EXTERNAL EVALUATION

FINAL REPORT (2nd Draft)

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Strengthening the Quality Infrastructure for Renewable Energies and Energy Efficiency in Brazil II

Country | Region: Brazil

Project number: 2019.2255.8
Implementation period: 01/2021 –12/2025

Executing agency: Physikalisch-Technische Bundesanstalt
Implementing partner institution: Instituto Nacional de Metrologia, Qualidade e Tecnologia - Inmetro

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This evaluation is an independent assessment. Its contents reflect the assessor's opinion which is not necessarily equivalent to PTB's view.

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LIST OF ABBREVIATIONS

ABC	Agência Brasileira de Cooperação *Brazilian Cooperation Agency*
ABRAC	Associação Brasileira de Avaliação da Conformidade *Brazilian Conformity Assessment Association*
ABEEólica	Associação Brasileira de Energia Eólica *Brazilian Wind Energy Association*
Anatel	Agência Nacional de Telecomunicações *National Telecommunications Agency*
ANEEL	Agência Nacional de Energia Elétrica *National Electric Energy Agency*
ANVISA	Agência Nacional de Vigilância Sanitária *Brazilian Health Regulatory Agency*
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung *Federal Ministry for Economic Cooperation and Development*
Caint	Coordenação Geral de Articulação Internacional, Inmetro *General Coordination of International Articulation, Inmetro*
CEPEL	Centro de Pesquisas de Energia Elétrica *Electric Energy Research Center*
Cgrce	Coordenação Geral de Acreditação *General Coordination of Accreditation*
DAC	Development Assistance Committee from the Organization for *Economic Cooperation and Development (OECD)*
Dconf	Diretoria de Avaliação da Conformidade, Inmetro *Conformity Assessment Directorate, Inmetro*
DeGEval	Deutsche Gesellschaft für Evaluation *German Evaluation Society*
Dimci	Diretoria de Metrologia Científica e Industrial, Inmetro *Cientific and Industrial Metrology Directorate, Inmetro*
Ditec	Divisão de Inovação Tecnológica, Inmetro *Technological Innovation Division, Inmetro*
Eletrobras	Centrais Elétricas Brasileiras S/A *Brazilian Electric Power Stations, Inc*
ELETROS	Associação Nacional de Fabricantes de Produtos Eletroeletrônicos *National Association of Manufacturers of Electrical and Electronic Products*
ENBPar	Empresa Brasileira de Participações em Energia Nuclear e Binacional S.A *Brazilian Nuclear and Binational Energy Holding Company, Inc*
ENIQ	Estratégia Nacional da Infraestrutura da Qualidade *National Strategy for Quality Infrastructure*
EPE	Empresa de Pesquisa Energética *Energy Research Company*
FINEP	Financiadora de Estudos e Projetos *Financing Agency for Studies and Projects*
Inmetro	Instituto Nacional de Metrologia, Qualidade e Tecnologia National Institute of Metrology, Quality and Technology

	National Metrology Institute of Brazil
IPT	Instituto de Pesquisas Tecnológicas, São Paulo *Institute for Technological Research, São Paulo*
KfW	Kreditanstalt für Wiederaufbau *Bank for Reconstruction*, Germany
LABELO	Laboratórios Especializados em Eletroeletrônica *Specialized Electrical and Electronics Laboratories*
MAPA	Ministério da Agricultura e Pecuária *Ministry of Agriculture and Livestock*
MDIC	Ministério do Desenvolvimento, Indústria, Comércio e Serviços *Ministry of Development, Industry, Trade and Services*
MEPS	*Minimum Energy Efficiency Standards*
MME	Ministério de Minas e Energia *Ministry of Mines and Energy*
NDC	Nationally Determined Contribution
NIB	Programa Nova Indústria Brasil *Brazilian new industry program*
PBE	Programa Brasileiro de Etiquetagem *Brazilian Labeling Program*
Procel	Programa Nacional de Conservação de Energia Elétrica *National Electricity Conservation Program*
PTB	Physikalisch-Technische Bundesanstalt *National Metrology Institute of Germany*
PV	*Photovoltaic*
QI	*Quality Infrastructure*
SDG	*Sustainable Development Goal*
SPE	Secretaria de Planejamento e Desenvolvimento Energético *Energy Planning and Development Secretariat*

1. Summary

This external evaluation concerns the second phase of the project *"Strengthening the Quality Infrastructure for Renewable Energies and Energy Efficiency in Brazil"*, implemented by PTB (Physikalisch-Technische Bundesanstalt) in cooperation with Inmetro (Instituto Nacional de Metrologia, Qualidade e Tecnologia). The project forms part of Germany's bilateral cooperation programme *"Just Transition in the Energy and Urban Sector in Brazil"*, funded by BMZ under project number 2019.2255.8, with a total volume of EUR 1.3 million.

The evaluation focuses on the implementation period from January 2021 to April 2025. It was carried out between December 2024 and May 2025 and included a field mission to Brazil from 24 March to 2 April 2025. The timing allows for the integration of findings and recommendations during the remaining months of implementation and provides strategic orientation for a possible third project phase. The evaluation applies a theory-based, utilization-focused approach guided by the OECD-DAC criteria and the project's results matrix. Data collection included extensive document analysis, interviews with over 20 stakeholders (public institutions, private sector, consultants), and a participatory validation workshop. It also addresses two specific learning questions formulated by PTB to inform an upcoming scoping mission in July 2025.

Framework Conditions

The second project phase was implemented in a politically and institutionally volatile context. During the Bolsonaro administration (2019–2022), regulatory institutions lost political backing, and Inmetro faced leadership turnover, budget constraints, and reduced strategic capacity. These factors challenged implementation and limited the project's ability to foster structural reform.

A political shift under President Lula (from January 2023) created new opportunities for strategic alignment. The launch of the *Nova Indústria Brasil* policy and the development of a national QI strategy (ENIQ) offered openings for systemic reform, although these were still in early stages at the time of evaluation.

Despite these dynamics, the project delivered significant technical outputs, including new QI services in biogas and photovoltaics, supported the modernization of the Brazilian Labelling Program (PBE), and launched *InovInmetro* as an institutional innovation platform. Challenges persisted in strategic steering, institutional anchoring, and the development of joint monitoring mechanisms.

Overall Assessment

The project is highly relevant to both Brazilian and German development priorities and made credible contributions to energy transition goals, institutional innovation, and quality infrastructure reform. Its effectiveness in delivering technical outputs is strong, though systemic uptake and outcome monitoring remain areas for improvement. The intervention was coherent with national and international development frameworks, but inter-institutional coordination structures were not formalized. Sustainability is weakened by financial fragility, staff turnover, and insufficient institutionalization of learning. **Nonetheless, the project delivered a solid performance across all criteria and provides a credible basis for scaling up cooperation.**

The evaluation confirms the project's role in laying strategic foundations for future cooperation. A potential third phase should build on achievements while strengthening strategic governance, institutional resilience, and joint learning systems.

Assessment According to OECD-DAC Criteria

A detailed justification and the project's numeric ratings per OECD-DAC criterion are provided in Section 5 of this report. The overall project rating is **2.4**, rounded to **"successful"** in accordance with the PTB evaluation scale. No downgrading is required.

Criterion	Evaluation of the criterion
1. Relevance	2,0
2. Coherence	2,5
3. Effectiveness	2,5
4. Efficiency	2,5
5. Impact	2,5
6. Sustainability	2,6
Global assessment	**2,4**

☒ No downgrading of the global assessment.

Criterion	Assessment of the Criterion
Relevance ***Mark: 2,0***	The intervention was well aligned with national and international policy frameworks, including Brazil's Nationally Determined Contribution (NDC) and the BMZ country strategy. It responded to the institutional needs of Inmetro and supported energy transition goals. While technically sound, the project design lacked mechanisms to adapt dynamically to leadership changes and did not explicitly address vulnerable groups.
Coherence ***Mark: 2,5***	The project was consistent with the broader German development portfolio and Brazil's QI structures. Coordination with other actors (e.g., GIZ, KfW) and with accreditation and standardization institutions (e.g., Cgcre, ABNT) was limited. Internal coordination improved over time, supported by the *Grupo Coordenador*, but strategic steering structures for planning and impact monitoring remained informal.
Effectiveness ***Mark: 2,5***	Most technical outputs were achieved, including the development of QI services and the transversal regulation for Brazilian Labeling Program (*Programa Brasileiro de Etiquetagem* - PBE) Yet, strategic steering was weak, and uptake by the private sector and other institutions remained limited. The application of Capacity WORKS tools was partial, with missed opportunities for institutional learning and monitoring.
Efficiency ***Mark: 2,5***	Resources were used reasonably in relation to outputs, despite pandemic-related delays and leadership turnover. Some redundancies (e.g., repeated missions) could have been avoided. Allocation efficiency was adequate, but

Criterion	Assessment of the Criterion
	stronger strategic planning could have improved systemic adoption and return on investment.
Impact ***Mark: 2,5***	The intervention contributed plausibly to higher-level changes in energy efficiency, renewable energy governance, and institutional innovation. However, these impacts remain emerging and are difficult to quantify. No negative unintended effects were observed, but structural change was constrained by external factors.
Sustainability ***Mark: 2,6***	The project strengthened technical capacities and initiated structural reforms (e.g., InovInmetro). Still, financial fragility, leadership turnover, and lack of strategic continuity threaten long-term durability. Institutional learning and governance mechanisms were not sufficiently anchored.

2. Introduction

This evaluation concerns the second phase of the project “Strengthening Quality Infrastructure for Renewable Energies and Energy Efficiency in Brazil,” implemented by the Physikalisch-Technische Bundesanstalt (PTB) in cooperation with the Brazilian Institute of Metrology, Quality and Technology (Inmetro). The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) under the project number 2019.2255.8 and forms part of the German Development Cooperation's broader efforts to support the energy transition in Brazil and contribute to the Sustainable Development Goals (SDGs), particularly SDG 7 and SDG 13.

The project has been implemented over a five-year period (2021–2025), following a successful first phase from 2016 to 2020. It focuses on strengthening Brazil’s national quality infrastructure (QI) in support of renewable energies and energy efficiency, aiming to improve the technical, institutional, and regulatory foundations for a sustainable and innovation-oriented energy sector. Key areas of the project included the development of new quality infrastructure (QI) services (such as in biogas and photovoltaic technologies), the promotion of stakeholder engagement through thematic dialogues, the launch of the InovInmetro platform to foster institutional innovation, and support for regulatory improvements—particularly through the introduction of a transversal framework for the Brazilian Labelling Program (PBE).

The present evaluation was carried out between December 2024 and May 2025 and follows the OECD-DAC evaluation criteria. It was guided by the project’s theory of change and results matrix, as outlined in the inception report. The evaluation is based on a triangulated methodology including document analysis, stakeholder interviews, and a participatory validation workshop. Interviews were conducted with representatives from Inmetro, the Brazilian ministries (MME, MDIC), private sector associations (e.g., ABRAC, ABSOLAR), and other relevant institutions working in the field of quality infrastructure.

The evaluation mission included a field phase in Brazil from 24/03/2025 to 02/04/2025 and was led by Jan-Marius Tillmanns (international evaluator), supported by Carlos Rupp Bindé (technical evaluator and PTB expert). On PTB side in Brazil, it was partially accompanied by the national intermittent expert, Ms. Eloisa Viggiani. The evaluation was commissioned by PTB’s Department for International Cooperation (Group Q.3) and coordinated with Inmetro’s International Affairs Directorate (CAINT).

The main goals of the evaluation were to assess the project’s relevance, effectiveness, coherence, efficiency, impact, and sustainability, and to derive actionable recommendations for the planning of a potential third phase. Intended users of the evaluation are PTB’s technical and management teams, BMZ, and the project partners in Brazil. The evaluation is also intended to contribute to the institutional learning process within PTB and to inform ongoing dialogue with other actors involved in Germany’s development cooperation in the energy and quality infrastructure sectors.

A particular methodological challenge of the evaluation was the fragmented institutional memory due to high staff turnover within Inmetro. This was addressed through targeted interviews with former and current staff and by cross-referencing multiple sources.

Another particularity was the evolving political context in Brazil, with the government change in 2023 creating new opportunities for strategic alignment. These opportunities were considered in the formulation of the evaluation’s recommendations for a potential third project phase (see Chapter 8).

Subject of the evaluation

Project title	Strengthening the Quality Infrastructure for Renewable Energies and Energy Efficiency in Brazil II
Programme	"Just Transition in the Energy and Urban Sector in Brazil"
Project objective	The National Quality Infrastructure for the development of renewable energy sources and the improvement of energy efficiency is strengthened
Term	01/2021 –12/2025
Volume	1.3 Mio. EUR
Evaluation period	December 2024 – May 2025

3. Framework conditions and strategic approach of the project

3.1. Framework conditions

At the time of project inception, Brazil's political and institutional framework conditions were undergoing considerable transformation. The following section outlines the key political, economic, sectoral, and organizational factors relevant to project implementation and highlights changes that occurred during the intervention period.

At the start of the project in early 2021, Brazil's political and institutional landscape was marked by considerable volatility. The administration of President Jair Bolsonaro (2019–2022) prioritized deregulation, the weakening of federal regulatory agencies, and a general reduction in the role of public institutions in economic governance. These policies significantly affected Inmetro, the main Brazilian partner in the project, which faced leadership turnover, budget cuts, and a loss of strategic orientation. Strategic steering bodies were dismantled or rendered ineffective, and project implementation was often reliant on the initiative of a few committed individuals within Inmetro's technical departments.

Economically, Brazil was still recovering from a prolonged recession (2015–2016), which had been further exacerbated by the COVID-19 pandemic. The pandemic caused delays in public investment, reduced institutional capacity, and created uncertainty in many key sectors, including renewable energy. While the renewable energy sector remained a strategic growth area, particularly in solar and wind energy, its expansion was hindered by inconsistent policy signals and a lack of coordination across regulatory institutions.

The Brazilian Quality Infrastructure (QI) system continued to show important structural weaknesses, including gaps in metrological services, regulatory fragmentation, and insufficient engagement with the private sector. Inmetro, although formally responsible for metrology, accreditation, conformity assessment, and legal metrology, struggled to fulfil its strategic coordination role. At the time of project inception, there was no comprehensive national quality infrastructure strategy in place, and no institutionalized mechanisms for interministerial or public–private coordination in the area of energy-related QI. Cultural barriers within Inmetro, such as siloed communication across directorates and limited institutional incentives for innovation, further complicated cooperation.

Explanatory Box: The Structure of Quality Infrastructure in Brazil

Brazil's quality infrastructure (QI) landscape is coordinated primarily by **Inmetro** (Instituto Nacional de Metrologia, Qualidade e Tecnologia), which operates under the Ministry of Development, Industry, Commerce and Services (MDIC). Inmetro is responsible for legal, scientific and industrial metrology, conformity assessment, and manages Brazil's national accreditation body (Cgcre).

However, Brazil's QI system is **institutionally fragmented**. Sectoral agencies such as **ANVISA** (health), **MAPA** (agriculture), **ANEEL** (energy), and **Anatel** (telecommunications) also exercise regulatory and inspection functions related to QI. Additionally, **ABNT** (*Associação Brasileira de Normas Técnicas*) is the recognized national standardization body, but it operates independently of Inmetro and follows a voluntary standardization model.

This complex and distributed structure means that while Inmetro has a strong legal mandate and technical capacity, its ability to steer systemic QI reform depends on **inter-institutional coordination**, **political support**, and **cross-sectoral dialogue**. The PTB-supported intervention aimed to reinforce Inmetro's leadership role while fostering stakeholder engagement across Brazil's wider QI ecosystem.

Sectorally, Brazil had made ambitious international commitments under the Paris Agreement and its Nationally Determined Contribution (NDC), including emissions reductions and energy efficiency targets. However, domestic implementation was slow. The National Energy Efficiency Plan (PNEf), though approved in 2011, had not been operationalized. Efforts to modernize the Brazilian Labelling Program (PBE) remained fragmented. Although the importance of quality infrastructure for renewable energy and climate goals was acknowledged in national policy discourse, implementation capacity remained limited.

During the project, several important changes occurred:

- The **political environment** shifted following the 2022 elections. The inauguration of President Luiz Inácio Lula da Silva in January 2023 marked a reorientation toward re-industrialization, environmental protection, and the restoration of public sector capacities. Inmetro's new leadership initiated a strategic review and took steps to rebuild internal coherence, including relaunching coordination with other ministries (e.g., MME and MDIC). However, institutional inertia and resource constraints persisted, and many reforms were still at an early stage by the time of the evaluation.
- In 2023, the Brazilian government launched the "Nova Indústria Brasil" (NIB) policy, which includes quality infrastructure as a key enabling condition for industrial transformation. This opened new strategic alignment opportunities for the PTB-Inmetro cooperation, especially in areas such as green hydrogen, digitalization, and circular economy.
- MDIC initiated a national QI strategy process (ENIQ) in cooperation with key stakeholders, representing an important step toward improved interinstitutional alignment and long-term planning. However, operational anchoring and implementation mechanisms for ENIQ were still under discussion as of early 2025.
- The partial **privatization and restructuring of national laboratories** (e.g., CEPEL – a strategic QI member that was under the management of Eletrobras) and their geographic relocation from Rio de Janeiro created logistical and institutional challenges for integrating new testing services, particularly in renewable energy sectors.
- On the technical level, Inmetro's capacity to deliver new services improved. New metrological services (e.g., for photovoltaic modules and biogas systems) were developed with PTB support,

but adoption and diffusion remained limited due to weak demand articulation, lack of private sector incentives, and institutional instability.

- Institutionally, the establishment of **InovInmetro** marked a key innovation. It offered a structured platform for internal collaboration and stakeholder engagement mechanisms and was widely perceived as a turning point toward a more service-oriented and open institutional culture. However, its long-term sustainability remains uncertain and depends on strategic integration into Inmetro's governance structures.

In summary, the project operated in a highly dynamic and at times even fragile political and institutional context. While the framework conditions at inception were marked by institutional retreat and regulatory fragmentation, the later stages of the project coincided with a political and strategic re-opening that offers important opportunities for future cooperation. The project responded adaptively to these changes, although its ability to influence structural reforms remained constrained by the pace of internal transformation within Inmetro and broader systemic factors in Brazil's public administration.

3.2. Strategic approach of the intervention

The strategic approach of the project "Strengthening Quality Infrastructure for Renewable Energies and Energy Efficiency in Brazil" was grounded in a theory of change that linked improvements in technical quality infrastructure (QI) to broader policy goals in energy transition, climate action, and industrial competitiveness. The project was conceived as a capacity development intervention focused on strengthening Brazil's metrology, conformity assessment, and regulatory systems to enable the more effective deployment of renewable energy technologies and the improvement of energy efficiency standards.

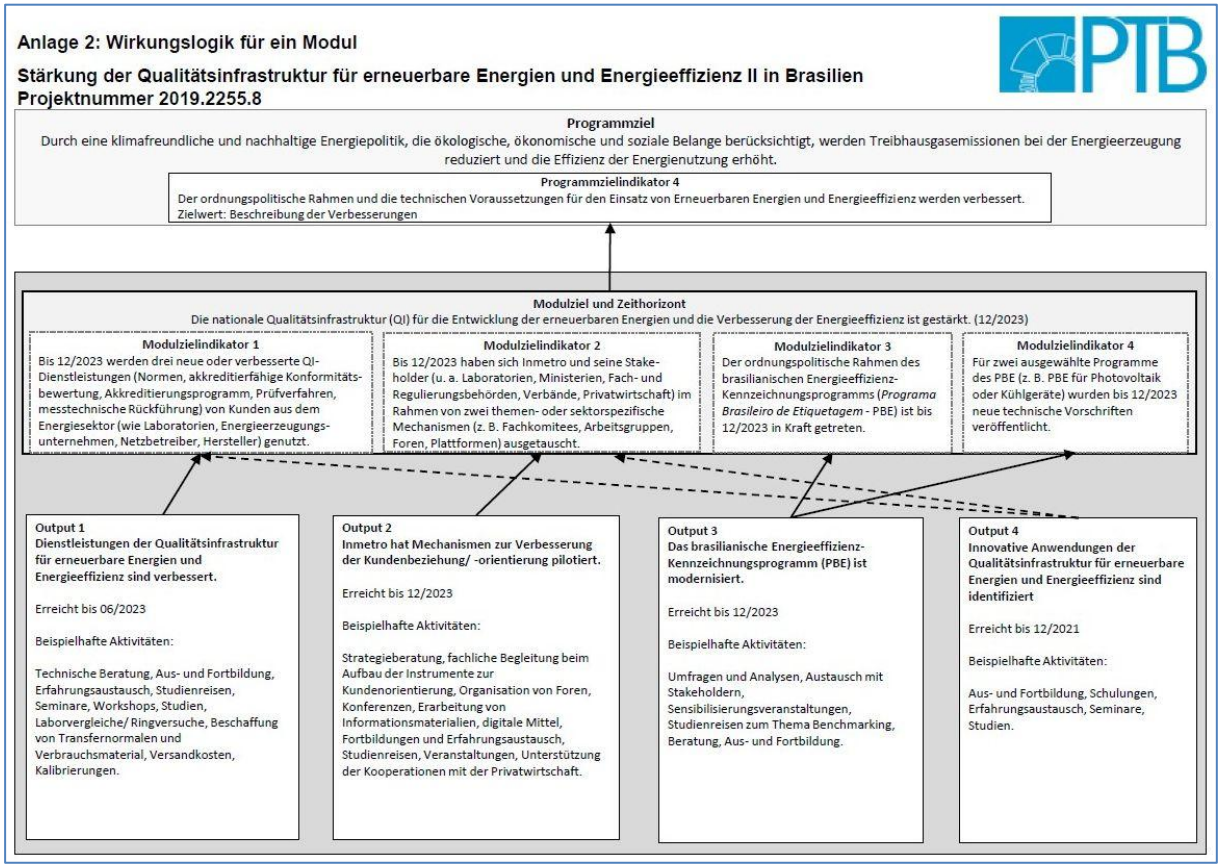
The intervention logic assumed that by delivering targeted technical support, facilitating institutional innovation, and fostering inclusive stakeholder engagement, Brazil's national QI system—coordinated by Inmetro—would be better equipped to respond to emerging challenges in the energy and climate sectors. Key mechanisms in this approach included the development of new QI services (e.g., in biogas and photovoltaics), the launch of InovInmetro as a platform for innovation and dialogue, and the technical and procedural support for drafting a transversal regulatory framework for the Brazilian Labelling Program (PBE).

In accordance with the results logic developed during project planning (see annex section), the intervention pursued a chain of results whereby:

- **Activities** such as technical cooperation, training, workshops, regulatory reviews, and consultation processes
- would lead to **outputs**, including new or improved metrology services, strengthened stakeholder interfaces, and modernized regulatory tools,
- which would result in **outcomes**, namely the broader use and institutional uptake of QI services and frameworks by public and private actors,
- ultimately contributing to **impacts** such as improved energy efficiency, increased renewable energy deployment, and support for Brazil's commitments under the Paris Agreement.

The project's strategic logic is summarized in the following simplified impact chain, which reflects the underlying theory of change developed during project planning and used throughout the evaluation.

Theory of Change –visual model[1]



The project's **strategic logic** is based on a clearly defined **theory of change** that links project activities to long-term contributions to Brazil's energy transition. At the input level, the project provided **technical cooperation**, conducted **training measures**, facilitated **stakeholder engagement formats**, and offered **regulatory advisory services**. These activities led to several confirmed **outputs**, including the development of new **quality infrastructure (QI)**

[1] A detailed version of the impact matrix is provided in the annex section. Both documents are only available in German or Portuguese language.

services — notably calibration and testing services for **biogas and biomethane** – including for interlaboratory comparison purposes — the establishment of **dialogue platforms**, recognition of the accreditation scheme for **ISO/IEC 17.029**, and the formulation of a **cross-cutting regulatory framework** for the **Brazilian Labelling Program (PBE)**.

At the outcome level, **the project aimed to contribute** to the increased use of QI services by laboratories, private sector actors, and regulatory institutions. While some positive developments were observed, systematic outcome-level monitoring was limited. **Enhanced regulatory quality and greater transparency in standard-setting processes were noted in selected areas**, such as the biogas sector and the modernization of the PBE. These outcomes are expected to support higher-level impacts, including a strengthened enabling environment for Brazil's energy transition, improved energy efficiency, and meaningful contributions to Sustainable Development Goals (SDGs)—in particular SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

4. Evaluation methodology

4.1. Evaluation design

The evaluation followed a theory-based, utilization-focused design structured around the OECD-DAC evaluation criteria. It was guided by the project's theory of change and results logic (see Chapter 3.2 and annex section), with the aim of assessing both the achievement of results and the underlying mechanisms and assumptions shaping implementation.

The evaluation was conducted in three phases:

- The **inception phase** (until 11 March 2025) focused on the review of project documentation, strategic frameworks, and monitoring data. Following a kick-off meeting on 18 December 2024, the evaluation team held exploratory discussions to identify key stakeholders for interviews and to refine the data collection tools. An evaluation matrix and interview guidelines (see annex section) were developed during this phase.
- The **data collection phase** (24 March to 2 April 2025, with online follow-ups where needed) included a field mission to Brazil, covering site visits and in-person interviews in Rio de Janeiro and Brasília. Key stakeholders included Inmetro staff across several directorates, representatives from MME and MDIC, PTB's project coordinator, the German intermittent expert, and contracted consultants. In addition to in-person interviews, online meetings were conducted with remote stakeholders and private sector actors, including an online focus group with representatives of industry associations (e.g., ABSOLAR and ELETROS). A debriefing workshop with Inmetro was held on 2 April 2025, during which preliminary evaluation results were presented and validated in dialogue with the working groups and representatives involved.
- The **reporting phase** (until 30 September 2025) involves the structured analysis of all data collected, the formulation of evidence-based conclusions, and the preparation of a short report, a full evaluation report, and a one-page summary to be published on PTB's website[2]. The process includes a final presentation of findings to PTB's International Cooperation Department (Group Q.3) in support of internal knowledge management and future project planning.

A mixed-methods approach was applied, with a primary emphasis on qualitative interviews. Semi-structured interviews were conducted based on standardized questionnaires aligned with the evaluation matrix. Interview partners included actors at different levels of the intervention: operational (Inmetro departments), strategic (ministerial stakeholders), and systemic (private sector, intermediaries).

[2] https://www.evaluierung.ptb.de/evaluierungsdatenbank

Additional data sources included progress reports, planning documents, regulatory texts, and strategy papers.

The evaluation also integrated the **five Capacity WORKS success factors**—Strategy, Cooperation, Steering Structure, Processes, and Learning & Innovation—as a framework to assess cooperation quality, implementation logic, and institutional adaptation. While Capacity WORKS is not the project's management model, it served as an analytical lens for triangulating results and identifying systemic strengths and weaknesses (see Chapter 5.1.3).

Data analysis followed a triangulated approach to validate findings across stakeholder perspectives and documents. Evaluation judgments were formed in reference to the project's intended results, contextual developments (Chapter 3.1), and underlying assumptions in the theory of change.

The strength of the design lies in its flexibility, contextual awareness, and alignment with utilization objectives. It enabled engagement with a diverse range of stakeholders and incorporated validation steps to enhance credibility. Limitations include a reliance on qualitative data and the absence of baseline indicators for some outcomes. Institutional memory gaps within Inmetro—due to leadership turnover—were addressed through targeted follow-ups and source triangulation.

4.2. Data sources; data quality

The evaluation draws on multiple data sources, including project documents, progress reports, strategic plans, regulatory texts, stakeholder interviews, and monitoring information. The data was collected and triangulated across three phases of the evaluation (see Chapter 4.1: Evaluation Design), combining document review with in-person and remote interviews. In line with the evaluation matrix, data was organized and interpreted along the OECD-DAC criteria and supplemented by insights from the Capacity WORKS framework.

Key data sources included:

- PTB's progress for the years 2021, 2022, 2023 and 2024;
- The Inception Report, Expert reports, the Financial Monitoring Sheet and results matrix;
- Strategic documents from Inmetro (e.g., Strategic Plan 2024–2027, InovInmetro documentation);
- Meeting minutes, mission notes, and debriefing presentations;
- Regulatory publications or drafts (e.g., *Portaria transversal* for PBE);
- Interviews with over 20 stakeholders from public institutions (Inmetro, MME, MDIC, EPE), private sector actors (e.g., ABRAC, ABSOLAR), and technical consultants.

Interview data quality was generally high in terms of relevance and detail, with direct access to key actors across different levels of intervention. Nevertheless, gaps in institutional memory — particularly due to leadership turnover at Inmetro — limited the availability of retrospective insight. To mitigate this, the evaluation team conducted follow-up interviews and triangulated interview content with available documentation.

Results-based monitoring proved to be the weakest source of structured data. Since 2023, the Asana project management platform was introduced and used by CAINT for monitoring both activities and selected impacts. Output coordinators were able to update relevant information directly, and progress was discussed in monthly coordination meetings. This increased the visibility of implementation progress for the coordination team. However, most of the time, PTB and CAINT had to follow up to ensure data was entered and kept current. The monitoring system nevertheless remained focused mainly on activities and outputs, with little systematic tracking of outcomes or qualitative indicators. While Asana

was perceived as a helpful tool, interviews revealed that its use did not translate into a comprehensive results-based monitoring system. In some cases, Output managers were surprised by requests to report on service use or demand-side data (e.g., number of service requests), indicating that the link between service provision and outcome monitoring was not fully institutionalized. There was no evidence that the impact model or the results matrix was regularly reviewed or updated during implementation. A common monitoring framework between PTB and Inmetro did not exist; reporting remained largely internal to PTB and geared towards activity-level accountability.

In addition, no systematic baseline data or counterfactual analysis was available to assess attribution of results. Despite this, the use of a robust evaluation matrix and triangulation of qualitative sources allowed the evaluation team to draw reliable conclusions on project performance and dynamics.

Overall data quality was therefore mixed: documentary evidence was comprehensive on the implementation side but limited on results-level monitoring. Stakeholder perspectives added depth and contextual richness, but evaluation findings would have been strengthened by a more mature and outcome-oriented monitoring system jointly maintained by the partners.

While project indicators were referenced in the activity request process (via the application form and its annexed results matrix), the lack of a jointly structured results-based monitoring system—with shared progress reviews, adaptive feedback loops, and strategic learning mechanisms—represented a limitation in the project's governance and long-term steering capacity. Although each new activity was assessed against its potential contribution to project goals, the absence of regular collective assessments and institutional-level learning tools made it difficult to systematically track behavioral or structural changes over time. This reflects a broader challenge in aligning bilateral cooperation modalities with results-based implementation systems and reinforces the importance of co-owned monitoring frameworks in future phases.

5. Evaluation results

5.1 Status of the transformation process (OECD/DAC)

This chapter presents the evaluation findings along the six OECD-DAC criteria as updated in the BMZ orientation guidelines of August 2021. Each criterion is assessed through its respective evaluation dimensions and questions, based on a triangulation of interviews, project documentation, and field observations. The structure follows a uniform format: each evaluation dimension is addressed in narrative form and concluded with a rating on the six-grade scale. At the end of each criterion section, an overall assessment and numerical score are provided, along with a summary table.

The evaluation results are derived from the application of a mixed-methods approach (see Chapter 4), supported by the evaluation matrix developed during the inception phase. The Capacity WORKS success factors are used, where relevant, to assess implementation quality, cooperation dynamics, and adaptive capacity.

In the following sections, the evaluation provides a detailed picture of the project's effectiveness and transformative impact, its alignment with partner priorities, coherence within the German and international development cooperation landscape, efficiency in resource use, sustainability of results, and contribution to higher-level development goals.

The evaluation applies the six-point grading scale used in PTB's evaluation format, based on the OECD-DAC criteria. This scale allows for a differentiated assessment of project performance across the six core criteria. The following table summarizes the meaning of each grade:

Evaluation	Grade	Description
very successful	1	very good result, far above expectations
successful	2	good result, entirely meets expectations
successful to a limited extent	3	satisfactory; results are below expectations, but mainly positive
rather unsuccessful	4	unsatisfactory result; below expectations; negative results prevail despite several positive results
mainly unsuccessful	5	negative results clearly prevail despite several positive partial results
entirely unsuccessful	6	the project has failed completely; situation has rather deteriorated

Table 1: Marking scale for the evaluation of the OECD/DAC criteria

Grades are based on a triangulation of qualitative and quantitative data, taking into account the relevance of project objectives, the plausibility of the results chain, and the contextual factors affecting implementation.

5.1.1 Relevance

Dimension 1: To what extent is the intervention's design geared to country-specific, regional, and global policies and priorities of the partners and the BMZ?

Overall, the intervention is well aligned with the political and strategic priorities of both Brazilian and German cooperation partners.

The project design reflects Brazil's national energy transition strategy, notably through its support for the modernization of the Brazilian Labelling Program (PBE), a key instrument of Brazil's energy efficiency policy. It is directly linked to Brazil's international climate commitments, including its Nationally Determined Contributions (NDCs) under the Paris Agreement, and supports Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

The intervention also aligns closely with Inmetro's strategic planning framework, especially the 2024–2027 Strategic Plan, which explicitly prioritizes green economy, decarbonization, and bioindustry. On the German side, the project supports the BMZ country strategy for Brazil, particularly under the bilateral cooperation programme "Just Transition in the Energy and Urban Sector." The programme contributes to decarbonization and climate resilience through energy and urban development reforms, thus situating the project within a coherent German development cooperation framework.

Dimension 2: To what extent is the intervention's design geared to the needs and capacities of the target groups?

The intervention is well aligned with the institutional and technical needs of the main implementing partner, Inmetro.

The project addresses capacity gaps in metrology for renewable energy and energy efficiency through the development of new QI services and the establishment of the InovInmetro platform. These measures responded directly to internal needs related to modernization, innovation, and external communication. The design also supports engagement with the private sector through structured stakeholder mechanisms. While the project did not collaborate directly with ABRAC, the association remains an

important actor in Brazil's quality infrastructure ecosystem—actively supporting Inmetro's efforts related to conformity assessment, testing laboratories, and the national regulatory environment.

The intervention was not designed with a specific focus on social inclusion but remained consistently oriented towards its defined institutional target group. While the primary target group consisted of institutional actors (e.g., regulators, laboratories, ministries), the perspective of rights holders such as small-scale producers, consumers, and informal market actors was not systematically addressed. These groups were not defined as target groups in the project design, and no specific safeguards or inclusion strategies were applied. **This design choice is consistent with the project's scope and objectives, which prioritised institutional strengthening.** As a result, the project's contribution to socially inclusive or pro-poor outcomes remained limited, although this was not a formal objective of the intervention. This assessment is in line with the project's documentation, which contains no references to safeguards, gender strategies, or environmental and social impact assessments (cf. Inception Report, Progress Reports 2021–2023). Consequently, the second dimension of the relevance criterion shows high institutional relevance, **with minor limitations in inclusiveness**.

Dimension 3: To what extent is the intervention's design appropriately, realistically and plausibly geared towards achieving the intervention's objective?

The intervention's design is technically sound and realistic, but organizational and monitoring weaknesses limit its plausibility.

The design leverages Inmetro's technical expertise and infrastructure, particularly in calibration, photovoltaic metrology, and biogas measurement. It has resources that are clearly oriented towards realistic results in terms of the internal scenario and the personnel available in each area. However, organizational constraints - including the frequent turnover of leaders and the absence of a project steering committee at times - weakened strategic coherence or kept the understanding of the reason for the tasks at the operational level.

The project results matrix focused primarily on quantitative indicators (e.g., number of services developed or consultations held), with limited mechanisms to capture the quality and frequency of service uptake, user satisfaction, or broader behavioral changes at the outcome level. While outcome indicator 1 includes the "number of services used," it does not reflect how often or how effectively these services were applied in practice. This limits the verifiability of sustained objective achievement.

Nonetheless, the design reflected a multidimensional perspective, incorporating elements of consumer protection, regulatory modernization, industry competitiveness, and environmental goals. However, some gaps remained in terms of inclusiveness—such as the absence of targeted engagement with vulnerable or disadvantaged groups—and structural limitations within Inmetro, including its dual role as regulator and service provider, constrained its responsiveness to emerging market needs. Distinguishing these framework conditions from the project's scope of influence is essential for a balanced understanding of the intervention's role and potential.

Dimension 4: To what extent has the intervention's design responded to changes in the environment and adapted to the needs?

The project demonstrated moderate but selective adaptability to changing institutional and political conditions.

Mechanisms to enhance stakeholder engagement and responsiveness were explored during the project. One such initiative was InovInmetro, which served as an internal platform to promote cross-departmental collaboration and foster a more service-oriented culture. In parallel, thematic dialogues were piloted—initially in the biogas sector—as a potential structured channel for long-term exchange

with external stakeholders. Although not yet institutionalized by the time of the evaluation, these efforts signalled a shift toward more participatory practices. However, broader adaptive management was limited. The project design did not fully anticipate or respond to recurring leadership changes at Inmetro, nor did it systematically revise the results logic or results matrix throughout implementation[3]. The regulatory ambition of the transversal PBE framework was scaled back due to institutional and political challenges, indicating a limited scope for strategic adaptation[4].

Moreover, the project provided limited targeted responses to decentralized or less institutionally connected QI stakeholders, such as regional laboratories (including accredited) or SMEs outside major industrial hubs. While some positive exceptions exist—such as the development of a biogas measurement protocol tailored to the needs of small-scale producers—many other segments remained only marginally engaged. This limited the project's potential to support a broader transformation across the national QI landscape.

Overall Assessment of Relevance: The intervention demonstrates a high degree of relevance. It is closely aligned with national and international policy frameworks and addresses core institutional needs at the partner level. The design is technically sound and consistent with the strategic objectives of both Inmetro and the BMZ. However, limited attention to vulnerable target groups and the absence of a structured human rights or inclusiveness approach, along with gaps in strategic adaptability, reduce the overall score.

Summary Table: Relevance
The following scores reflect the intervention's strong alignment with strategic frameworks and institutional needs, while acknowledging gaps in inclusiveness and adaptability to changing institutional conditions.

Criterion	Evaluation dimension	Weighting	Appraisal
Relevance	The intervention's design is geared to country-specific, regional and global policies and priorities of the partners and the BMZ.	25 %	1
	The intervention's design is geared towards the needs and capacities of the target groups	25 %	2
	The intervention's design is realistically and plausibly geared towards achieving the intervention's objective	25 %	2
	The intervention's design has responded to changes in the environment and adapted to the needs.	25 %	3
Global assessment of the relevance			2,0

[3] Information provided during interview with Inmetro CAINT on 26.05.2025

[4] Information provided during interview with Inmetro DCONF on 26.05.2025

5.1.2 Coherence

Dimension 1: Internal coherence: Within German development cooperation, to what extent was the intervention designed and implemented in a complementary manner, based on a division of tasks?

While some informal exchanges between PTB and GIZ took place during the project, alignment between the two institutions was partial and not always effective. From PTB's perspective, relevant project information—such as progress reports and planned activities—was often shared only upon request, and in at least one case (within the H2Brasil project), an activity with Inmetro was implemented without prior coordination. These limitations may be partly attributed to PTB's lack of permanent in-country presence, which constrained its participation in coordination spaces regularly attended by other German development actors.

It is acknowledged that, from GIZ's point of view, a functional division of tasks was established, with PTB focusing on quality infrastructure and GIZ addressing broader regulatory and energy policy issues, these exchanges may have been considered sufficient[5]. The divergence in perceptions highlights a need for more structured and transparent collaboration mechanisms in future multi-actor cooperation settings. The project also reinforces synergies with other German-supported initiatives such as H2Brasil, the Global Project Quality Infrastructure (GPQI), and the bilateral energy partnership, even though coordination mechanisms were not fully formalized.

However, the internal coherence of the intervention was challenged by frequent staff changes on both the German and Brazilian sides[6]. These affected continuity in communication and the consistent application of a shared strategic vision, especially in areas requiring inter-institutional alignment. In specific instances — such as the regulatory stocktaking for the PBE — roles between Inmetro and the Ministry of Mines and Energy (MME) were not clearly defined. As a result, delays occurred in consolidating responsibilities and producing a unified roadmap for regulatory review. Despite this, the project contributed to the German-Brazilian bilateral programme "Just Transition," and its design avoided duplication with other initiatives, reinforcing coherence within the German portfolio.

Dimension 2: External coherence: To what extent does the intervention's design and implementation complement the partner's own efforts and are coordinated with other donors' activities?

The intervention strongly complemented Inmetro's internal reform efforts. Initiatives like InovInmetro and the thematic dialogues were fully aligned with Inmetro's goals and supported institutional ownership without substituting core responsibilities. Rather than acting in place of Inmetro, the project built internal capacities and improved collaboration practices.

Coordination with other donors occurred mainly through GIZ, particularly in areas such as hydrogen and regulatory reform. Informal cooperation channels—joint workshops, technical exchanges—contributed to partial harmonisation. However, coordination with other international partners (e.g., UNIDO, European technical institutions) remained limited.

The project relied on Inmetro's internal systems and structures, including laboratories, the accreditation body Cgcre, and regulatory departments. No parallel structures were created. New services (e.g., PV calibration, biogas standards) were integrated into existing institutional frameworks. While some digital

[5] Information provided during interviews with GIZ on 27.05.2025 and 28.05.2025.

[6] Information provided during interviews with the PTB team and its consultants at the prior assessment stage as well as in an interview with Inmetro CAINT on 26.05.2025.

tools were introduced, these remained underutilized, particularly in terms of cross-institutional integration. For example, the Asana platform, which was used for internal monitoring within CAINT, was not linked to broader data systems such as those operated by MDIC (e.g., under the *Nova Indústria Brasil* strategy) or by MME (e.g., for the National Energy Efficiency Plan). Similarly, Inmetro's own internal data tools were not connected to external dashboards or open-access portals that could support knowledge sharing with other stakeholders, including the private sector and civil society.

Monitoring and accountability systems were not shared across donor institutions. PTB followed its own reporting protocols, and while thematic workshops facilitated learning, no common indicators — such as the number of services adopted by private-sector users — or joint M&E frameworks were established. Potential partners for a joint monitoring system could have included Inmetro (via CAINT and the output coordinators), MDIC (in the context of ENIQ and industrial policy implementation), and GIZ (through the bilateral energy partnership and its dashboards). Closer integration with platforms such as the ENIQ coordination interface (**which was still being developed and only formally published in June 2025**) or collaborative dashboards maintained by the GIZ-led bilateral energy partnership could have helped track systemic effects more consistently. For instance, coordination with MDIC's strategic instruments under the "*Nova Indústria Brasil*" industrial policy, the future ENIQ implementation with MME's data systems for the National Energy Efficiency Plan, could have enhanced alignment and long-term tracking of outcomes or indication of the Minimum Energy Efficiency Standards (MEPS) for commercial refrigerators that could support the extension of the PBE to this product line. This represents a missed opportunity for improved cross-institutional accountability and learning.

Overall Assessment of Coherence:

The intervention is coherent both internally, within the German development cooperation portfolio, and externally, with Brazil's institutional frameworks. Task division between PTB and GIZ was generally effective, and coordination with Inmetro was respectful of subsidiarity. However, frequent staff changes on all sides – within PTB, GIZ, and Inmetro – limited institutional memory and continuity in coordination. In the absence of mechanisms for structured knowledge transfer and joint steering, this affected strategic alignment across institutions and hindered systemic coherence.

The overall score is **3 (successful to a limited extent)** due to the application of the formal rating system without decimals. This technical rounding does not fully reflect the positive findings on internal and external alignment, but points to **the need for stronger institutional integration and more formalized cooperation structures** in future phases.

Summary Table: Coherence

This assessment considers the project's internal and external alignment within the development cooperation ecosystem, weighing both complementarity with German initiatives and coordination challenges in Brazil's fragmented QI landscape.

Criterion	Evaluation dimension	Weighting	Appraisal
Coherence	Internal coherence: Within German development cooperation, the intervention was designed and implemented in a complementary manner, based on the division of tasks.	50 %	2

	External coherence: The intervention's design and implementation complement the partner's own efforts and are coordinated with other donors' activities.	50 %	3
Global assessment of the coherence			2,5

5.1.3 Effectiveness

Dimension 1: To what extent has the intervention achieved its objective (at outcome level) according to the indicators agreed upon?

The intervention is broadly on track to achieve its intended objectives by the end of the project period. Key outcome indicators — such as the development and uptake of at least three new or improved QI services — have been met or are progressing toward finalization. Examples include the biogas analysis protocol, the implementation of traceability methods in anemometry, and the operationalization of accreditation scheme according with ISO/IEC 17029. Although the photovoltaic calibration service was initially planned, its completion is expected to extend beyond the current project cycle.

However, it should be noted that the final annual report for 2024 and the associated updated outcome data were not made available to the evaluation team. The only source of indicator-level information was the presentation provided during the evaluation's kick-off meeting in December 2024. As a result, the degree of fulfilment of the outcome indicators could not be independently verified at the time of reporting. Moreover, while the project documentation lists several new or improved services, it does not consistently distinguish between those developed in Phase I (2016–2020) and Phase II (2021–2025). Despite this attribution gap, the available output data and stakeholder interviews strongly suggest that the minimum target of three services developed during Phase II has been achieved and possibly exceeded. Usage data, however, remains unavailable.

Outcome indicator	Degree of fulfilment (in %)	Appraisal (A-C)	Justification
Three new or improved QI services are used by energy sector clients (e.g., labs, generators, grid operators, manufacturers). Initial value: 0 Target value: 3 Current value: 2 (data from 01/2025)	Likely 100% (usage data unavailable)	B+	Multiple new or improved services have been developed, including in biogas, solar, and conformity assessment. However, project reporting does not clearly distinguish between services developed in Phase I and Phase II. Despite this, triangulated evidence from outputs and stakeholder interviews indicates that the target has likely been achieved or exceeded. Due to the lack of usage data, full verification was

			not possible at the time of the evaluation.
Inmetro and stakeholders exchanged via two sector-specific mechanisms (e.g., committees, forums). Initial value: 0 Target value: 2 Current value: 1 (InovInmetro established)	50%	A	InovInmetro successfully established. Second mechanism expected to be implemented in 2024.
Legal framework for the PBE (transversal regulation) is enacted. Initial value: 0 Target value: 1 Current value: 1 (published in 2024)	100%	A	Publication in September 2024

The establishment of InovInmetro as an internal platform for stakeholder engagement, as well as initial pilot events of thematic dialogues — particularly in the biogas sector — contributed to enhanced institutional responsiveness. These efforts reflect a shift toward a more open and collaborative institutional culture, even though formalization of the dialogue formats remains ongoing.

In the regulatory domain, the modernization of the PBE framework advanced through the preparation and public consultation of a revised technical proposal. Although narrower in scope than originally envisioned, this development represents a relevant step toward more adaptive and transparent regulatory processes.

Taken together, the project has delivered measurable outcome-level results. Nonetheless, due to the absence of updated monitoring data and final reporting from 2024, the assessment relies primarily on stakeholder interviews, output tracking, and plausibility reasoning. While qualitative aspects such as behavioural shifts and institutional adaptation were not captured by specific indicators in the initial results matrix, they were nonetheless observed and discussed among key stakeholders during the evaluation process.

Dimension 2: To what extent have the intervention's activities, inputs and outputs considerably contributed to achieving the intervention's objective (at outcome level)?

The delivery of key technical inputs — including the calibration of solar reference cells, pitot tubes for anemometry, and analytical methods for biogas — has substantially enhanced Inmetro's technical capabilities. The launch of InovInmetro introduced a new platform for institutional innovation and responsiveness. Revised technical regulations and stakeholder consultations linked to the PBE process also represent meaningful outputs.

These outputs have begun to be used by Inmetro departments and selected external stakeholders such as ABRAC. However, the full uptake remains limited due to constrained outreach, fragmented internal communication, and uneven integration across departments. Access to the project's benefits is formally open, but practical barriers persist for smaller or decentralized actors. While no specific targeting or

monitoring mechanisms for disadvantaged groups were implemented, this was not foreseen in the project's scope and should not be weighed negatively in the assessment.

Key internal factors influencing achievement of the project's objective included high staff turnover—particularly six directors in eight years within DCONF—and the absence of a formal steering structure, which led to reduced strategic coherence. External factors included political transitions at the national level, which impacted institutional continuity and delayed planned reforms.

Dimension 3: To what extent has the quality of the intervention's implementation considerably contributed to achieving the intervention's objective (at outcome level)?

Summary assessment:
The quality of implementation was mixed. The technical implementation of laboratory services and regulatory outputs was strong and benefited from Inmetro's expertise. However, several success factors of Capacity WORKS—particularly strategic steering, institutional learning, and process integration—were underdeveloped. While some cooperation mechanisms functioned well and the creation of InovInmetro supported innovation, the absence of a formal steering structure and a systematic results-based monitoring system limited the project's ability to adapt and align strategically. On this basis, the dimension is rated **2.6**, indicating that the implementation contributed to outcome achievement, but was hindered by structural weaknesses.

CW – Strategy Factor: The project strategy was jointly developed in a participatory process, largely conducted remotely due to the COVID-19 pandemic. While this ensured continuity, it limited deep engagement and mutual strategic ownership. The theory of change and results logic were not systematically reviewed or updated during implementation. Although the project had a clear thematic focus, strategic planning remained static and reactive to contextual changes.

CW – Cooperation Factor: Cooperation among key actors improved during the second half of the project, especially following leadership changes at CAINT. Dialogue with external stakeholders, such as ABRAC, was enhanced, and new formats such as thematic dialogues were introduced. However, cooperation was not based on a formalized framework, and responsibilities were not always clearly defined across departments. Informal mechanisms compensated for this to some extent but could not replace institutionalized cooperation processes.

CW – Steering Structure Factor: A formal steering committee did not exist. Operational coordination took place through the "*Grupo Coordenador*", which included CAINT, output coordinators and PTB advisors. This structure facilitated working-level coordination but lacked the mandate and mechanisms to provide strategic oversight or revise the project logic. Strategic discussions occurred informally and were not based on systematic monitoring data. This hindered strategic alignment and institutional responsiveness, especially during times of political or institutional transition.

CW – Processes Factor: Sectoral and institutional processes were partially analyzed, but not systematically mapped or integrated into project management. Thematic dialogues and stakeholder consultations were functional but remained disconnected from broader strategic planning and budgeting cycles within Inmetro. Organizational adjustments took place around InovInmetro, but the project's influence on long-term process change and institutional transformation was limited.

CW – Learning & Innovation Factor: The creation of InovInmetro as an innovation platform is a clear positive outcome. It encouraged internal collaboration and stakeholder dialogue. However, learning mechanisms (e.g., documentation of lessons, feedback loops, and after-action reviews) were not institutionalized. Knowledge management remained fragmented, and staff turnover hindered continuity. The absence of a structured learning strategy limited the project's ability to build on past experience.

Summarized assessment for Dimension 3:

CW Success Factor	Weight	Appraisal (1–6)	Reason
Strategy	20%	3	Joint development, but limited adaptation and underused theory of change
Cooperation	20%	2	Improved collaboration with internal and external actors, but not institutionalized
Steering Structure	20%	3	No formal committee; ad hoc coordination insufficient for strategic guidance
Processes	20%	3	Partial mapping and integration; limited influence on institutional processes
Learning & Innovation	20%	2	InovInmetro as a key asset; weak institutionalization of learning mechanisms
Overall weighted score		**3 (2,6)**	Implementation contributed to outcomes but lacked strategic depth and structural anchoring

Dimension 4: To what extent has the intervention leveraged potentials of unintended positive results and reacted to risks and/or the occurrence of (unintended) negative results?

The project generated several positive unintended results, including strengthened collaboration among laboratories and new channels of communication across Inmetro's departments. Thematic dialogues not only improved interaction with external stakeholders, but also led to increased cross-departmental exchange within Inmetro, raising internal visibility of project topics and creating a more collaborative institutional culture.

It is important to note that the intervention forms part of a long-standing partnership between PTB and Inmetro. Several interview partners emphasized that despite the limited responsiveness in some areas, Inmetro has evolved positively over the years. The current project contributed to this evolution by reinforcing internal dialogue formats and introducing institutional innovations such as InovInmetro.

In the area of biogas, the intervention supported initial collaboration and technical progress that may position Inmetro more prominently in this sector in the future. However, this development still depends strongly on individual engagement within the chemistry laboratory and should be viewed as an emerging opportunity rather than a consolidated institutional shift.

Some unintended negative effects were observed in the form of reinforced dependence on a small number of committed individuals and insufficient buffering against leadership discontinuities. Strategic steering was largely informal, and the project lacked mechanisms to sustain direction during periods of institutional volatility. **These weaknesses were not directly caused by the intervention, but they were not effectively mitigated either.** In this sense, the project's implicit assumptions about institutional stability were not sufficiently matched with adaptive or risk-responsive structures. The project's results-based monitoring system was insufficiently equipped to detect and address these risks in a timely manner.

Although not directly involved in the project, institutional actors such as ABRAC have played — and could continue to play — a catalytic role in bridging Inmetro's technical developments with market needs, helping to amplify the practical relevance and uptake of project results.

The project achieved most of its intended outputs and made plausible contributions to expected outcomes, particularly in strengthening selected quality infrastructure (QI) services, supporting the modernization of the Brazilian Labelling Program (PBE), and fostering institutional innovation through InovInmetro. Technical implementation was strong, but strategic steering, results-based monitoring, and institutional coordination remained underdeveloped, limiting the project's adaptive capacity and systemic effectiveness.

The overall rating is **3 (successful to a limited extent)** due to the formal grading system's exclusion of decimals. The underlying score of **2.5** suggests a more favorable performance that falls between "successful" and "successful to a limited extent." It reflects a solid technical achievement tempered by structural weaknesses in project governance and learning systems.

Summary Table: Effectiveness

The ratings below reflect the extent to which outputs were achieved and contributed to intended outcomes, considering internal implementation quality and the project's use of strategic tools such as Capacity WORKS.

Criterion	Evaluation dimension	Weighting	Appraisal
Effectiveness	The intervention has achieved its objective (at outcome level) according to the indicators agreed upon.	25 %	2
	The intervention's activities, inputs and outputs have considerably contributed to achieving the project's objective (at outcome level).	25 %	2
	The quality of the intervention's implementation has considerably contributed to achieving the intervention's objective (at outcome level).	25 %	3
	The intervention has leveraged potentials of unintended positive results and reacted to risks and/or the occurrence of (unintended) negative results.[7]	25 %	3
Global assessment of the effectiveness			2,5

[7] *Positive and negative unintended effects should be weighed against each other. If no unintended effects can be identified and there was no corresponding monitoring system, a "2" should be awarded here. If such a monitoring system was in place, a "1" can also be awarded here.*

5.1.4 Efficiency

Description of Inputs

Based on the current project structure, the budget was distributed across four main outputs:

- Output 1: Strengthening technical services in metrology and quality, ISO/IEC 17029 accreditation scheme, etc.);
- Output 2: Institutional innovation and stakeholder engagement through the creation of InovInmetro;
- Output 3: Support for modernization of the Brazilian Labeling Program (PBE);
- Output 4: Promotion of innovative applications of QI services (e.g., biogas and green hydrogen-related innovations).

Overview of Quality Infrastructure Services Developed or Strengthened under the PTB–Inmetro Project (2016–2025)

The following table summarizes the main technical services and institutional mechanisms developed, enhanced, or introduced across the four outputs of the project. These services reflect the project's strategic focus on supporting Brazil's energy transition through quality infrastructure.

Output	Area	Developed Service or Contribution	Institution(s) Involved
1	Biogas	Calibration service for CH_4 and CO_2; proficiency testing scheme	DIMCI, Chemistry Lab
1	Solar	Calibration of solar cells (outdoor test bench)	DIMCI
1	Hydrogen	Measurement of purity and impurities in H_2 (initial mapping)	DIMCI, Dconf
1	Accreditation	Recognition of ISO/IEC 17029 scheme for conformity assessment	Cgcre
2	Institutional	Establishment of InovInmetro innovation platform	CAINT, all departments
3	PBE	Drafting of cross-cutting Portaria; benchmarking studies	Dconf, MME
4	New applications	Stakeholder dialogues on H_2; biogas roadmap	Dconf, stakeholders

While a final cost breakdown is pending (FiMo "Summary of Actual Costs" table), qualitative assessments indicate that resource allocation broadly reflected these strategic priorities. Additional budget categories likely included central metrology services (DIMCI), stakeholder engagement (dialogues and consultations), and limited support to accreditation areas that may only extend a new service without its efficiency aspects being addressed (e.g. Cgcre).

On the other hand, the political changes in the country and at Inmetro did not allow for effective results when analyzed against the PBE modernization criterion, even with investments in missions and benchmarking work, it was not possible to advance the Brazilian program as planned.

Dimension 1: To what extent can the use of resources by the intervention be deemed reasonable regarding the outputs achieved (production efficiency)?[8]

The project largely delivered its planned outputs using allocated resources in a reasonable and controlled manner. Most activities were executed within the available budget, and no evidence of major overspending was identified. At the operational level, production efficiency was generally satisfactory. However, some efficiency losses occurred due to fragmented travel planning, limited integration between missions, and uncoordinated efforts during the early stages of the PBE modernization. While not formal duplications, overlapping responsibilities and limited role clarity — especially during leadership transitions — led to redundancies in stakeholder engagement and delayed certain planning decisions.

To avoid conflating production and allocation efficiency, strategic aspects such as the project's two-year extension and the implementation timeliness are treated under allocation efficiency (see Dimension 2).

Efficiency gains were realized in some areas, such as the internalization of facilitation capacities by Inmetro. Initially, external consultants were required to moderate thematic dialogues and workshops; however, over time, Inmetro developed internal competencies to lead these processes, reducing reliance on outsourced support. This also strengthened institutional ownership and continuity.

Production efficiency could have been further improved through better integration of missions, structured documentation of lessons learned, and consistent application of internal learning platforms. These measures would have mitigated knowledge loss caused by staff turnover and avoided redundancies. Overall, although some transaction costs and delays were observed, the project demonstrated reasonable production efficiency under challenging circumstances and is expected to finalize its remaining outputs by the end of 2025.

Dimension 2: To what extent can the use of resources by the intervention be deemed reasonable regarding the achievement of the intervention's objective/outcome (allocation efficiency)?[9]

From the perspective of allocation efficiency, the project's use of resources is deemed reasonable. The two-year extension, driven in part by COVID-19 restrictions and institutional turnover, affected the timeliness of implementation — a core aspect of allocation efficiency. While financial savings may not have been substantial, stronger planning - especially regarding leadership continuity and cross-departmental engagement - might have reduced delays and strengthened systemic impact. Key results, such as stakeholder engagement mechanisms and service-level improvements, could have been amplified through better integration of monitoring tools, internal communication strategies, and cross-sector collaboration.

The strategic decision to include biogas as an additional technical field, following stakeholder demand, represents a positive example of adaptive allocation. Conversely, the absence of early integration of private-sector users — such as ABRAC — limited uptake and systemic learning at outcome level, despite modest resource needs. Likewise, strategic learning mechanisms such as centralized documentation or interdepartmental knowledge platforms could have strengthened horizontal effects.

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[8] Production efficiency refers to the relationship between inputs and outputs; "allocation efficiency" to the relationship between inputs and achieved results. The criterion covers both project design and implementation.

[9] Focus is on the timeliness and use of funds. Comparing planned and actual spending helps assess opportunity costs and resource efficiency over time.

Summarized Evaluation of Efficiency

The project's efficiency is assessed as reasonable. Outputs were largely delivered within the planned budget, and some operational gains were achieved through internalized capacities at Inmetro. Nonetheless, coordination gaps, staff turnover, and fragmented planning led to avoidable delays and reduced cost-effectiveness in certain areas.

At the strategic level, resources were broadly aligned with priorities, and adaptive measures such as the inclusion of biogas services responded to emerging needs. However, delayed stakeholder engagement and limited learning structures reduced systemic effects.

With a score of 2.5, efficiency is slightly lower than effectiveness (2.3), mainly due to missed opportunities for optimization in planning, coordination, and knowledge transfer.

The following grades assess the use of resources in relation to outputs and outcome-level contributions, considering contextual limitations and the project's internal cost-effectiveness.

Criterion	Evaluation dimension	Weighting	Appraisal
Efficiency	The use of resources by the intervention is deemed reasonable with regard to the outputs achieved (production efficiency).	50 %	2
	The use of resources by the intervention is deemed reasonable with regard to the achievement of the objective/outcome (allocation efficiency).	50 %	3
Global assessment of the efficiency			2,5

5.1.5 Higher-Level Development Results

Dimension 1: To what extent have the intended higher-level development changes taken place or are expected to take place in the near future?

The project is designed to contribute to Brazil's long-term transformation towards a greener and more efficient energy system by strengthening its quality infrastructure (QI). While direct attribution is limited, it is plausible that the intervention contributes to the enabling environment for structural change. This includes improved conditions for integrating renewable energy into the grid and for supporting decarbonisation through energy efficiency.

Higher-level development changes are expected to materialize over a **2–5-year horizon**, depending on adoption rates and broader policy alignment.

- **Economic**: The project improved the technical environment for renewable energy, potentially fostering innovation and investment.
- **Environmental**: Enhanced metrology and regulatory frameworks support Brazil's decarbonisation goals (SDG 13).
- **Social**: More transparent labelling (PBE) may empower consumers and reduce energy costs, though tangible effects on low-income households are only expected in the medium term.

Interactions between these dimensions are mostly positive. Trade-offs (e.g., affordability of energy-efficient products) may exist but are not directly attributable to the project.

Dimension 2: To what extent have the results achieved by the intervention (at outcome level) contributed to the intended or implemented higher-level changes?

The intervention plausibly contributes to higher-level development results through a combination of technical and institutional achievements. Outcome-level results—such as the development of new QI services (e.g., biogas and photovoltaic calibration), the transversal framework for the Brazilian Labelling Program (PBE), and the creation of InovInmetro—have laid important foundations for long-term transformation. InovInmetro functioned as a semi-permanent platform for institutional innovation, stakeholder engagement mechanisms, and internal cultural change. Its sustainability, however, remains contingent on continued leadership support and strategic integration. In the biogas sector, improved metrological services and increased visibility helped position Inmetro more prominently in this emerging field, although adoption remains dependent on external demand and internal continuity.

Some limitations were encountered, notably in relation to institutional continuity at Inmetro, the underdevelopment of systematic monitoring mechanisms, and untapped opportunities to strengthen private sector stakeholder engagement during the early design and implementation phases. Despite these constraints, the intervention served as a reference model in several respects. InovInmetro demonstrates potential as a replicable structure for institutional innovation. The introduction of thematic dialogues marked a qualitative shift in stakeholder engagement and organizational learning, and the modernization process of the PBE established new participatory approaches to regulatory reform. In interviews, several Inmetro staff expressed the need for more systematic Regulatory Impact Assessments (RIA) to guide evidence-based regulatory reform processes.

Dimension 3: To what extent has the intervention contributed to positive and not to negative unintended higher-level development changes?

The intervention contributed to several positive development effects that, although not formally defined as target outcomes, were consistent with the project's overarching objectives and strategic direction. These developments are part of a broader trajectory of institutional transformation that has been supported by a long-standing partnership between PTB and Inmetro, which dates back to the 1960s. The current intervention builds on a first dedicated project phase (2016–2020) and constitutes the second phase of structured cooperation, running from 2021 to 2025. This continuity has facilitated incremental institutional learning and increased alignment between the project and Inmetro's internal reform agenda. Staff from CAINT specifically emphasized a growing sense of ownership and strategic commitment to the project's goals. This evolving institutional maturity is further reflected in the project's indirect but significant contribution to the development of Brazil's biogas sector, where improved metrological services and increased visibility have helped strengthen the sector's technical foundations and supported its inclusion in policy dialogues and strategic planning processes within Brazil's energy transition agenda.

No significant negative unintended consequences have been identified to date. Nonetheless, some potential risks were observed. Fragmented internal communication may have limited opportunities for cross-departmental collaboration, and the uptake of new services could be constrained in the absence of stronger market incentives. While measures to address these risks—such as the facilitation of internal dialogue through InovInmetro—were implemented, they were not consistently institutionalized across the organization.

Summary of Impact Assessment

Overall, the project is rated as moderately successful (2.5) in terms of impact. While plausible contributions to enabling structures—such as institutional innovation (InovInmetro), selected QI

service development, and improved internal collaboration—can be identified, sustained systemic change remains uncertain. The lack of long-term tracking mechanisms and persistent structural risks (e.g., political volatility, leadership turnover) significantly limit the demonstrability and measurability of broader development results.

Criterion	Evaluation dimension	Weighting	Appraisal
Higher-level development results	The intended higher-level development results have taken place or are expected to take place.	25 %	2
	The results achieved by the intervention (at outcome level) have contributed to the intended or implemented higher-level results.	50 %	3
	The intervention has contributed to positive and not to negative unintended higher-level development changes.	25 %	2
Total assessment of the higher-level development results			2,5

5.1.6 Sustainability

Dimension 1: To what extent do the partners, target groups and organizations involved have the capacities required to ensure that positive results are continued?

The sustainability of the project's outcomes depends significantly on the institutional capacity and internal coherence of Inmetro. Technically, key departments - particularly those involved in metrology and energy labelling - have the operational ability to maintain and further develop new services introduced under the project, such as biogas and photovoltaic calibration. However, financial sustainability remains fragile due to structural limitations in public budgeting and the absence of institutionalized mechanisms for long-term resource allocation.

Ownership is evident in selected units, such as CAINT and DIMCI, where engagement and strategic orientation align closely with the project's goals. The establishment of InovInmetro reflects a positive institutional will to continue stakeholder-oriented reforms.

While Inmetro retains the formal national mandate for quality infrastructure—ensuring its legitimacy and authority—it operates within a fragmented QI landscape (see Chapter 3.1). This context requires continued inter-institutional coordination and political support. Technical infrastructure has been improved, but resilience across Inmetro's organizational units remains inconsistent, with regulatory and governance areas showing particular vulnerability to external pressures and institutional instability. Risks such as political interference, leadership turnover, and a lack of systematic risk management remain partially addressed at best.

Dimension 2: To what extent has the intervention considerably contributed to the capacity of partners, target groups and other organizations involved to continue the positive results?

The intervention contributed meaningfully to strengthening Inmetro's institutional capacities. Notably, the creation of InovInmetro as a semi-permanent innovation structure, the operationalization of new QI services in biogas and photovoltaics, and the development of participatory stakeholder engagement mechanisms have all enhanced the organization's institutional maturity.

Training activities and expert support contributed to increased human capital within Inmetro, and the engagement of private sector associations—particularly ABRAC—has created foundations for more durable sectoral alliances. However, the intervention provided limited support for the institutional consolidation of results. Tools that could help anchor innovations—such as basic financing strategies, human resource planning, or formalized learning systems—were not systematically addressed. Promising learning formats emerged (e.g. InovInmetro) but were not institutionalized in ways that would mitigate known risks like staff turnover or leadership discontinuities. As a result, positive dynamics remained vulnerable to external shocks.

Resilience was strengthened primarily in technical departments, while governance and management structures continued to show fragility. The intervention did not explicitly define vulnerable individuals or groups as part of its target group, nor were rights holders structurally addressed in the project logic. As a result, no specific contributions to the resilience or sustained access to QI services for disadvantaged actors can be observed.

This observation reflects the project's design choices and is **not meant as a critique of implementation quality** but highlights an area where future interventions could strengthen inclusion and adopt a clearer human rights-based approach, in line with the BMZ's cross-cutting objectives.

Dimension 3: To what extent are the results of the intervention durable?

The project's technical outputs—such as metrological services and testing protocols—are likely to remain operational, provided that core technical capacity and minimal institutional support are maintained. Institutional innovations, especially InovInmetro, show strong potential for long-term impact, but their continuation will require consistent leadership backing and resource allocation.

Key risks to durability include the absence of institutionalized knowledge management, the erosion of institutional memory due to high staff turnover, and ongoing vulnerabilities in budget and strategic planning. These soft risks—though not immediately disruptive—limit the institutional anchoring of innovation and stakeholder engagement processes developed during the project.

At the same time, there is credible potential for lasting impact. Inmetro's involvement in national discussions on renewable energy certification (e.g., biogas traceability and measurement protocols) has improved its positioning as a technically relevant actor in Brazil's energy transition agenda. The reputational capital associated with partnerships under the German-Brazilian cooperation umbrella (e.g., with PTB and GIZ) also reinforces Inmetro's visibility and legitimacy at the national and international levels.

Some mitigation measures are already in place. The creation of InovInmetro, the initiation of internal strategy dialogues, and efforts to decentralize knowledge (e.g., through training and interdepartmental working groups) have partially addressed institutional risks. However, the long-term sustainability of these results will depend on the formal integration of these mechanisms into Inmetro's governance structures and human resource planning.

Summary of Sustainability Assessment

Overall, the project is rated as successful to a limited extent (3.0) in terms of sustainability. Technical capacities and selected institutional mechanisms—such as InovInmetro and stakeholder dialogue formats—show promising potential for continuity. However, sustainability remains uneven

across departments and depends on ongoing political and managerial commitment, which cannot be ensured by the project alone.

Criterion	Evaluation dimension	Weighting	Appraisal
Sustainability	The partners, target groups and organizations involved have the capacities required to ensure that positive results are continued.	33.33 %	3
	The intervention has considerably contributed to the capacity of partners, target groups and other organizations involved to continue the positive results.	33.33 %	3
	The results of the intervention are durable.	33.33 %	2
Total assessment of the sustainability			2,6

Synthesis of Key Findings Across Criteria

Taken together, the evaluation reveals a project that is highly relevant to national and international policy frameworks, and largely effective in delivering technically sound outputs and fostering institutional innovation. The coherence with German and Brazilian priorities is strong, although the absence of formal coordination mechanisms limited broader synergies. The intervention plausibly contributes to higher-level development goals, especially in the renewable energy and efficiency sectors, while laying foundations for longer-term institutional transformation. Sustainability remains a concern due to financial fragility, leadership turnover, and limited knowledge retention structures. Nonetheless, positive signals—such as increased ownership in key departments, the successful establishment of InovInmetro, and growing private sector stakeholder engagement—suggest that many project outcomes have the potential to perdure beyond the project's current horizon.

5.1.7 Summary of the intervention's contributions to the 2030 Agenda for Sustainable Development

Based on the evaluation findings presented in Sections 5.1.1 to 5.1.6, the intervention demonstrates a credible, if selective, contribution to the core principles of the 2030 Agenda for Sustainable Development. The analysis below interprets the OECD-DAC criterion ratings in light of the Agenda's key dimensions: **universality and shared responsibility**, **multidimensional sustainability**, **inclusiveness**, and **accountability**.

Universality and Shared Responsibility

The project's **high relevance (2.0)** and **coherence (2.2)** confirm its strategic alignment with both national (e.g. Brazil's NDCs and industrial policies) and international frameworks (e.g. BMZ's Just Transition agenda). These ratings reflect a shared commitment to supporting low-emission energy

systems and regulatory innovation. The use of existing institutional structures—particularly Inmetro's legal mandate and technical departments—ensures that responsibilities were embedded in nationally recognized systems, rather than parallel donor-driven mechanisms.

Multidimensional Sustainability

The intervention made tangible contributions to **environmental** and **economic sustainability**, as reflected in its **impact (2.3)** and **sustainability (2.4)** scores. Investments in renewable energy metrology and modernization of the PBE directly support SDGs 7, 9, 12, and 13. However, structural risks—such as fragmented governance, leadership turnover, and weak institutional memory—undermine long-term resilience. While no major negative effects were observed, the durability of results remains partially dependent on continued political will and internal capacity.

Inclusiveness and the Principle of Leave No One Behind

Inclusiveness was not an explicit design objective and was reflected only indirectly in implementation. As discussed in the **relevance (2.0)** and **effectiveness (2.3)** sections, the project primarily targeted institutional stakeholders and regulatory bodies. Vulnerable groups, such as small-scale producers or lower-income consumers, were not structurally included. The project's contribution to inclusiveness is therefore limited, though energy labelling and decentralized QI services may yield indirect social benefits in the medium term.

Institutional Learning and Accountability

As highlighted in the **efficiency (2.5)** and **sustainability (2.4)** sections, the absence of a joint monitoring framework between PTB and Inmetro constrained strategic adaptation and mutual accountability. Learning did occur—particularly through innovation platforms like InovInmetro and stakeholder dialogues—but was not systematically institutionalized. There is strong potential for improvement in future phases through joint impact monitoring, structured feedback loops, and clearer steering mechanisms.

Conclusion

In summary, the intervention aligns well with the 2030 Agenda in terms of strategic orientation, technical contribution, and systemic ambition. However, limitations in inclusiveness, monitoring, and sustainability mechanisms reduce the depth of its impact. The evaluation confirms that while the project laid important foundations, future cooperation must strengthen integration across sectors, promote equity-oriented access strategies, and institutionalize learning to ensure full alignment with Agenda 2030 principles.

6. Assessment of specific evaluation questions

The evaluation addressed two specific learning questions identified by PTB to inform the planning of a potential third project phase and an upcoming scoping mission in July 2025. These questions focused on optimizing cooperation to enhance effectiveness and understanding the status and future trajectory of the Brazilian Energy Efficiency Labelling Programme (PBE). The following sections summarize the findings in relation to each of these questions.

Learning Question 1: How can the cooperation system be optimized to enhance intervention effectiveness? Which actors should be more engaged, and how?

The evaluation confirms that the second project phase built on several operational lessons from Phase I (2016–2020), particularly in relation to stakeholder engagement and internal cooperation within Inmetro. Tools such as InovInmetro and the introduction of thematic dialogues emerged directly from Phase I's identified gaps—namely the absence of formalized communication and external outreach

structures. The gradual inclusion of private-sector actors—such as through consultations with associations like ABRAC—reflects a positive learning curve towards more user-oriented service design.

However, strategic and system-level learning remained only partially institutionalized. The absence of a formal strategic steering structure—already noted as a weakness in Phase I—persisted in Phase II. Although weekly coordination meetings between PTB and Inmetro maintained operational alignment, they did not serve as platforms for strategic monitoring or updating the project's theory of change.

To enhance effectiveness, the project would benefit from strengthening joint governance mechanisms. This includes the creation of a project steering committee that meets periodically to review strategic direction, monitor assumptions in the theory of change, and guide stakeholder integration. In addition, deeper engagement is recommended with institutions that were insufficiently involved in Phase II despite their systemic relevance - namely Cgcre (accreditation), ABNT (standardization), and regulatory partners. These actors have roles in defining technical norms and regulatory frameworks that intersect with energy efficiency and renewable energy services, but they remained peripheral to project implementation.

Engagement with the private sector improved through the introduction of stakeholder engagement mechanisms, particularly with associations like ABRAC. However, a more structured approach to stakeholder mapping and early-stage involvement in service design is needed to ensure ownership, market relevance, and broader adoption. Regional diversification also remains a gap; Inmetro's QI services remain concentrated in specific geographic areas, limiting responsiveness to regional needs and innovation hubs[10].

Internally, the use of InovInmetro shows promise as a cross-cutting innovation and dialogue platform. Yet, the institutionalization of learning remains weak. A structured knowledge management system—covering documentation, lessons learned, and continuity mechanisms—is essential to ensure that innovation and cooperation gains are not lost due to staff turnover or political shifts.

Learning Question 2: How do stakeholders assess the status and future of PBE, and which actors are driving its progress?

Stakeholder feedback on the PBE modernization process was generally positive, particularly in relation to the development of the cross-cutting regulatory framework (*Portaria transversal*) and improved dialogue with industry. The PTB project was credited with supporting technical improvements and institutional frameworks that are aligned with the goals of the National Energy Efficiency Plan (PNEf).

However, several actors noted that the reform remains incomplete. The transversal framework has laid an important foundation, but sector-specific regulations are still pending, and interministerial coordination is inconsistent. There is a lack of formal institutional anchoring for the cross-cutting regulatory framework, and no dedicated structure ensures follow-up, implementation, market vigilance or enforcement.

Momentum for the PBE modernization is currently being driven by a combination of actors: technical departments within Inmetro, selected private sector stakeholders (e.g., energy-intensive industries), and consultants engaged in regulatory design. ABRAC has played a catalytic role in pushing for more transparency and reliability in energy labelling. Nevertheless, broader market adoption and public trust

[10] Innovation hubs are regional centers where research, business, and collaboration drive technological and market-oriented innovation. In Brazil, many are outside the capital and need more tailored QI services.

in the PBE depend on expanding this coalition to include more sectoral ministries (e.g., MME, MDIC), enforcement agencies, and consumer groups.

In sum, while the project made significant technical contributions to the PBE and strengthened the basis for stakeholder participation, the future success of the programme hinges on political continuity, stronger institutional integration, and clear implementation structures that extend beyond the project's technical scope. Ensuring that the transversal framework translates into practice will require a more strategic approach to institutional alliances and regulatory ownership in a potential third phase.

7. Lessons learned

The evaluation of the PTB–Inmetro cooperation highlights a set of important lessons that are relevant not only for planning a potential third project phase, but also for informing future PTB-supported interventions in complex institutional settings. These lessons reflect both the achievements and persistent challenges encountered during the two project phases (2016–2020 and 2021–2025), and underscore the importance of linking technical cooperation with long-term institutional development and adaptive systems thinking.

It is important to recognize that both phases unfolded in a highly dynamic—and at times adverse—environment. The second phase, in particular, was shaped by three external factors: first, the political climate under the Bolsonaro administration, which deprioritized regulatory institutions and curtailed public sector reform; second, the effects of the COVID-19 pandemic, which disrupted institutional processes and delayed implementation timelines; and third, significant staff turnover at both PTB and Inmetro, accompanied by structural financial constraints and a shrinking workforce within Inmetro. These factors significantly influenced the project's implementation context and must be considered when assessing the depth and pace of institutional change.

The following lessons are structured according to their relevance to the OECD-DAC evaluation criteria and provide guidance for future cooperation strategies:

Lesson	Core Message	Related OECD-DAC Criteria
1. Context sensitivity	Political and institutional volatility (e.g. during the Bolsonaro administration) significantly shaped project implementation. Flexible cooperation structures and political economy analysis are essential.	Relevance, Coherence
2. Innovation requires institutional anchoring	InovInmetro was a key innovation driver, but its impact remains fragile without formal integration into governance and budgeting processes.	Effectiveness, Sustainability
3. Steering requires structure, not just coordination	Operational coordination alone cannot substitute for a formal strategic steering mechanism. Structured oversight is critical for tracking systemic outcomes.	Effectiveness, Efficiency
4. Structure stakeholder engagement early	Stakeholder dialogues improved in Phase II, but earlier mapping and feedback mechanisms would have strengthened relevance and uptake.	Efficiency, Effectiveness

Lesson	Core Message	Related OECD-DAC Criteria
5. Build resilience through continuity planning	Leadership changes, staff turnover, and budgetary instability weakened implementation. Embedding the project in national long-term strategies (e.g. ENIQ, NIB) enhances resilience.	Sustainability, Impact
6. Technical outputs require uptake strategies	High-quality technical outputs (e.g. in biogas, PV) need accompanying strategies for regulatory integration, institutional ownership, and market incentives.	Effectiveness, Impact
7. Systemic learning requires systemic monitoring	Without a dynamic results framework, learning remained reactive. A regularly reviewed theory of change and joint monitoring mechanisms are critical for adaptive management.	Efficiency, Sustainability, Learning & Accountability

Topics for further internal PTB exchange

In addition to the formal lessons derived from project implementation, several cross-cutting topics emerged that may be valuable for internal reflection and organizational learning within PTB:

- Approaches for embedding strategic steering in technically driven projects
- Continuity planning in contexts with high leadership turnover
- Structuring stakeholder engagement for system-level impact
- Strengthening the interface between innovation tools (e.g. InovInmetro) and institutional strategy to ensure long-term relevance and integration.

These findings provide a foundation for targeted improvements in strategic steering, institutional resilience, and learning systems, and are directly linked to the recommendations in Chapter 8.

8. Recommendations

Based on the evaluation's findings and guided by the specific learning questions, the following recommendations are provided to improve future cooperation, enhance systemic impact, and inform the design of a potential third phase. The recommendations are derived from the analysis of project achievements and constraints, learning between the two phases, and the structural conditions under which the intervention took place.

They take into account not only technical and institutional dynamics, but also broader contextual challenges, including political volatility, budgetary constraints, and shifts in leadership that have shaped the operating environment for both PTB and Inmetro. The evaluation recognizes that many of the systemic limitations identified—such as reduced staffing capacity, weakened steering structures, or inconsistent inter-ministerial coordination—are not solely the result of project design, but stem from external structural factors. Therefore, the recommendations aim to strike a balance between ambition and realism, offering pragmatic proposals for adaptive, inclusive, and resilient cooperation strategies going forward.

Recommendations to the partners (Inmetro and related Brazilian institutions)

Strategic Steering and Internal Governance

- Establish a formal, cross-departmental steering committee to ensure strategic alignment, improve internal communication, and coordinate cross-unit contributions. This mechanism should reinforce CAINT's institutional position and mitigate bottlenecks caused by individualized coordination. (Priority: Highest)

Institutional Anchoring and Sustainability

- Institutionalize InovInmetro as a permanent platform with formal links to Inmetro's planning and decision-making processes. (Priority: High)
- Develop internal knowledge management systems to preserve institutional memory, including structured documentation of lessons learned, continuity planning, and monitoring based on the project's results matrix. (Priority: High)

Policy Alignment and Regulatory Continuity

- Secure political and institutional commitment for the PBE framework by activating or establishing interministerial coordination mechanisms (e.g. involving MME and MDIC) to ensure stronger ownership and implementation capacity. (Priority: High)

Stakeholder and Regional Outreach

- Expand early and systematic engagement with private sector stakeholders through actor mapping, consultation formats, and feedback loops. (Priority: Medium)
- Develop regionalized QI approaches, tailoring service delivery to local needs through structured assessments and coordination with subnational institutions. (Priority: Medium)

Service Delivery Models

- Incorporate simple business planning elements—such as Canvas model, cost structure, user targeting, and basic performance indicators—into the design of new QI services, to support adoption and long-term sustainability. (Priority: Medium)

To the PTB Project Implementation Team

Joint Monitoring, Learning and Adaptation

- Establish a joint monitoring and learning framework with Inmetro, with regular reviews of the results matrix, outcome tracking, and a strategic steering forum (specifically involving CAINT, Cgcre, and technical divisions—together with PTB, and consider periodic inclusion of key external stakeholders (e.g., german cooperation partners, Brazilian ministries, private sector associations or regulatory bodies). (Priority: Highest)

Stakeholder System Integration

- Systematically involve Cgcre and ABNT in project planning and implementation to align technical cooperation with standardization and accreditation systems. (Priority: High)

Strategic Policy Alignment

- Promote stronger integration of project outputs with national policy frameworks, such as ENIQ, NIB, and Brazil's decarbonization commitments — starting from the design phase. (Priority: High)

Risk and Knowledge Management

- Anticipate political and organizational shifts through risk mapping and continuity planning. (Priority: Medium)
- Document institutional learning processes systematically and create accessible knowledge repositories. (Priority: Medium)

Policy Contribution

- Support the development of incentive frameworks (e.g., linking PBE to public procurement or fiscal mechanisms). (Priority: Medium)
- Provide targeted support for Regulatory Impact Assessments (RIA) to strengthen evidence-based policymaking. (Priority: Medium)

To PTB's International Cooperation Department (Group 9.3)

Resilience and Systems Thinking

- Systematically integrate resilience planning into project design — for example through flexible sequencing, distributed ownership, or scenario planning — especially in volatile institutional contexts. (Priority: High)

Stakeholder Engagement Standards

- Define minimum standards for stakeholder mapping and engagement planning — not only identifying relevant actors, but also outlining how, when, and through which formats they should be involved — to be applied in early project phases. (Priority: Medium)

German Development Cooperation Synergies

- Strengthen coordination mechanisms with other German actors (e.g., GIZ, KfW) at the country level to enhance complementarity and shared learning. (Priority: Medium)

Evaluation Design and Learning

- Encourage more meaningful use of existing theory-of-change tools (e.g. results matrix, impact model) to explicitly reflect the rationale for intervention, institutional risks, and pathways to systemic change. (Priority: High)

To PTB Evaluation Unit (Working Group 9.01)

- Ensure that knowledge management practices—both within PTB and among partner institutions—are systematically assessed in evaluations, where relevant. (Priority: Medium)

Monitoring Resilience and Adaptation

- Include context-relevant resilience indicators—such as leadership continuity, political backing, and institutional coordination—in evaluation frameworks, especially in settings with known institutional volatility. (Priority: Medium)
- Develop learning templates for capturing unplanned results and adaptive strategies. (Priority: Medium)

Digital Tools

- Promote the use of digital tools to support decentralized implementation, monitoring, and data collection—particularly in contexts with limited institutional continuity or geographic dispersion. (Priority: Medium)

9. Annexes to the evaluation report

1. Impact matrix (from the module proposal)
2. Evaluation schedule
3. Schedule of the field phase/data acquisition, and list of contact persons
4. Questionnaires and/or interview guidelines

Annex 1 – Matriz de Impactos do Módulo[11]

Título do projeto	**Número do Projeto**	**Duração**
Fortalecimento da Infraestrutura da Qualidade (IQ) para energias renováveis e eficiência energética II	**2019.2255.8**	**01/2021 até 12/2023**
País	**Matriz elaborada em**	
Brasil	**16.10.2020**	

Objetivo	Indicadores	Fontes de verificação	Suposições/ Riscos
Objetivo do Programa Através de uma política energética sustentável e de efeito climático neutro que considere os aspectos ecológicos, econômicos e sociais, a emissão de gases de efeito estufa é reduzida e a eficiência no consumo de energia aumentada.	**Indicador 4 do Programa** O marco legal e as condições técnicas para o emprego de energias renováveis e eficiência energética são melhoradas. Valor base: Quadro legal 2017 Valor meta: Descrição das melhorias		Não preencher
Objetivo do Módulo (Outcome) A Infraestrutura da Qualidade nacional para o desenvolvimento das fontes	**Indicador de outcome 1** Até 12/2023 **três** serviços da Infraestrutura da Qualidade novos ou melhorados (p.ex. normas, avaliação da conformidade capacitada para acreditação, programa de acreditação disponível para solicitação, ensaios, rastreabilidade metrológica) são utilizados por clientes do setor	Carta de aceite do cliente atestando que o serviço foi entregue, pedido de calibração, certificado de calibração emitido ou disponibilização do programa de acreditação no site do Inmetro-Cgcre, norma ou regulamento revisada/o ou publicada/o.	As orientações e diretrizes políticas com respeito à modernização do modelo regulatório se mantêm. Através de uma infraestrutura da qualidade que funciona uma

[11] The impact matrix is only available in Portuguese and German language

Objetivo	Indicadores	Fontes de verificação	Suposições/ Riscos
renováveis de energia e a melhoria da eficiência energética está fortalecida.	de energia (como laboratórios, empresas produtoras de energia, operadores de redes, fabricantes). Valor base: 0 Valor meta: 3		contribuição para alcançar os objetivos do clima é feita.
	Indicador de outcome 2 Até 12/2023 o Inmetro e suas partes interessadas (entre outros: laboratórios, ministérios, órgãos técnicos ou reguladores, associações, setor privado) trocam informações no âmbito de **dois** mecanismos de intercâmbio temáticos ou setoriais (p. ex. comites técnicos, grupos de trabalho, foros, plataformas). Valor base: 0 Valor meta: 2	Metas fixadas, plano de trabalho anual/ agenda acordada, reuniões periódicas, financiamento assegurado	
	Indicador de outcome 3 O marco legal do Programa Brasileiro de Etiquetagem (PBE) entra em vigor até 12/2023. Valor base: 0 Valor meta: 1	Por meio do Sistema Inmetro de Legislação (SIL) é possível verificar as Portarias Inmetro e Resoluções Conmetro publicadas. É por meio do SIL que devemos verificar a publicação do marco legal do PBE.	
	Indicador de outcome 4 Até 12/2023 **dois** programas priorizados do PBE tem publicadas novos regulamentos (p. ex. PBE fotovoltaico, refrigeradores). Valor base: 0 Valor meta: 2	Pelo Sistema Inmetro de Legislação (SIL) é possível identificar as publicações realizadas para os aperfeiçoamentos dos regulamentos específicos do PBE.	

Objetivo	Indicadores	Fontes de verificação	Suposições/ Riscos
Output 1 Serviços da Infraestrutura da Qualidade para energias renováveis e eficiência energética estão melhorados.	**Indicador de output 1.1** **Duas** análises técnicas detalhadas (p. ex. definição de faixas de medição e incertezas de medição necessárias, efeitos devidos à injeção de energias renováveis na qualidade de energia das redes) completadas até 12/2021 como base para o desenvolvimento de serviços. Valor base: 0 Valor meta: 2	Documento de análise, resultados de comparações interlaboratoriais	
	Indicador de output 1.2 Até 06/2023 o Inmetro e outros atores da Infraestrutura da Qualidade oferecem **cinco** serviços novos ou melhorados (p. ex. rastrea-bilidade em anemometria, calibração de células solares de referência, avaliação de conformidade para inversores e/ou medidores, ensaios para a qualidade de energia, medição de componentes do biogás, ensaios de proficiência para biogás, novo programa de acreditação). Valor base: 0 Valor meta: 5	Publicados nos sites, diretórios de serviços	
Output 2 O Inmetro implementou de forma piloto mecanismos para melhorar a relação/ orientação ao cliente.	**Indicador de output 2.1** **Três** opções para os mecanismos de intercâmbio e contato com os clientes desenvolvidas por escrito até 06/2022. Valor base: 0 Valor meta: 3	Documento/ relatório	

Objetivo	Indicadores	Fontes de verificação	Suposições/ Riscos
	Indicador de output 2.2 Até 12/2021 **duas** cooperações tecnológicas (p. ex. digitalização metrológica e provimento da Infraestrutura da Qualidade) entre Inmetro (p.ex. incubadora-Ditec) e o setor privado (laboratórios, indústria, start-ups) estabelecidas (acordos assinados). Valor base: 15 (Em 2020: 10 cooperações e 5 laboratórios associados) Valor meta: 17	Acordos documentados	
Output 3 O Programa Brasileiro de Etiquetagem (PBE) está modernizado.	**Indicador de output 3.1** Uma proposta para a futura concepção do PBE (elaborada a partir de uma tomada de subsídios sobre a situação atual e os problemas do PBE e de práticas internacionais de referência) é apresentada aos tomadores de decisão até o final de 2022. Valor base: 0 Valor meta: 1	Publicação oficial do Inmetro da tomada de subsídios e os registros da consolidação dos comentários recebidos. Registros de reunião (ata, slides, listas de presença, etc) para apresentação das alternativas às partes interessadas.	
	Indicador de output 3.2 O marco legal elaborado é colocado em consulta pública até final de 04/2023. Valor base: 0 Valor meta: 1	Pelo Sistema Inmetro de Legislação (SIL) é possível identificar a consulta pública do marco legal do PBE.	
Output 4	**Indicador de output 4.1**	Documentos/ relatórios	

Objetivo	Indicadores	Fontes de verificação	Suposições/ Riscos
Aplicações inovadoras da Infraestrutura da Qualidade para energias renováveis e eficiência energética são identificadas.	**Duas** análises técnicas conduzidas até 12/2021 para novas áreas temáticas no setor de energias renováveis e eficiência energética (p. ex.: a definição de métodos de medição e instrumentos necessários para medidas de vibração ou hidrogênio ou de normas e atores envolvidos na cadeia de produção na área de biogás). Valor base: 0 Valor meta: 2		

Outputs	Principais atividades dos Outputs	Inputs / Instrumentos planejados	Suposições
Output 1	Assessoria técnica, capacitação, intercâmbio de experiências, viagens de estudo, seminários, workshops, estudos, intercomparações, compra de padrões itinerantes e material de consumo, transporte, calibrações, etc.	coordenação missões de especialistas compra de acessórios	
Output 2	Consultoria estratégica, acompanhamento técnico na criação de instrumentos para a orientação ao cliente, organização de fóruns, conferências, artefatos de comunicação, recursos digitais, treinamento, viagens de estudo, eventos, apoio às cooperações com o setor privado, etc.	coordenação missões de especialistas recursos para comunicação	
Output 3	Pesquisas e análises, intercâmbio com partes interessadas, eventos de sensibilização, viagem de estudos para benchmarking, assessorias, treinamento, etc.	coordenação missões de especialistas material	
Output 4	Capacitações técnicas, troca de experiências, seminários, etc.	coordenação missões de especialistas Fundo para o apoio a medidas inovadoras	

Annex 2 - Evaluation schedule

What (Milestones)	Deadline (Remarks)
INCEPTION PHASE	
Inception Report (IR)	It was agreed that the inception report will be prepared in English, with the final version translated into Portuguese.
Evaluator delivers 1st draft (**English**)	13.02.25
PTB delivers comments	17.02.25
Evaluator delivers 2nd draft	18.02.25
PTB delivers comments	21.02.25
Evaluator delivers pre-final IR	05.03.25
PTB delivers comments	07.03.25
Evaluator translates IR into Portuguese	10.03.25
Partners provide comments, if any (deadline 1 week)	+ 1 week
Evaluator delivers final IR	18.03.
DATA COLLECTION PHASE	
Mission to Brazil (Rio de Janeiro and Brasília)	between 24.03.25 and 02.04.25
REPORTING PHASE	
Evaluator delivers 1st draft of evaluation report (**English**)	24.05.25
PTB delivers comments	+ 2 weeks
Evaluator delivers 2nd draft	tbd
PTB delivers comments	tbd
Evaluator delivers pre-final version (there can be more commenting loops, if necessary)	tbd
Project partners deliver comments, if any (two weeks)	+ 2 weeks
Final discussion (alternatively, the final discussion can take place once all reports have been finalized)	tbd
Evaluator delivers 1st draft of short report (English) and One-Pager (German)	tbd
Commenting loops with PTB	
Evaluator delivers final versions of all reports	By 30.09.25
Presentation at Group Q.3	tbd

Annex 3 - Schedule of the field phase/data acquisition, and list of contact persons

Horário	Reunião	Localização	Contatos / Pessoas
Segunda, 24 de março de 2025			
09:00 - 12:00	Reunião de abertura da avaliação - Apresentações - Objetivos e escopo da avaliação - Visão geral do Inmetro a ser feita pela Caint - sobre o projeto, atividades e resultados (Outcomes 1 a 4) a ser falado de forma livre por cada um dos coordenadores de projeto, sem apresentação formal - Alinhamento da agenda e formato de trabalho	Xérem	Evaluation Team (2 persons), local PTB team member CAINT – Coordination for International Affairs Output Managers O1–O3 (Inmetro) Directors and technical staff from Dimci, InovInmetro, Dconf, Dimel
12:00 - 13:30	Almoço	Inmetro	-
13:30 - 16:00	Sessão de avaliação e entrevistas - Output 02 - *mecanismos de intercâmbio e contato com os clientes e cooperações tecnológicas* Entrevistas - Análises das ações e tomada de decisão Análise dos resultados encontrados	Xérem	Evaluation Team (2 persons), local PTB team member Output 02 – Responsible Manager, InovInmetro Relevant technical staff
Terça-feira, 25 de março de 2025			
09:00 - 12:00	Sessão de avaliação e entrevistas - Output 01	Xérem	Evaluation Team (2 persons), local PTB team member

Horário	Reunião	Localização	Contatos / Pessoas
	Serviços de IQ em energias renováveis e eficiência energética aprimorados - Entrevistas - Análises das ações e tomada de decisão - Análise dos resultados encontrados		Output 01 – Responsible Manager, Dimci Laboratory staff (DQUIM, DIOPT)
12:00 13:30	Almoço	Inmetro	
13:30 - 16:00	Sessão de avaliação e entrevistas - Output 01 *Serviços de IQ em energias renováveis e eficiência energética aprimorados* - Entrevistas - Análises das ações e tomada de decisão - Análise dos resultados encontrados	Xérem	Evaluation Team (2 persons), local PTB team member Output 01 – Responsible Manager, Dimci Representatives from Dimci laboratories: DIELE (Division of Electrical Metrology) – Technical staff DINAM (Division of Fluid Dynamics Metrology) – Technical staff
Quarta, 26 de março de 2025			
09:00 - 12:00	Sessão de avaliação e entrevistas - Output 03 - *Modernização do Programa Brasileiro de Etiquetagem* - PBEEntrevistas - Análises das ações e tomada de decisão	BACEN	Evaluation Team (2 persons), local PTB team member Output 03 – Responsible Manager, Dconf Representatives of the Directorate for Conformity Assessment (Dconf): – Responsible Manager – Technical staff (2 persons)

Horário	Reunião	Localização	Contatos / Pessoas
	Análise dos resultados encontrados		
12:00 - 13:30	Almoço		-
13:30 – 16:00	Entrevistas CAINT – Coordenação de Articulação Internacional	BACEN	Evaluation Team (2 persons), local PTB team member 3 staff members of CAINT
Quinta, 27 Março 2025			
10:00 - 11:00	MME – Ministério de Minas e Energia	Ministério de Minas e Energia, Esplanada dos Ministérios, Bloco U, Brasília/DF, Sala 555	Evaluation Team (2 persons) Representatives from the Department of Energy Efficiency and Project Management: – Director of the Department for Energy Information and Efficiency – General Coordinator for Energy Efficiency – Project Coordinator for Energy Efficiency – Head of the Division for Project Management Support
	Almoço		
14:00 – 15:30	Projeto Global de Infraestrutura da Qualidade, GIZ	Sala “Brasília”; Brasília Trade Center, Setor Comercial Norte Q 1 - Asa Norte, Brasília –	GIZ Brazil – Representatives from the Global Project Team *(Note: Personal contact details such as phone numbers have been removed.)* Evaluation Team (2 persons)
Sexta, 28 de março de 2025			
08:00 - 10:00	GIZ - Foco do projeto - Coordenação de ações e sinergias	GIZ Brasília BTC, Setor Comercial Norte Q 1 - Asa Norte, Brasília – DFBrasília, DF	– Coordinator, German-Brazilian Energy Partnership – Coordinator, H2Brasil Project and Energy Transition Programme Evaluation Team (2 persons)

Horário	Reunião	Localização	Contatos / Pessoas
	- Efetividade dos projetos - Perspectivas futuras da GIZ		
11:00 - 12:00	Embaixada Alemanha - Foco do projeto - Coordenação de ações e sinergias - Efetividade dos projetos - Perspectivas futuras da embaixada	Embaixada da Alemanha; St. de Embaixadas Sul 807 - Brasília, DF, 70415-900	Advisor for Social Development Cooperation Evaluation Team (2 persons)
	Almoco		
14:30 - 15:30	MDIC – Ministério de Desenvolvimento Indústria e Comércio	Esplanada dos Ministérios - Ministério do Desenvolvimento, Indústria, Comércio e Serviços, Bloco J, 7º andar, sala 701, Brasília	Ministry of Development, Industry and Trade (MDIC) – General Coordinator for Quality Infrastructure *(Note: Telephone number removed for data protection reasons)* Evaluation Team (2 persons)
Segunda 31 de março de 2025			
11:00 – 12:00	Visita EnBPar		Manager, PROCEL Evaluation Team (2 persons), 1 local PTB team member
	Reserva de agenda para últimas entrevistas ou reuniões		Evaluation Team (2 persons), 1 local PTB team member
Terça-feira, 01 de abril de 2025			
10:00 – 11:00	Apresentação preliminar dos resultados da fase presencial para PTB	DFN	Representatives from the German project management team Evaluation Team (2 persons), 1 local PTB team member

Horário	Reunião	Localização	Contatos / Pessoas
11:00 - 14:00	Elaboração relatório e apresentação		Evaluation Team (2 persons)
15:30 – 16:30	EPE – Empresa de Pesquisa Energética	EPE Praça Pio X, 54 - Centro - Rio de Janeiro	1 Technical Advisor to the Directorate Evaluation Team (2 persons), 1 local PTB team member
Quarta 02 Abril 2025			
09:00 - 12:00	Apresentação dos resultados da fase presencial - Apresentação - Espaço para discussões	Xérem	Participants included: – Directors of Scientific Metrology (Dimci), Conformity Assessment (Dconf), Legal Metrology (Dimel), Accreditation (Cgcre), and Planning (Diplan) – Output Coordinators (O1–O3) and invited technical staff – CAINT – International Cooperation Unit – PTB – German project team (online) Evaluation Team (2 persons), 1 local PTB team member

Annex 4 - Questionnaires and/or interview guidelines

Evaluation Questionnaires for the PTB-Inmetro Project

The following questionnaires reflect the current stage of preparation and serve as a guiding framework for structuring the evaluation discussions. Rather than fully structured interviews, they provide a flexible approach to collecting relevant insights while allowing for open-ended discussions. As the evaluation progresses, these questions may be further refined and adapted to better suit specific interview partners, ensuring a focused and contextually relevant dialogue.

While coherence and synergies are not the primary priorities for the project team, they remain integral aspects of the evaluation process. Given that the final evaluation report will serve multiple users and clients, the analysis will take a broad perspective to address different stakeholder interests and ensure comprehensive findings. To achieve this, the evaluation follows the OECD-DAC criteria, providing a structured framework for assessing the project's alignment, effectiveness, and sustainability.

Evaluation Criteria

Relevance: Evaluates whether the project aligns with the needs of target groups and the policy priorities of partners and donors. It also examines whether the intervention's design is appropriate for achieving its intended objectives and remains adaptable to changing conditions.

Coherence: Analyzes the alignment of the project with other development initiatives in the sector and country. It assesses both internal coherence within German development cooperation and external coherence with partner countries, donors, and international standards. This ensures that the project's contributions complement broader policy frameworks.

Effectiveness: Measures the extent to which the project has achieved or is expected to achieve its intended objectives. It examines whether inputs, outputs, and management mechanisms have successfully contributed to project goals and how well they address identified sector challenges.

Efficiency: Assesses whether resources have been used economically to achieve the desired results. It evaluates cost-benefit aspects, alternative resource allocations, and whether outputs were delivered with minimal resource input, ensuring optimal use of financial and human resources.

Impact: Examines the long-term and broader changes brought about by the intervention. It considers both intended and unintended positive or negative effects on social, economic, and environmental developments, including possible ripple effects beyond the project's direct scope.

Sustainability: Determines whether the project's positive outcomes will persist beyond its duration. It analyzes the institutional, financial, and political conditions that enable or hinder the continuation and long-term impact of the intervention, ensuring long-lasting benefits for stakeholders.

1. Questionnaire for Political and Development Partners

Focus: Coherence of the Intervention

1. To what extent does the project align with national policies and development strategies in Brazil?

2. How well does the project complement German development cooperation priorities, including BMZ strategies?

3. In what ways has the intervention adapted to evolving political, economic, or institutional contexts?

4. How does the intervention contribute to global and regional policy objectives (e.g., SDGs, climate action frameworks)?

Coordination and Synergies with Other Interventions

5. How effectively has the project been coordinated with other development initiatives (e.g., GIZ, KfW, BNDES, FINEP)?

6. Are there overlapping efforts or gaps in donor coordination within the sector?

7. How does this intervention leverage existing structures or partnerships to maximize impact?

8. To what extent have joint systems for M&E, learning, and accountability been used?

Effectiveness and Sustainability of Collaboration

9. To what extent have collaboration mechanisms facilitated knowledge-sharing and joint decision-making?

10. What challenges have been encountered in ensuring effective cooperation between partners?

11. How sustainable are the partnerships created or strengthened through this project?

2. Questionnaire for Inmetro and Its Directorates

Focus: Project Effectiveness, Efficiency, Impact, and Sustainability

Effectiveness of Project Implementation

1. To what extent have the project's objectives been met based on agreed indicators?

2. How well have the activities contributed to strengthening Inmetro'srole in energy efficiency and renewable energy quality assurance?

3. What internal or external factors have influenced the achievement of results?

4. Have there been unintended positive or negative effects of the project on INMETRO's institutional capacity?

Institutional and Capacity Development

5. Has the project contributed to Inmetro's ability to provide new or improved QI services?

6. What impact has the project had on internal coordination and decision-making processes at Inmetro?

7. Have staff training and technical support been effective in building long-term institutional capacity?

8. What mechanisms are in place to ensure continued institutional learning and knowledge transfer beyond the project?

Stakeholder Engagement and Private Sector Interaction

9. How important are stakeholder engagement and client orientation for Inmetro, and how are they prioritized within the institution?

10. What concrete measures are being taken across Inmetro to improve stakeholder engagement and client orientation?

11. Are the mechanisms established for industry consultation and feedback effective?

12. What are the main bottlenecks or challenges in ensuring that Inmetro's services align with market needs?

What promising approaches or initiatives exist to strengthen collaboration with private sector actors?

Sustainability and Future Prospects

13. How likely are the project's benefits to be sustained beyond its implementation period?

14. Are there financial or institutional barriers that could hinder long-term impact?

15. What further support or changes are needed to strengthen Inmetro's capacity and services?

3. Questionnaire for Private Sector Stakeholders

Focus: Coherence and Consistency of the *Programa Brasileiro de Etiquetagem* (PBE)

Relevance and Market Needs

1. How well does the current PBE framework align with industry needs and energy efficiency goals?

2. Have private sector actors been sufficiently involved in shaping PBE regulations and standards?

3. What are the key barriers to compliance with PBE labeling and certification requirements?

4. As an instrument to enforce energy efficiency, the PBE is closely linked to environmental protection. How effectively has the updated PBE framework promoted the development, introduction, and use of more efficient technologies, contributing to energy savings?

5. To what extent has the updated PBE framework led to measurable impacts on economic growth, social inclusion, and environmental goals?

Effectiveness of the PBE Modernization Efforts

6. Has the modernization of PBE improved clarity and efficiency in the certification process?

7. Are there measurable benefits from the regulatory updates in terms of product innovation or market access?

8. To what extent have the recent changes supported the competitiveness of Brazilian manufacturers?

9. Has PBE modernization resulted in any unintended consequences for the private sector (e.g., increased costs, market distortions, innovation incentives)?

Quality Infrastructure and QI-Services

9. Does the existing QI system adequately support PBE implementation?

10. What gaps exist in metrological services, conformity assessment, or technical regulations?

11. How can cooperation between the private sector and QI institutions be improved to enhance compliance?

Future Perspectives and Recommendations

12. What additional improvements are needed to make PBE more effective and industry-friendly?

13. Are there best practices from other countries that Brazil could adopt in energy efficiency labeling?

14. How can private sector involvement be enhanced to ensure a more responsive and sustainable PBE framework?