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Energy balances in useful energy in Latin America : lessons learnt from 6 countries

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EXTENDED ABSTRACT

This paper looks at the experience of Latin American countries[1] (LACs) in obtaining detailed information on energy consumption by end-uses through the production of useful energy balances .

Introduction / background

Energy efficiency evaluations at national or sectoral levels are usually based on the classic energy balance and for more comprehensive evaluation on detailed energy end-use data. The energy balance allows to evaluate the trend in aggregate energy indicators, such as energy intensities (i.e. consumption per unit of GDP).

The final energy consumption by end-use enables to calculate detailed energy efficiency indicators (EEIs), which provide the only indicators suited for a top-down evaluation of the impact of energy efficiency policies on energy demand. This energy efficiency analysis can be extended to the « useful energy », which encompasses the efficiency of end-use equipment.

Such analysis is often considered as the starting point of any assessment of the energy efficiency potential, as it enables to measure the level of energy needs (or energy services) and identify the potential technologies that could be promoted to meet them to improve the end-use efficiency in the future.

Methodology

The useful energy consumption is obtained by multiplying the final energy consumption by end-use efficiencies, at the level of the different types of equipment and technology. The useful energy consumption indicates what amount of energy is really available for the final consumers, i.e. the so called "energy service".

The typical output of a useful energy balance is a disaggregated account of how energy is used in a country. For instance it shows how the energy consumption of households is distributed by end use (cooking, lighting, water heating, cooling, heating and main large electrical appliances (e.g. refrigerators, TVs).

Setting up an Useful Energy Balance (UEB) is intensively data demanding and far more complex and costly than to build the classic energy balance. Indeed, as end-use efficiencies vary according to end-use, energy type and equipment/technology, UEB have to be calculated at a very detailed level. Two categories of additional data are required compared to the classic energy balance: i) detailed energy consumption by end-use/energy consuming equipment and level of penetration of various technologies and equipment by end-use ; ii) end-use efficiency of the various types of equipment (e.g. LPG or wood stoves for cooking). Such data are based on a combination of different sources: surveys (either dedicated to the study or done separately), especially for the penetration of the different technologies (e.g. share of households with different types of lamps), energy audits or default value taken from the literature or technical documentation, especially for the efficiency values (e.g.

[1] Argentina, Columbia, Peru, Uruguay and Paraguay.

lamps 'efficiencies). Our experience in many countries demonstrates that around 1000 times series are needed for setting up an UEB.

Results

The experiences of LACs countries reveal some general characteristics in data availability (for instance less data in transport and services) and obviously some discrepancies that are due to national circumstances such as the type of governance on data collection, the willingness to collect data, the energy context etc.

The comparison of results of various studies of useful energy balance in LACS shows discrepancies in the penetration of various technologies, due to national circumstances or different level of implementation of energy efficiency policies, in the level of end-use efficiency, due to differences in the energy mix ,energy prices and age of equipment. This is in the household sector that the differences are the largest (Table 1) due a different penetration of biomass, the least efficient fuel for cooking, and of efficient lighting technologies (CFL, Led).

Table 1: End-use efficiency derived from Useful Energy Balance in Latin America

Country	Years	Total*	Households
Uruguay	2006	44%	42%
Peru	2016	40%	27%
Colombia	2015	47%	18%
Paraguay	2011	39%	33%

Conclusion & discussions

Building an useful energy balance is feasible but requires a significant effort of data collection. Apart from the production of the useful energy balance itself, the information gathered in such an exercise has multiple other benefits, which justify the effort needed:

- Evaluate the potential for energy efficiency improvements;
- Calculate energy efficiency indicators, to understand the trend in energy efficiency and evaluate the impact of the policies implemented;
- Project the long-term development of final energy demand with end-use demand models.

Apart from producing useful energy balances there are a lot of projects all around the world aiming at the same goal of getting detailed data by end-use, such as the ODYSSEE-MURE project for 30 European countries, the BIEE project of UN-Eclac for Lacs countries, the Meetmed data base for 4 Arabic countries, the EEUDM initiative of ADEME and IEA for G20 countries or the data bases developed by CONUEE in Mexico.

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