar is the expansion of renewables. To create a suitable and profitable energy transition pathway, a developing country and emerging economy as Paraguay must consider that this process involves all levels of government, the businesses and the entire population. Additionally, the energy transition is a process which requires a precise and clear roadmap, with a holistic overview, identifying key projects, setting monitoring campaigns and especially, requiring good cooperation among all involved parts <sup>[17]</sup>. Along with this, the same approach is necessary to improve energy efficiency levels, since it also requires an interaction between multiple actors that generate multiple actions at multiple levels <sup>[18]</sup>.

In summary, the progress made by Paraguay regarding EE is not yet very tangible; however, it should be noted that at least there is already a tendency to raise awareness regarding the importance of the efficient use of available energy resources. Nevertheless, it is important to emphasise that decisive political actions are required to accomplish all the proposed objectives and to reach significant results. To this purpose, coherent institutional governance is required, which must be characterised by a high technical capacity, with committed and motivated human capital and having the tools to intervene and enforce policies and regulations <sup>[19]</sup>. It is worth noting that energy efficiency, besides being a key factor for the energy transition pathway, increases energy security, helps save money to all people involved (consumers, businesses) and is environmentally friendly.

Through the analysis of Paraguay's energy policies, it was verified that the EE is part of the public policies of the country and since the creation of the CNEE, the programs and projects in this area have been intensified. However, six years after the creation of this committee, the progress achieved is neither tangible nor numerous, but they represent the first steps. It is important to mention that since the publication of the Energy Policy Paraguay 2040, the country has shown interest in energy sustainability, and despite having a large gross domestic supply of electricity, it is concerned about future energy scenarios. However, according to the regulatory functions influencing energy efficiency developed in <sup>[20]</sup>, Paraguay has just made the first step in public policy, and it is still required to develop regulatory functions (set performance standards and monitor them, perform management audits, develop human resources, etc.) and the utility programs (offer customer incentives such as subsidies or tax advantages, etc.) For this reason, it is important that, from now on, the government sets priorities and can define local financial funds for this sector to work reliably on the proposed actions. Thus, the country will be able to overcome the barriers and to accomplish the objectives set.

---

## References

1. Vicente, J. Eficiencia Energetica Parte 1: Antecedentes Historicos; Espacio mas abierto: Alicante, Spain, 2014.
2. World Commission on Environment and Development. Towards Sustainable Development. In Our Common Future: Report of the World Commission on Environment and Development; United Nations, Oxford University Press: New York, NY, USA, 1987; p. 247.
3. Ruiz, A. Cuarto Diálogo Parlamentario Europa-América Latina Para El Desarrollo Sustentable Del Sector Energético, L C/L. 1677; Naciones Unidas, Comisión Económica para América Latina y el Caribe (CEPAL): Santiago de Chile, Chile, 2001.
4. Patterson, M.G. What Is Energy Efficiency? Concepts, Indicators and Methodological Issues. *Energy Policy* 1996, 24, 377–390.
5. Bazilian, M.; Outhred, H.; Miller, A.; Kimble, M. Opinion: An Energy Policy Approach to Climate Change. *Energy Sustain. Dev.* 2010, 14, 253–255.
6. Corporacion Andina de Fomento (CAF). Energía: Una Visión Sobre Los Retos y Oportunidades En America Latina y El Caribe; Informe energetico sectorial. Serie hacia una nueva agenda energética para la región; Corporacion Andina de Fomento (CAF): Caracas, Venezuela, 2013; Available online: <http://scioteca.caf.com/handle/123456789/605> (accessed on 26 October 2017).
7. Lutz, W. Reformas Del Sector Energético, Desafíos Regulatorios y Desarrollo Sustentable En Europa y América Latina, LC/L.1563-; Naciones Unidas, Comisión Económica para América Latina y el Caribe (CEPAL): Santiago de Chile, Chile, 2001.
8. Geller, H.; Schaeffer, R.; Szklo, A.; Tolmasquim, M. Policies for Advancing Energy Efficiency and Renewable Energy Use in Brazil. *Energy Policy* 2004, 32, 1437–1450.
9. Honty, G.; Lobato, V.; Mattos, J. Energía 2025-Escenarios Energeticos Para El Mercosur; Coscoroba Ediciones: Montevideo, Uruguay, 2005.
10. Espinola, E. Avances de La Eficiencia Energetica En La Republica Del Paraguay. *Mundo Electr.* 2014, 97, 86–89.

11. Vice Ministerio de Minas y Energia (VMME). Eficiencia Energética En El Paraguay Condiciones Para El Desarrollo de Una Matriz Energetica Sustentable; Hannover Messe: Hannover, Germany, 2012.
12. Santos, T.; Sabbatella, I. Energy (and Climate) Challenges in South America: What Planning for What Transition. In The Regulation and Policy of Latin American Energy; Elsevier: San Diego, CA, USA, 2020.
13. Fundación para el Análisis y los Estudios Sociales (FAES). Claves de Éxito de La Transición Energética. Papeles FAE S No. 208 (7-03-2018); FAES: Madrid, Spain, 2018; pp. 1–52.
14. Partnership on Energy Transition. Energy Transition—Orientation paper; Urban Agenda for the EU: Tallin, Estonia, October 2017.
15. Sauer, I.L.; Escobar, J.F.; Da Silva, M.F.P.; Meza, C.G.; Centurion, C.; Goldemberg, J.J. Bolivia and Paraguay: A Beacon for Sustainable Electric Mobility? *Renew. Sustain. Energy Rev.* 2015, 51, 910–925.
16. Associació Pacte Industrial de la Regió Metropolitana de Barcelona. Guia de Iniciatives Locals Hacia La Transición Energetica En Los Poligonos Industriales; Cuaderno 1; Associació Pacte Industrial de la Regió Metropolitana de Barcelona: Barcelona, Spain, 2016.
17. Federal Ministry for Economic Affairs and Energy. Making a Success of the Energy Transition; PRpetuum GmbH, Ed.; Federal Ministry for Economic Affairs and Energy [BMWi]: Berlin, Germany, 2015.
18. Federal Ministry for Economic Affairs and Energy. Making a Success of the Energy Transition; PRpetuum GmbH, Ed.; Federal Ministry for Economic Affairs and Energy [BMWi]: Berlin, Germany, 2015.
19. Delina, L.L. Coherence in Energy Efficiency Governance. *Energy Sustain. Dev.* 2012, 16, 493–499.
20. Berg, S.V. Energy Efficiency in Developing Countries: Roles for Sector Regulators. *Energy Sustain. Dev.* 2015, 29, 72–79.

---

Retrieved from <https://encyclopedia.pub/entry/history/show/8208>