

EXTERNAL EVALUATION - SHORT REPORT

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Strengthening Quality Infrastructure for Energy Efficiency in Ecuador

Country/Region: Ecuador

Project number: PN 2014.2488.6
Project term: January 2019 – December 2023

Lead executing agency: Ministry of Production, Foreign Trade, Investments and Fishery - MPCEIP
Executing agency: Undersecretary for Quality; Ecuadorian Standardization Service – INEN;
Ecuadorian Accreditation Service - SAE

PTB | Section: 9.33 Latin America and Caribbean
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This evaluation is an independent assessment. Its contents reflect the evaluators' opinion which is not necessarily equivalent to PTB's view.

List of abbreviationsA faint, light gray world map is visible in the background of the page, composed of a grid of small squares.

BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CMC	Calibration and Measurement Capacity
CMEE	Centro Metrológico del Ejército Ecuatoriano
CNEE	Comité Nacional de Eficiencia Energética
GHG	Greenhouse Gas
INEN	Servicio Ecuatoriano de Normalización
LED	Light-Emitting Diodes
MEM	Ministerio de Energía y Minas
MPCEIP	Ministerio de Producción, Comercio Exterior, Inversiones y Pesca
OECD/DAC	Organization of Economic Cooperation and Development / Development Assistance Committee
PLANEE	National Plan for Energy Efficiency
PTB	Physikalisch-Technische Bundesanstalt
QI	Quality Infrastructure
SAE	Servicio de Acreditación Ecuatoriano
SDG	Sustainable Development Goal

1. Executive summary of the project

The project was based on the ambition of the Ecuadorian government to reduce the energy consumption and restructure the energy supply (energy transition). This includes, among others, improvements in the energy efficiency of electrical household appliances and illuminating devices. In order to determine the level of such efficiency, a reliable system of testing and metrological traceability is required.

The project has been funded by the German Ministry for Economic Cooperation and Development (BMZ) with a total amount of 1 Mio. Euro and was implemented between January 2019 and December 2023 by Germany's National Metrology Institute PTB.

The political partner was the Ecuadorian Ministry for Production, Foreign Trade, Investments and Fishery (MPCEIP). The main implementing partners were the Undersecretary for Quality within the MPCEIP, the Ecuadorian Standardization Service (INEN) and the Ecuadorian Accreditation Service (SAE). Other stakeholders involved were the Ministry of Energy and Mines (MEM), public and private test and calibration laboratories, manufacturers and importers.

The project objective was to strengthen the national Quality Infrastructure (QI) system to provide services demanded in the area of Energy Efficiency. The respective outputs covered the establishment of services for the conformity assessment of energy efficiency products (output 1), ensuring the metrological traceability for new calibration services (output 2), the strengthening of the cooperation among QI actors through the implementation of joint action plans (output 3) and the sensibilization for quality issues with regard to energy efficiency (output 4).

2. Evaluation of the project

The evaluation took place in November 2023 and covered the whole project period. It was accompanied by a number of stakeholder meetings and site visits in Ecuador. The evaluation team studied and assessed the various project documents and held semi-structured individual as well as group interviews. The preliminary findings were discussed with all project partners at the end of the evaluation mission.

The objective of the evaluation was to assess and value the quality of the services provided by PTB's project. It contributed to the accountability towards the counterparts and the BMZ and reflected learning processes within the project and at institutional level.

The six OECD/DAC criteria were used as an evaluation basis for this evaluation:

- Relevance: Is the project doing the right things?
- Coherence: How well does the project fit?
- Effectiveness: Is the project achieving its objectives?
- Impact (higher-level development results): What difference does the project make?
- Efficiency: How well are resources being used?
- Sustainability: Will the results last?

The following marking scale was used for the evaluation:

1	2	3	4	5	6
very successful	successful	successful to a limited extent	rather unsuccessful	mainly unsuccessful	entirely unsuccessful

Overall, the project received the mark: 1.9.

Relevance

The project has been fully in line with national political energy and QI strategies and with priorities within the public and private sector. By strengthening the QI with regard to energy efficiency, the project helps to foster international trade and provides a basis for ensuring consumer trust in energy-efficient products. Furthermore, the project contributes to Ecuador's plans of reducing energy demand and transforming the energy supply matrix. It is therefore seen as a continuation of previous programs and activities that focused on the substitution of outdated household appliances by more energy-efficient devices. The project is also a contribution for complying with the Sustainable Development Goals (SDGs) of the Agenda 2030 and matches with development priorities established by BMZ with regard to QI and actions against climate change.

Before project start, weaknesses in capacity building and in technical equipment within the public QI system had been identified. Furthermore, various standards were not up-to-date and the traceability of measurements for important magnitudes were not internationally recognized. The cooperation between stakeholders showed significant deficiencies. Testing facilities were existing, but not capable of executing all the required tests with adequate accuracy and could not cover all the products (e.g. LEDs) selected for this project. SAE showed a need for improvement in the technical evaluation of institutions in charge of certifying electrical products and testing laboratories for energy efficiency measurements.

The concept of the project was generally appropriate and realistic, although the reason for the selection of refrigerators and lighting devices as references is not evident. MEM with its competent role for energy efficiency could have been better involved in the design and execution of the project. The target indicators (outcome) were clear and their achievements measurable. However, indicator 2 did not provide evidence that the services were only offered for energy-efficiency evaluations. Indicator 3 showed deficiencies as the questionnaires were not answered by the same partners and "satisfaction" depends largely on personal perception.

The project demonstrated sufficient flexibility including the topic of industrial energy management as a new element. Furthermore, – although beyond the scope of the project – the project invited as observing member to the project's Steering Committee the Metrological Centre of the Ecuadorian Army (CMEE) due to their role in maintaining the national standards for the physical magnitudes of time and frequency. The effects of COVID-19 required that several activities as well as the coordination by PTB had to be implemented virtually.

Overall, the criterion received the mark: 1.7

Coherence

For many years, the German development cooperation has supported Ecuador in the restructuring and expansion of its industry, including the increase of energy efficiency in all consumption sectors. This project has been part of a series of similar bilateral and regional projects in Latin America and the Caribbean. There is a huge potential to reduce the emissions of greenhouse gases (GHG) and support the national climate contribution. The project is also complementary to government approaches to address the electricity shortages by providing incentives for efficient energy consumption.

The Organic Law on Energy Efficiency and the national plan for Energy Efficiency (PLANEE) laid the foundations on which the project could be based upon with its specific objectives and focus on qualification measures in the field of QI. Previous government programs already aimed to promote the use of more energy-efficient appliances through soft financing measures. The PTB project built on this, in particular by supporting energy efficiency testing laboratories. Capacity building on energy management in the industrial sector became important through the mandatory implementation of ISO 50001 for all high-consumption facilities as from January 30, 2025. The project strengthened existing institutional structures in Ecuador without creating new ones or changing their functions and tasks. On the other hand, the project relied on services of partner organizations outside Ecuador and thus fostered international cooperation at the regional level of Latin America and the Caribbean.

Overall, the criterion received the mark: 2.0

Effectiveness

The project had defined three indicators for measuring the outcome achievements. All targets were by far exceeded well before the project ended. However, the calculation of indicator 3 raised doubt as to the selection of the participants in the questionnaire was not representative and with the questions not necessarily reflecting the objectives of this project.

At output level, the indicators, with the exception of two, were fully accomplished. The international recognition of calibration and measurement capacities (CMC) in the two magnitudes of temperature and humidity could not be completed due to lengthy administrative and technical processes beyond the influence of the project. The action plans for illuminating devices and refrigerators have been signed among various stakeholders but could not be integrated by partner institutions into the indicator systems at institutional level.

Starting from the accreditation of certification institutions, the accreditation of services offered by testing laboratories and the development of new calibration services, the general scope of QI services has considerably been improved. Furthermore, the competence of the national network of calibration laboratories has been strengthened, including the dialogue between the public and the private sector. However, the project planning has not taken sufficient account of alternative options for strategy development, e.g. choosing a more regional approach. Mapping of future demand and the provision of testing and calibration services should have been carried out prior to the start of the project.

The long lead time prior to project start provided a burden in the form of political and personnel changes. This necessitated several adjustments to the operational plan. Almost all relevant stakeholders participated actively in the execution of the project. However, the group of consumers that had been initially addressed was not present during the planning process and project implementation. This is to a certain extent also true for the Ministry of Energy. Although responsible for energy efficiency, the ministry had no major involvement and responsibility at the start of the project and its role remained unclear.

Also staying aside were the National Energy Efficiency Committee (CNEE) composed of different ministries and other institutions, as well as institutions with a role in market surveillance. The improvements regarding cooperation and coordination as initiated by the project and supported through the formation of the project's Steering Committee have been positively acknowledged by all participants. Steering committee meetings were held to discuss the project progress, analyze, and solve problems and plan for new activities. There has been no indication to what extent the Interministerial Quality Committee participated in the project or benefitted from its results.

A systematic analysis of processes in the sector environment by means of a process map was not carried out. However, these processes were recorded in the context of the CALIDENA workshop through a detailed inventory of the value chains, thus making visible the position of the project within the sector's quality environment. The coordination and management processes required in the project were anchored in the main partners and therefore did not give rise to significant problems. Availability of staff for workshops, trainings, internships, and other events did not prove to be problematic. Knowledge sharing at the international level has improved significantly. The systematic transfer of acquired experience to other employees within institutions was noted as an innovation.

The project adequately addressed the assumption and risks specified in the Annual Operating Plan, despite the unforeseen conditions imposed by COVID-19, which forced the project to be extended, and the change in PTB's project coordination. The conceptual change in the original project proposal expanded the topic of electrical energy efficiency of household appliances to include industrial applications. As a result of the workshop for the qualification of energy managers, the MEM initiated an academic training program, while SAE is developing a corresponding program for the accreditation of certification bodies for Energy Efficiency Consultants.

Overall, the criterion received the mark: 1.5

Efficiency

The budget of 1 Mio. Euro was mainly spent for achieving output 1 (conformity assessment, 25% of total) and output 2 (metrology, 39% of total). This corresponds with the findings that the human and technical capacities for calibration and measurements in the relevant magnitudes had to be improved. Most of the budget was used for the contracting of short- and long-term experts to implement capacity building measures, studies, etc. as well as for international exchanges. Among the financing of equipment, the purchasing of a photometric bank needs to be highlighted.

Significant expenditure savings could be achieved with the shifting towards hybrid and virtual workshops and the involvement of foreign experts from within the region. Overall, the project budget was consequently and directly used to achieve the project results. An alternative use would not have led to an incremented output. That two result indicators could not be accomplished was not due to a lack of financing.

The project period was extended from 4 to 5 years without additional funds. Despite this, the project achieved the targets of all outcome indicators.

Overall, the criterion received the mark: 2.0

Impact (higher-level development results)

Due to the nature of this project, there was no direct measurable impact regarding the protection of the environment and natural resources. The energy efficiency labelling of certain electrical equipment had already been in place before the start of the project. The impact of such labelling in Ecuador is unknown. However, it is foreseeable that the QI improvements supported by the project will contribute to reducing energy consumption and thus GHG emissions. However, to make the effects visible, it is necessary to exploit the energy efficiency potential of other products groups beyond refrigerators and lighting equipment (e.g. air conditioning). To this end, the capacities of testing laboratories need to be significantly expanded. Vulnerable groups were not particularly affected by the project.

The outcome of the project was as expected and contributed to the intended changes. However, the project has not viably contributed to overall development changes, due to its institution-strengthening focus and the development of national quality services. Transparency and reliability in energy consumption measurement will help in manifesting consumer confidence. The comparability, harmonization and technical competence achieved will lead to international recognition and thus reduce trade barriers. However, no general development change has been recorded qualitatively or quantitatively in the course of the project. In practice, the project was more exemplary than impactful, but it has contributed to important changes in the organizational and individual capacities of the national quality system. The project developed new demand-driven metrology, standardization and testing services. Once these services are used on a large scale, an impact on the energy efficiency quality and therefore benefits for the population in general can be expected.

Overall, the criterion received the mark: 1.7

Sustainability

The measure contributed indirectly to the achievements of the SDGs 7, 13 and 8. The effect on energy efficiency improvements cannot be assessed as this depends also on technical regulations and minimum energy performance standards. But it is expected that together with improved market surveillance and increased conformity testing the new services and technical structures will be used more intensively. Adding to this are new plans to reactivate programs for replacing obsolete appliances. The requirement for the introduction of energy management systems will most certainly be extended beyond high consuming industries. The demand for energy managers will therefore increase in the coming years. The project was not directly related to other donors' projects during the same period.

The project results can certainly contribute to ease the current tense electricity supply situation due to insufficient generation capacity and reduce the ecological impacts by new hydropower plants or fossil fuel powered plants.

The domestic appliance industry will compete better against imported products, thus potentially creating more national jobs. However, immediate positive impacts cannot be determined due to the limited scope of the measure and its focus on improving basic conditions of the QI system. But it was noted that the project gave a significant impetus to bringing the topic of energy efficient products to political and public attention.

Reducing energy costs is of great importance, especially for disadvantaged population groups. In this regard, the importance of reliable testing and, by extension, comprehensible labelling of energy efficiency in products is significant. The measure can therefore serve as an important model for future product groups.

Overall, the criterion received the mark: 2.3

3. Learning processes and experiences

SAE has been strengthened in the accreditation of institutions for the certification of electric products and in its role within the Standardization Committee. INEN actively participated in the declaration and publication of its CMCs, which can be applied to other magnitudes in the future. The exemplary application to energy-relevant devices and processes was advantageous for the identification of stakeholders, the development of action plans, the definition and implementation of activities and for understanding the role of QI in quality requirements of goods and services. The use of the CALIDENA methodology and the Rapid Diagnostic Tool has been generally considered as very helpful.

The importance and benefits of closer and coordinated cooperation has been widely recognized. The involvement of the private sector has been an important learning experience, improving the relationship to state authorities and creating a mutual understanding. The formation of the Steering Committee that included all relevant cooperation partners as well as PTB helped in sharing the management role among all participants.

4. Recommendations

Recommendations to the partners:

INEN is advised to develop and implement a strategic plan for metrology that defines a series of actions for those aspects that limit the use and promotion of its services. For MEM it is recommended that existing technical regulations on energy efficiency for electrical appliances will be updated with adjusted classifications and new regulations adopted (for example for LEDs). The Undersecretary for Quality is advised to further improve market surveillance and seek for broader cooperation at regional level. Furthermore, it is recommended to implement and maintain a knowledge management system and make use of the diagnostic tool CALIDENA wherever possible. All partners are advised to intensify the sensibilization of consumers regarding energy efficiency of household appliances and illuminating equipment.

Recommendations to the project team:

Indicators should be formulated in a way that they can adequately measure the achievement of the objectives and the effectiveness of the implemented activities. Future projects (in the sector) should pay more attention to the involvement of buyers and final users of energy-efficient equipment and involve institutions that are relevant for market surveillance.

Recommendations to the International Cooperation Department (9.3):

A successful project should continue to assist activities that lead to the international recognition of magnitudes, such as temperature and humidity. For increasing the demand for QI services, it is generally helpful to integrate – from the beginning – manufacturers, importers, dealers and consumers in the project design and implementation. Reports of participants in capacity building activities should provide detailed information on lessons learned as well as recommendations for actions that can improve the present situation within their institutions.

Recommendations to the evaluation unit of Working Group 9.01:

Documents in the PTBbox could be structured according to the project outputs, thus allowing for a better overview during the evaluation process. It is further advised that the responsible counterpart institutions present the main outcomes, challenges and activities of the project at the beginning of the evaluation mission. PTB is also advised to provide the technical basis that allows for a parallel review of working evaluation documents by different participants.