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Proposed business plan for energy efficiency in Brazil

Lilian Silva De Oliveira*, Rafael Amaral Shayani, Marco Aurelio Gonçalves De Oliveira

Universidade de Brasília (UnB), Campus Universitário Darcy Ribeiro, Brasília (DF), Brazil

HIGHLIGHTS

- Brazil's successful efficiency program was presented, including the government's goal to increase the savings 25 times until 2030.
- To achieve this huge goal, the national energy efficiency program needs a new approach, including new institutional arrangements.
- These arrangements proposals are the useful contribution from this paper.

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ABSTRACT

The Brazilian Ministry of Mines and Energy published the National Energy and Efficiency Plan, which calls for electricity savings of 10% by 2030. At first sight, the projected goal does not seem too ambitious, but this figure is nearly eighteen times the known historical savings for the country. Adjustments need to be made to the current energy efficiency business plan. This article suggests what should be changed in order to make the program more attractive and effective. These include changes on its organizational structure, legislation, verification of results and transparency. The new plan aims to eliminate some existing barriers and introduce new mechanisms that should help the country meet its future goals.

1. Introduction

In 2011, the Brazilian Ministry of Mines and Energy (MME) published the National Energy Efficiency Plan that calls for 10% energy savings by 2030. At first sight, the projected goal does not seem too ambitious. In fact, reductions of up to 25% are usually obtained, especially in sectors or installations where Energy Efficiency Program (EEPs) have not yet been established (PROCEL Edifica, 2009).

Successful voluntary EEPs have been introduced in Brazil since the launching of National Electrical Energy Conservation Program (PROCEL), over 25 years ago. The government invested nearly US $633.44 million in energy efficiency actions, saving nearly 37.47 TWh of energy (Table 1). The reduction in peak demand, 11.655 MW, is proportional to US$15.1 billion or equivalent to a 9270 MW power plant (PROCEL Edifica, 2009; Plano Nacional de Energia, 2030).

As shown in Table 1, in 2009 the Brazilian electric consumption reached 443 TWh and the amount of energy saved that year was 5.47 TWh. For 2030, the MME projects consumption is expected to reach 1025 TWh, with a 10% energy efficiency goal (102.5 TWh/year). The current goal is eighteen times larger than the historical values saved until now (Fig. 1), what turns it into a rather ambitious goal. Adjustments need to be made to the current Brazilian energy efficiency business plan to meet this challenge, which include changes in legislation, oversight, result measurement and verification, and more transparency.

In this paper, the Brazilian electric sector is reviewed and changes to its structure are suggested while addressing the following questions: How can Brazil effectively attain its 10% energy savings goal? What policies and tools are currently available? What organizational (institutional) changes are needed to meet this challenge?

Abbreviations: ABNT, Brazilian Association of Technical Norms; ANEEL, Brazilian Electricity Regulatory Agency; BNDES, National Bank for Economic and Social Development; CFL, Compact Fluorescent Lamp; CICE, Energy Conservation Intern Commission; CNPq, National Council of Technological and Scientific Development; CONAE, National Energy Conservation Commission; DDE, Department of Energy Development; DEDE, Department of Alternative Energy Development and Efficiency; DT, Technology Department; DTD, Department of Energy Efficiency Development; DTP, Department of Energy Efficiency Projects; EEP, Energy Efficiency Program; ELETROBRÁS, Brazilian State Electric Energy Company; Encon Fund, Energy Conservation Promotion Fund; EPPO, Energy Policy and Planning Office; ESCO, Energy Service Company; EWT, Economy Working Team; GEF, Global Environment Facility; GERE, Executive Group for the Rational Production and Use of Energy; IEEFP, International Energy Efficiency Financing Protocol; INMETRO, National Institute of Metrology; IPI, Industrialized Product Tax; MIT, Three-phase Induction Motor; MME, Ministry of Mines and Energy; LFI, Regional and Local Financial Institutions; PROCEL, National Electrical Energy Conservation Program; PROESCO, Energetic Efficiency Project Support Program; RAC, Regulatory Affairs Committee; R&D, Research and Development; SENER, Mexican Ministry of Energy.

* Corresponding author. Tel.: +55 34 3261 1227.
E-mail address: lilians@unb.br (L.S. De Oliveira).

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Table 1
Energy Efficiency in Brazil from 1986 to 2009: investments and savings.
Source: References PROCEL Edifica (2009) and Plano Nacional de Energia (2030).

Year	Investment disbursements [[a]US$ million]	Total consumption [TWh]	Avoided investment [[a]US$ million]	Peak demand reduction [MW]	Energy saved	
					[TWh]	[% of total consumption]
1986–1999	298.08	3507	1809.96	2719.00	9.00	0.26
2000	14.71	332	1131.22	552.00	2.30	0.69
2001	16.97	310	1187.78	600.00	2.50	0.81
2002	23.76	324	735.29	309.00	1.30	0.40
2003	23.19	360	1131.22	453.00	1.30	0.36
2004	53.17	375	1404.03	622.00	2.40	0.64
2005	55.43	390	1018.10	585.00	2.20	0.56
2006	63.91	412	1244.34	772.00	2.80	0.68
2007	29.98	428	1583.71	1357.00	3.90	0.91
2008	17.53	426	1644.23	1588.00	4.30	1.01
2009	36.71	443	2213.56	2098.00	5.47	1.23
Total	**633.44**	**7307**	**15,103.44**	**11,655.00**	**37.47**	**0.51**

[a] US$1.00=R$1.77 on 10/03/2010.

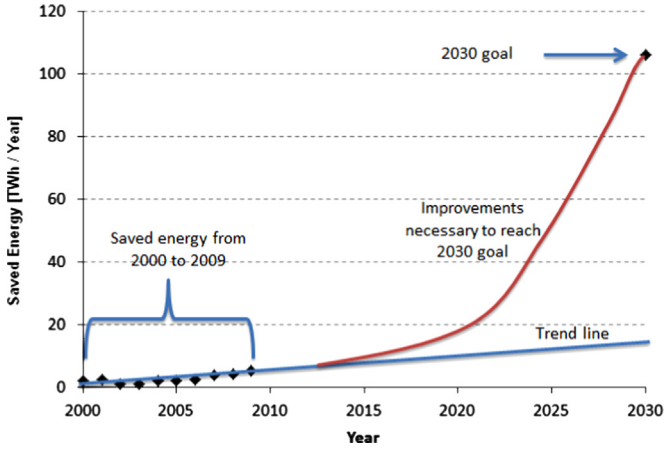

Fig. 1. Comparison with the trend line of saved energy and the goal for 2030 (PROCEL Edifica, 2009; Plano Nacional de Energia, 2030).

Energy efficiency actions introduced in other countries are discussed, with a focus on program funding and the obstacles to their execution. The implementation of pilot projects in Mexico and Thailand is presented. Then, a detailed analysis of energy efficiency in Brazil is performed, with focus on its operational structure, characteristics, shortcomings, access to funding, regulation and verification of results.

2. Energy efficiency—international context

2.1. International energy efficiency financing protocols

Since EEPs were introduced, a major obstacle has been to overcome the energy efficiency expansion barrier, due to the lack of confidence and economic feasibility for all stakeholders (Dreessen, 2007). The problem is not the availability of resources, but the obstacles to their access by Regional and Local Financial Institutions (LFIs). Difficulties also lie in the lack of harmony between current LFI lending practices and the needs of the EEPs, as manifested by Dreessen (2007): (i) Current bank lending practices only provide 70 to 80% of the total funding needs; (ii) Cash flows from energy savings not being considered in funding assessments; (iii) LFIs are not fully informed regarding EEPs, generating insecurity when authorizing loans; (iv) Lack of internal expertise to adequately assess, in market-acceptable terms, the risks and benefits of energy efficiency program funding; (v) Loan terms that hinder the economic feasibility of EEPs (high interest rates and difficult repayment terms).

Since there is no immediate solution to this problem, many energy efficiency markets are not sufficiently developed to motivate LFIs to invest in this area. To address this issue, the International Energy Efficiency Financing Protocol (IEEFP) was established in 2006, with the following objectives (Dreessen, 2007): (i) To create a plan to help LFIs; (ii) To focus on "energy conservation" in loan repayment, and to review credit rating guidelines regarding energy efficiency; (iii) To provide training, on the local level, to banks regarding EEP funding; (iv) To establish goals and procedures to evaluate the risks and to ensure the benefits of investing in EEPs; and (v) To create a loan infrastructure from the outset that may be replicated (Dreessen, 2007).

The protocol also establishes guidelines to: (vi) Provide minimum standards for the technology used in energy conservation; (vii) Draft the terms and general conditions to be included in the various funding agreements (savings measurement and verification, equipment commissioning, safety); and (viii) Develop training material (manuals, seminars, and case studies) for LFIs.

The following should also be considered in the IEEFP regarding EEP incentives, (Dreessen, 2007): (ix) The creation of a specific sector for commercial loan funding; (x) The promotion of EEP sustainability; (xi) The elimination of current barriers to devaluation risks; (xii) The aggregation of other programs to EEP funding initiatives; and (xiii) The promotion of long-term energy use and delivery, and reductions in carbon emissions.

With the creation of the IEEFP, pilot projects have been implemented in Mexico and Thailand. These countries were selected to discuss the IEEFP due to the progress attained by their governments in promoting energy efficiency as a fundamental factor in their respective national energy strategies (INEE—Instituto Nacional de Eficiência Energética, 2001).

2.2. The Mexican experience

The organizational structure of the electric sector is coordinated by the Mexican Ministry of Energy (SENER). Subordinate to SENER are three state-owned utilities, three research institutes, one energy efficiency promotion entity, and one regulatory agency (Fig. 2). The National Energy Conservation Commission (CONAE) is