Ministry of Environment
United Nations Development Programme
Brazilian Cooperation Agency

BRA/16/G76Mid-Term Evaluation Report:
Brazilian HCFC Phase-out Management Plan Project
(Stage II)

Output 3

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ACRONYMS

ABC-Brazilian Cooperation Agency

ABIQUIM- Brazilian Chemical Industry Association

ABNT- Brazilian Association of Technical Standards

ABRAVA-Brazilian Association of Refrigeration, Air Conditioning, Ventilation and Heating

ABRIPUR -Brazilian Polyurethane Industry Association

ACP – Assessment Committee Projects

CFC -Chlorofluorocarbon

COC-Certificate of Completion

CTC -Carbon tetrachloride

CTF/APP-Federal Technical Registration of Potentially Polluting Activities

DU-E-Single Export Declaration

DU-IMP-Single Import Declaration

ER- Export Registry

EU -End User

ExCom -Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

GHG-Greenhouse Gases

GIZ -DeutscheGesellschaftfürInternationaleZusammenarbeit

GPCO-Ozone Layer Protection Management

GWP-Global Warming Potential

HC -Hydrocarbon

HCFC-Hydrochlorofluorocarbon

HFC -Hydrofluorocarbon

HFO-Hydrofluorolefin

HPMP – HCFC Phase out Management Plan

IE-Individual Enterprise

IBAMA -Brazilian Institute of Environment and Renewable Natural Resources

IC- Individual Contract

IL- Import License

IMU-Implementation and Monitoring Unit

IOC- Incremental Operating Cost

ISF-Integral Skin Foam

LTA -Long Term Agreement

MAPA-Ministry of Agriculture, Livestock and Food Supply

MCTIC -Ministry of Science, Technology, Innovation and Communications

ME-Ministry of Economy

MMA-Ministry of Environment

MLF-Multilateral Fund for the Implementation of the Montreal Protocol

MS-Ministry of Health

IN-Normative Instruction

ODP-Ozone Destruction Potential

ODS-Ozone Depleting Substance

PAC - Project Assessment Committee

PR-Progress Report

PRODOC- Project Document

PROZON-Interministerial Executive Committee for the Protection of the Ozone Layer

PU-Polyurethane

RAC -Refrigeration and Air Conditioning

RPF-Rigid polyurethane foams

SDG- Sustainable Development Goals

SH-System House

SME-Small and Medium Enterprise

TOR-Term of Reference

UNDP-United Nations Development Programme

UNIDO -United Nations Industrial Development Organization

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EXECUTIVE SUMMARY

Background

This document corresponds to the Mid-Term Evaluation Report of the BRA/16/G76 Project "**BRA/16/G76 – Brazilian HCFC Phase out Management Plan - Stage II**." coordinated by MMA, with the UNDP as the implementing agency and funded by the Multilateral Fund for the Implementation of the Montreal Protocol (FML). The Project contributed to the efforts made by the Brazilian Government to fulfill international commitments under the Montreal Protocol on Substances that Deplete the Ozone Layer, an international environmental treaty established in 1987 and ratified by 198 Parties. The Protocol aims to protect the ozone layer, eliminating the production and consumption of Ozone Depleting Substances (ODS). Brazil has been developing measures to protect and recover the ozone layer for over three decades. Brazil adhered to the Vienna Convention and the Montreal Protocol through Decree 99,280 of June 6, 1990, committing itself to the total elimination of chlorofluorocarbons (CFCs), among other measures, in accordance with the goals and indicators agreed through a National Plan. However, since 1988, Brazil has carried out actions to fulfill the Montreal Protocol goals.

For the implementation of actions aimed at the elimination of HCFCs, the Brazilian HCFC Phase out Management Plan (Brazilian HPMP) received financial support from the Multilateral Fund for the Implementation of the Montreal Protocol (FML). The Program has been implemented since 2012, with the support of Project BRA/12/G76, finished in 2020. This Program is in its second stage, with Project BRA/16/G76 referring to the component that supports the foam sector. polyurethane in its conversion process.

In November 2015, during the 75th Ordinary Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (ExCom), resources in the amount of USD 35,963,970 were approved to reduce the consumption of HCFCs in Brazil by 35% by 2020 and 45% by 2021 (Decision 75/43 – Annex III), having established the Associate Agreement, a document of understanding between the Government of Brazil and the Executive Committee of the Multilateral Fund, to reduce the consumption of hydro chlorofluorocarbons (HCFCs). At that time, were defined the planning of resources and the amount to be allocated for the execution of projects to be implemented by the agencies: UNDP, UNIDO and GIZ, including the new Project BRA/16/G76, to be implemented by UNDP.

To achieve these goals, according to BRA/16/G76 PRODOC, the country has committed to: (i) Eliminate the consumption of 1.5 ODP tonnes of HCFC-22 in all sectors and 131.82 ODP tonnes of HCFC- 141b in the polyurethane foam manufacturing sector through Regulatory Actions (Component 1 of the Brazilian HPMP – Stage II); (ii) Eliminate the consumption of 169.08 ODP tonnes of HCFC-141b and 0.60 ODP tonnes of HCFC-22 in the Polyurethane Foam Manufacturing Sector (Component 2 of the Brazilian HPMP – Stage II); (iii) Eliminate the consumption of 100 ODP tonnes of HCFC-22 in the Refrigeration and Air Conditioning Services Sector (RAC) (Component 3 of the Brazilian HPMP – Stage II); (iv) Eliminate the consumption of 61.06 t ODP of HCFC-22 in the RAC Manufacturing Sector (Component 4 of the Brazilian HPMP – Stage II); (v) Carry out actions to implement and monitor Stage II of the Brazilian HPMP (Component 5 of the Brazilian HPMP – Stage II). It is in this context of actions to achieve improvements in the protection of the ozone layer that the BRA/16/G76 Project initiative is

approved to be implemented nationwide, coordinated by the Ministry of the Environment and supported by IBAMA, with direct execution by UNDP and MLF funding.

This project was called the Brazilian HCFC Phase Out Management Plan in its Stage II, which continued the actions carried out in Stage I. Stage II has as its general objective the elimination of HCFC consumption in the sector of polyurethane foams and aims to provide technical assistance to the Brazilian government for this purpose. The Project started on the date of its signature, November 29, 2016, and is expected to be completed by December 31, 2021, and the Subprojects destined to the conversion of system houses and individual companies have already been partially completed by December 2020. However, the Project Assessment Committee (PAC) approval meeting took place on May 19, 2016, and the MLF made the Tranche 1 resource available in 2015.

The Brazilian HPMP Country Strategy Agreed between the Brazilian Government and the MLF Executive Committee to meet the targets established in Stage II of the Brazilian HPMP took into account the country scenario in 2013, when the Brazilian consumption of HCFC in ODP was composed of approximately 46 % for the manufacturing sector and 54% for the service sector. Regarding the consumption profile in ODS, the refrigeration and air conditioning service sector corresponded to approximately 66% of the total HCFC consumed in the country.

The project's resources total is US$ 17,020,000.00 (seventeen million and twenty thousand US dollars). It is being implemented through annual work plans, linked to MLF disbursements, which were carried out in accordance with the rules of the Fund itself, agreed through three Meetings :i) Tranche 1 (75th Meeting, Montreal 16-20 November of 2015) ; ii) Tranche 2 (80th Meeting, Montreal, 13-17 November 2017); and iii) Tranche 3 (82nd Meeting, Montreal, December 3-7, 2018). So far, three disbursements have been made by the Fund, called tranches, requested by the Brazilian Government to the Fund, with the following amounts: US$ 3,078,900 (Tranche 1); US$ 2,627,704 (Tranche 2) and US$ 7,168,396 (Tranche 3), and a new disbursement equivalent to the last tranche of the Project must still be requested, which will be US$ 3,895,000 meeting the MLF criteria for the release of this last disbursement. Until December 2020, US$ 8,077,161.42 had been spent, which would represent the use of 63% of the resources made available by the MLF to date, which would total US$ 12,875,000. However, Project expenditures per tranche indicate that the first tranche was disbursed at 98.94%; in the case of the second it was 83.26%; and third until December 2020 was only 36.21% of the MLF.

Purpose, scope and methodology

The purpose of the evaluation is to evaluate the results obtained until December 31, 2020, as well as to know the reasons and factors of the degrees of achievement or non-reach, the recommendations and lessons learned allowing the improvement to the future execution of the Project, and future projects aimed at protection of the ozone layer. The evaluation was carried out from February to June 2021, in Brasília, and coordinated by the independent consultant. The evaluation methodology was based on the evaluation guidelines of UNEG and UNDP with regard to the mid-term evaluation of technical cooperation projects, and in accordance with the elaborated Terms of Reference. For this, the criteria of relevance, effectiveness, efficiency, impact, sustainability and project design were used.

The methodology was based on quantitative and qualitative models. Online interviews were conducted with interlocutors; Project reports, reports and documents were consulted. All evaluation findings were cross-checked, and in the best case, there was triangulation of different sources and methods to ensure reliability and credibility. The evaluation was based on the

Project's logical framework, considering the implementation process and the evaluation criteria, with the respective guiding questions included in the Evaluation Matrix Framework. Due to the number of actor that have been directly participating in the execution of each Product/Outcome, it was possible to conduct interviews with approximately 25 partners and most relevant beneficiaries of the Project: MMA, UNDP, IBAMA and ABC; as well as individual companies, system houses and end users.

Key findings

The Project originally proposed four Outcomes which are effectively being implemented. These Outcomes aim to produce greater long-term effects. In relation to Project BRA/16/G76 in particular, the following 4 strategic Outcomes were defined: Outcome 1: Implemented Project Management (Component 5 of the Brazilian HPMP – Stage II); Outcome 2: Adjusted regulatory framework (Component 1 of the Brazilian HPMP - Stage II); Outcome 3: Industrial Conversion Investment Projects implemented (Component 2 of the Brazilian HPMP - Stage II) and Outcome 4: Assistance to the components of the Brazilian HPMP - Stage II related to the RAC sector (Component 4 of the Brazilian HPMP – Stage II).

In terms of Project design, it can be said that the goals were clear and ambitious, to be achieved in just five years, and becoming more suitable from June 2019, when the Long Term Agreement (LTA) modality was approved for support the assistance from system houses to users. At the end of 2020, there was already the identification of the need to carry out a Project Review, seeking to: extend the execution period; adjust and replace companies, system houses and end users in the Output 3 Product list (originally made up of 27 subprojects, 13 of which are individual and 14 group subprojects led by system houses in which these would work with companies and end users); as well as compensating for the difficulties faced by the COVID 19 pandemic that started in March 2020, in Brazil. The project's design proved to be adequate to the needs of support to more than 450 national companies and to provide the country with an updated regulatory framework that is adequate for new ones indicators and targets on the topic, agreed with the MFL. In this way, real challenges were faced in achieving the proposed Products, and the project had an initial baseline, an execution strategy based on the experience of the predecessor project BRA/12/G76; having no need to design an exit strategy as it is carried out by the private sector; as well as kept the risk analysis updated during the execution of the Project. The execution was designed and executed by Outcome, maintaining the UNDP's Implementation and Monitoring Unit, acting in collaboration with the Montreal Protocol Coordination in MMA, and monitoring by the Brazilian Cooperation Agency.

The Project had a communication strategy since the beginning of its execution, having included publications, campaigns, websites and folders and meetings with direct beneficiaries of the Project. The design was consistent with the needs for technical support to different types of companies, priorities and policies for protecting the ozone layer in the country, presenting as very positive the formulation of instruments, dissemination of alternatives to the replacement of HCFC-141b, constitution of networks of entrepreneurs, monitoring of proposals or updating of normative instructions pertinent to the topic and completion of demonstration projects in supermarkets in the northern region for the replacement of HCFC-22, as well as support to companies in the improvement of equipment, processes and selection and replacement of HCFC- 141b by substances that do not destroy the ozone layer and have a low global warming power.

The Project has always been in accordance with national policies and international commitments on the subject and has been followed with interest by relevant actors in the sector

and working in areas of interest to the national private sector. It can be considered a Project with a high degree of relevance, as it has supported the production of information, studies, pilot projects, guidelines, surveys of the national situation of use of non-protective substances in the ozone layer, creation and modernization of normative instructions, bringing quality to the regulatory framework on the subject, as well as providing technical support and enabling actions to improve the management of initiatives and policies to protect the ozone layer, in its different aspects involved. The improvement of the regulatory framework on the non-use of HCFCs so far has allowed the fulfillment of the Brazilian Government's international commitments in relation to the agreed targets, in its Stage II of the Brazilian HPMP.

The actions concerning this Project also directly or indirectly dialogue with eight (8) of the 17 Sustainable Development Goals (SDGs): 3, 9, 11, 12, 13, 14, 15, and 17.

In terms of effectiveness, important advances were made in the improvement of the legal and regulatory framework with an important participation of MMA and IBAMA in the approval and/or operation of new normative instructions with an impact on the impediment of HCFC imports, this being restricted to about 10 % for uses in the healthcare sector (needles and instrument parts for use in this sector) and solvent sector. This change was due to the fact that, as of January 1, 2020, Normative Instruction (IN) No. 4 of IBAMA came into effect, whereby the import of HCFC-141b for use by companies that are part of the national production situation would no longer be allowed industrial polyurethane foams throughout the national territory. This IN was preceded by two years by another IN that alerted national businessmen about the cessation of imports as of January 2020.

Furthermore, the Project until December 2020 had ensured the conversion of eight (8) System Houses from the 14 System Houses initially programmed (three of which were ineligible); as well as the conversion of 81 end users out of the total end users to be converted from 445 companies by the completion of the Project. In terms of Individual Companies, nine (9) of the 13 participating companies with individual projects were converted.

In total, the Project promoted, until December 2020, the conversion of 98 companies of a consumption reduction of 68.14 tonnes ODP compared to the total reduction amount by the end of the Project of 169.08 tonnes ODP. In addition, it should be noted that from the last "Report on the Verification of HCFC Consumption Targets in Brazil", covering the years 2018 and 2019, from August 2020, it reported that "the total consumption of HCFC in Brazil, in 2018 and 2019, considering the import minus the export, was 824.96 and 838.85 ODP tonnes, respectively. Therefore, the reductions were 37.85% and 36.80% in relation to the initial point, values much higher in relation to the goals for 2018 and 2019". Therefore, it is possible to evaluate how achieved a high degree of efficiency, due to the reduction of ODSs exceeding what it was agreed with the MLF, without having completed the Project.

In this scenario, it should be noted that by December 2020, the indicator of 98 companies converted from the 470 planned until December 31, 2021, when the conclusion of the Project is expected, had been reached. This represents the reach, by December 2020, of 20.85% of the indicator established in the PRODOC to be obtained as an indicator of the success of this Outcome.

The second success indicator of Outcome 3 refers to the achievement of 27 completed investment subprojects by the end of December 2021. Until December 2020, 17 investment subprojects were carried out exclusively, contemplating the technological conversion of the plant from nine subprojects into group and eight subprojects of individual companies. However, the SH investment subprojects aimed at supporting the technological conversion of end-user companies

are still underway and far from the agreed indicators for each of the investment subprojects for the provision of services.

Therefore, to date, the elimination of consumption was 68.14 ODP tonnes of the 169.08 ODP tonnes agreed, leaving, therefore, 100.94 ODP tonnes to be eliminated by the end of the Project. Thus, from 2016 to December 2020, approximately 40.30% of the agreed target for the indicator was eliminated at the end of the Project's execution. It should be noted that even the reduced reach of the amounts agreed in terms of investment projects and the elimination of HCFC consumption were the result of a set of factors, of which there was a preponderance of the presence of the COVID 19 pandemic in the years 2020 and early 2021 (while this report was being prepared), causing significant delays in the execution of service actions in group projects (SH) with the end users of these companies.

Also, the availability of HFC-365/227 in the domestic market at competitive prices compared to HFO and water-based; the strong marketing strategy, implemented in the past, associating HFC with green technologies; and the belief that HFCs will still be used for a long period, until the country defines its timetable for reducing the use of these substances, have influenced the decision of beneficiary companies to join the Project, making it difficult to guarantee the planned quantities for conversion subprojects .

As seen, from March 2020, there were difficulties in the national productive sector due to the state of pandemic, in which several companies suspended activities or disappeared; faced supply difficulties; and the technical and in-person assistance faced difficulties in being carried out with the end users, in order to materialize the technological conversion changes. In this context, in 2021, adjustments would be made to the time and companies participating in the remaining term of the Project.

Through Outcome 4 of BRA/16/G76, the bilateral agency GIZ has been supported by the Project in the execution of the commitment assumed during Stage I of the Program (Project BRA/12/G76) and the purchase processes of equipment for companies in the commercial refrigeration services sector (supermarkets) necessary for the execution of demonstration projects. Thus, an agreement was established between UNDP and GIZ, as well as the transfer of necessary funds, so that UNDP, as lead agency, could assist GIZ in the implementation process of the aforementioned demonstration projects.

The UNDP Project Monitoring and Implementation Unit has been maintaining a very satisfactory management, monitoring and supervision system for the operationalization of activities and products, supporting investment subprojects in individual companies and system houses, and end users.

Thus, it can be said that the Project, through its actions, allowed it to be achieved to a very satisfactory degree in relation to obtaining the Outcomes indicators, if we consider the difficulties faced in the execution of the Project, due to the effects and measures adopted in the pandemic, which did not depend on the Project's direct decision; as well as, due to the characteristics of the decision-making process of each of the companies that involve more time, as it is related to technological options with effects on the production system and on the composition of costs of each company, covering these strategic decisions of medium and long term in the business field of the polyurethane foam sector.

It should be noted that the initial design of the Project was adequate to the socioeconomic reality of the country, and met the needs of adapting the technological conversion of companies' plant in order to allow the replacement of HCFC-141b in companies in their different types. It should be noted that in the Brazilian market substances are being used that do not destroy the

ozone layer and replace HCFC-141b (e.g. HFCs - hydrofluorocarbons), but that contribute to climate change through the emission of gases that contribute to warming global. These substances are not prohibited for use by companies under Brazilian legislation and regulations, as Brazil has not yet ratified the Kigali Amendment to the Montreal Protocol, approved in 2016. The Federal Government currently has numerous legislative initiatives that are under review by the National Congress, aimed at combating climate change. In June 2018, the then President of the Republic sent a message to Congress with the text of the Kigali Amendment to the Montreal Protocol, approved in 2016.

It is important to clarify that this Project design has been facing a reality quite different from what would be expected, with the years 2020 and 2021 presenting situations of sanitary crisis in the global and Brazilian scenario, due to COVID 19, with no adjustment being made to the original design, so far, even with the pandemic.

The four Outcomes and 31 Products executed were technically adequate to the needs of the sector, being produced, in general, on time, with adjustments in the execution schedule, generating small term extensions without increases in the costs of activities and Products; and reasonably priced according to the FML manuals. The implementation and respective strategy contributed to promoting favorable conditions of contribution, so far, for the execution of the Project aiming at achieving the Objective, Outcomes and goals agreed in the Project Document, in relation to the contribution to reach Stage II of the Brazilian HPMP, with respect to BRA/16/G76.

It should be noted that the resources provided since the approval of the Project reached the amount of US$ 17,020,000.00 of which, so far, the FML of the Montreal Protocol has transferred three Tranches out of a total of four Tranches agreed with the Brazilian Government. By December 2020, US$ 13,125,000.00 had been transferred, representing three tranches in the amounts of: (i) US$ 3,328,900.00 - Tranche 1; (ii) US$ 2,627,704 - Tranche 2; and (iii) US$ 7,168,396.00 - Tranche 3. There would still be the last Tranche 4, in the amount of US$ 3,895,000.00. Thus, it would be possible to affirm that resources have already been made available to execute the equivalent of 77, 1% of the total Project budget. Due to the characteristics of the conditions for the disbursement of each of the FML Tranches, it should be clarified that from Tranche 1, 98.94% has already been executed; from Tranche 2, 83.26% were executed and from Tranche 3, 36.21% were executed. This means that approximately US$ 8,077,160.00 of the US$ 13,125,000.00 have already been executed or committed. What would represent, if added to Tranche 4, the need to execute still around US$ 5,047,840 (balance of Tranches 1, 2 and 3) and the US$ 3,895,000 (balance of Tranche 4), which would total the amount still to be executed in the next years of US$ 8,942,840, in case of substantive review and extension of the execution period (Stage II of the Brazilian HPMP can be concluded until 2024), since the Project would finish on December 31, 2021.

Over the years 2016 to 2020, the average annual disbursement was US$ 2 million, and in the years 2018 and 2019 (with LTA) it was US$ 2.4 million. This situation would in principle require that at least three years be added to the completion of the current Project design, with 27 investment subprojects, with the current technical team and installed capacity and available in the CS to support the conversion of the total end users. Currently, the executing agency and MMA are evaluating alternatives to adapt the Project's execution to the times of pandemic; as well as studying the expansion of the capacity to support end users in their respective conversion processes, reinforcing with consultants the technical performance of CS, which serve hundreds of companies as input suppliers. The Project's organizational structure remains the same as proposed in the design of the Project Document, with functions and responsibilities shared in a

fluid and collaborative way among the actors participating in the project's execution, monitoring and evaluation (MMA, UNDP and ABC).

At the same time, whenever necessary, the IMU and the Montreal Protocol team at MMA held meetings to deal with issues that required actions from the Project, which provided greater efficiency in obtaining solutions and referrals for the quality of the Project's management. to the procedures required by the agreement with the FML, under the coordination of MMA, the Project prepares a Progress Report together with the UNIDO and GIZ Agencies, since 2017, presented at the Fund's Executive Committee meetings, covering the technical and financial aspects of the execution of the Projects, which makes up Stage II of the Brazilian HPMP. This instrument is an important element for planning, monitoring and has supported the release of Plots for Project implementation; as well as to monitor the achievement of goals agreed with the Montreal Protocol. So far, no Substantive Reviews of the Project have been carried out, however, the annual activity and resource plans have been updated, for the presentation of the Reports to the FML and at the Tripartite Meetings. General Reviews of budget and financial adjustments were carried out.

The initial Project Work Plan approved with PRODOC, in 2016, provided for the full execution of the Project by December 31, 2021. However, as previously seen, several factors acted to verify important differences in the pace of execution of the 27 investment subprojects (equivalent to 27 Outcome Products 3), bringing the need for adjustments in time, in the modality of service contract (LTA) and in amounts.

A very positive point that brought greater efficiency in Project management was the adoption of the LTA contracts passed with the System Houses, from July 2019, and if there was no COVID 19 (from mid-March 2020), there would be a high probability of higher end-user conversion (average of 20 converted users per month) with the Project likely to reach the target of around 350 to 380 end-users by August 2021.

This would greatly approximate the achievement of the expected goals and results with the proper management of the Project, as the list of end users of each of the System Houses would be updated and revised in 2021 (2021 estimate, with probable cancellation of 23 end user companies for not meeting the criteria or for declining to participate in the Project, due to national market conditions). Therefore, instead of 445 converted end users there would be an immediate reduction in total end users totaling approximately 422 end users at Project completion.

It should also be noted that the degree of efficiency of implementation (adequate resources, implementation time and opportunity for response/solution) and the quality of management (processes, dynamics and instruments) would actually tend to be higher if the Brazilian Government ratified the Kigali Amendment to the Montreal Protocol, which was approved in 2016.

As previously indicated, the original Project execution schedule was being updated by the annual action plans executed by UNDP and agreed with MMA and ABC, as well as with the FML. As of 2019, the products and implemented actions provided for in the action plans are more in line with the capacity to execute and manage this type of Project, which is still very dependent on test and laboratory results; as well as the decisions of each company on the opportunity to carry out the activities proposed in the Project. It was noticed the ability to carry out tests to follow-up initiatives, as well as to promote technical consulting spaces for the validation of products with companies and dissemination of results. It would also involve the ability of IMU's management to articulate partnerships with System House and Individual Companies to support the Project's initiatives. The original Outcomes and Resources Matrix and respective products could be assessed as adequate, if conditions had remained normal, without pandemic, and if the new LTA's

contract modality had been approved in 2018, instead of mid-2019. Until the end of the Project, it is expected that these external factors can be overcome in order to allow the Project to present the best pace of implementation, in accordance with the management experience to date.

It should be noted that the initial design of the Project was adequate to the socioeconomic reality of the country, and met the needs of adapting the technological conversion of companies' plant in order to allow the replacement of HCFC-141b in companies in their different types. It should be noted that in the Brazilian market substances are being used that do not destroy the ozone layer and replace HCFC-141b (e.g. HFCs - hydrofluorocarbons), but that contribute to climate change through the emission of gases that contribute to warming global. These substances are not prohibited.

At the same time, whenever necessary, the IMU and the Montreal Protocol team at MMA held meetings to deal with issues that required actions from the Project, which provided greater efficiency in obtaining solutions and referrals for the quality of the Project's management to the procedures required by the agreement with the FML, under the coordination of MMA, the Project prepares a Progress Report together with the UNIDO and GIZ Agencies, since 2017, presented at the Fund's Executive Committee meetings, covering the technical and financial aspects of the execution of the Projects , which makes up Stage II of the Brazilian HPMP. This instrument is an important element for planning, monitoring and has supported the release of Plots for Project implementation; as well as to monitor the achievement of goals agreed with the Montreal Protocol. So far, no Substantive Reviews of the Project have been carried out, however, the annual activity and resource plans have been updated, for the presentation of the Reports to the FML and at the Tripartite Meetings. General Reviews of budget and financial adjustments were carried out.

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As previously indicated, the original Project's execution schedule was being updated by the annual Action Plans executed by UNDP and agreed with MMA and ABC, as well as with the FML. As of 2019, the products and implemented actions provided for in the Action Plans are more

in line with the capacity to execute and manage this type of Project, which is still very dependent on test and laboratory results; as well as the decisions of each company on the opportunity to carry out the activities proposed in the Project. There was a great ability to carry out tests to follow-up initiatives, as well as to promote technical consulting spaces for the validation of products with companies and dissemination of results. It would also involve the ability of IMU's management to articulate partnerships with System House and Individual Companies to support the Project's initiatives. The original Outcomes and Resources Matrix and respective Products could be assessed as adequate, if conditions had remained normal, without pandemic, and if the new LTA contract modality had been approved in 2018, instead of mid-2019. Until the end of the Project, it is expected that these external factors can be overcome in order to allow the Project to resume the best pace of implementation, in accordance with the management experience to date.

The financial and administrative management of the Project, ensured by the IMU/UNDP, was considered, to a certain extent, to have a high degree of efficiency, due to professionals with extensive experience in Project execution and memory of projects previously developed in the foam sector; for acting in a timely manner in developing or correcting strategy; adopted transparent and collaborative processes with companies and partners in the foam sector. At the same time, the Project relied on fluid communication between the different actors, collaborators and direct beneficiaries to achieve the results so far. Furthermore, permanent partnerships were established between MMA, UNDP, IBAMA and the international consultant for project management, an efficient implementation of initiatives and responding in time to the demands and specificities of different types of beneficiaries.

In practice, the project has executed and committed approximately 68.5% of the resources made available by December 2020, with the prospect of disbursing the remaining almost US$ 8.5 million (including the resources related to the last tranche not yet received) in the next three years , in other words, extending the Project's execution period. Its efficiency allowed that the activities and products carried out could contribute, to a certain extent, to the achievement of expected results and effects, with greater results to be achieved for the future conclusion of the technical cooperation. The Project achieved, with adequate costs and with a certain degree of delay, certain expected short and medium-term results and effects. The long-term objectives and goals were guaranteed by the advances in the institutional framework, it is expected that by the end of the Project, greater impacts may be obtained with the probable Brazilian ratification of the Kigali Amendment, as national decisions and strategies are taken in this regard.

Regarding the period from 2016 to 2020, the programming of budget resources by Outcome was constituted as follows: Outcome 1: US$ 1,594,155.00 of which were executed until December 2020 (3 Tranches) about US$ 748,931.67 thousand ; Outcome 2: US$ 120,000.00 thousand of which approximately US$ 66,082.33 thousand were disbursed by December 2020; Outcome 3: US$ 14,705,844.92 million of which approximately US$ 6,697 were disbursed by December 2020 .153.64 million; and Outcome 4: US$ 600,000.00 thousand of which were disbursed until December 2020 approximately US$ 564,990.78 thousand

Therefore, the execution of the Outcomes compared to the planned had the following percentages, without involving the committed resources: Outcome 1: 46.0% of the planned; Outcome 2: 55.0% of the planned; Outcome 3: 45.5% of planned and Outcome 4: 94.1% of planned

The degree of efficiency of the Project's implementation and management quality can be considered very satisfactory considering the significant efforts made by the Project's collaborators during the execution. However, due to factors external to the Project, in some years, disbursements were reduced in relation to what was planned; delays in the execution schedule

of the Project actions; and a high degree of monitoring and evaluation of Outcomes achieved, not just products and activities. The Project executed 64% of the resources made available. With adequate costs, with adequate human and financial resources and with relative delay, it achieved certain expected short-term results and effects, for these five years of the Project, in its axes of action.

Main conclusions

From the evaluation carried out, it was possible to confirm the high degree of relevance of the Project, so far, since the objectives and results of this international cooperation are enabling the fulfillment of the international commitments assumed by the Brazilian Government in relation to the goals agreed with the Montreal Protocol regarding this Stage II Project - Brazilian HPMP. It also maintains the relevance for the achievement of public policies regarding the Project's contribution to the achievement of existing national goals in the Brazilian HPMP and other documents on the subject for the protection of the Ozone Layer, with the elimination of ODS in the foam sector, as exposed on MMA website.

The adopted strategy, objectives and results expected by the Project and the proposed design remain valid and remain relevant, after five years of Project execution, given the current stage of the national socioeconomic reality, meeting the demands and business capacities in the area of foams installed in the Country .Therefore, it can be evaluated as achieved in a very satisfactory degree of adequacy and relevance of the Project design when compared with the process of execution of the Products and contribution to the Outcomes, and from these to the Development Objective, so far.

The Project acted by disseminating technical information on the subject, disseminating the characteristics and conditions of financial support from the FML for technological conversions; it sensitized national businessmen on the issues of ozone layer protection, climate change and sustainable development, through meetings, communications and direct mailings and the development of a website, which could also be accessed by citizens interested in the subject. Furthermore, information and awareness campaigns were carried out among the population of certain cities through the use of news broadcast by means of urban public transport. The presence of a specialized international consultancy allowed the exchange of information from other international projects on the subject.

As seen: (i) Project management was very satisfactory; (ii) the regulatory framework for the sector was updated and guarantor of non-import of HCFC-141b (and reduction of HCFC-22 imports also in 2021) from January 2020 for the foam sector, although the Amendment is not approved from Kigali; (iii) 17 companies out of 24 were converted (three of which have international capital), and 81 end user companies out of 445 were also converted; and (iv) the completion of the BRA/12/G76 Project component for the purchase of equipment from five supermarkets (RAC) to support pilot experiments was satisfactory, of which were carried out for three supermarkets and the third batch of purchases was redirected to seven technical schools for the purpose of training students in the outcome theme4.

Therefore, the effectiveness of the Project can be evaluated to some extent as very satisfactory, given the progress achieved and the fact that the issue of the execution period of this Project can be finalized by the end of 2024, without prejudice to resources or ability to obtain Project results. If the current date of completion of the Project, which is 12/31/2021, was considered, it would be possible to consider it as moderately satisfactory for an intermediate evaluation, which would be almost a final evaluation, if there was no extension of the execution

term until 2024. It would be important to highlight that the products achieved so far have contributed to the achievement of Outcomes that have shown a significant contribution to the achievement by the end of the Project's General Objective in relation to the Brazilian HPMP - Stage II (which also involves contributions from UNIDO and GIZ).

The degree of efficiency of the Project's implementation and management quality can be considered very satisfactory considering the significant efforts made by the Project's collaborators during the execution. However, due to factors external to the Project, in some years, disbursements were reduced in relation to what was planned; delays in the execution schedule of the Project actions; and a high degree of monitoring and evaluation of Outcomes achieved, not just products and activities. The Project executed 64% of the resources made available. With adequate costs, with adequate human and financial resources and with relative delay, it achieved certain expected short-term results and effects, for these five years of the Project, in its axes of action.

It is true that there is a need to follow up and speed up the ratification by the Brazilian Government of the Kigali Amendment to the Montreal Protocol, in order to guarantee greater impacts in the medium and long term to the Project's results; as well as improving the likelihood of greater sustainability in technological conversion and substitution of substances to HFC by national companies in the coming years.

Therefore, it can be said that the Project has been successfully given the conditions it faced over the five years of execution, due to the magnitude of resources and contracts with private sector companies involved in the execution of initiatives distributed in different regions of the national territory; for acted in a pandemic period; for having been supported by changes in the regulatory framework, for complying with the commitments and goals agreed in the Project and for contributing to the Brazilian HPMP Stage II Agreement and for presenting adequate costs for the Brazilian market and awaiting ratification of the Kigali Amendment to the Montreal Protocol

Recommendations:

Recommendation 1: A substantive revision of the Project is suggested to be carried out in the next two months to adjust the implementation time and budget funds for an extended execution period until 2024, and to confirm the list of enterprises to be technologically converted until the conclusion of the Project.

Recommendation 2: It is recommended to extend the execution period without harming the funds allocated and scheduled for disbursement to achieve the expected targets and indicators, allowing to make up for the delays caused by the two years of pandemic and the replacement of the contract model for a more suitable LTA type.

Recommendation 3: It is suggested to insist with the National Congress and specific Commissions on the importance to ratify of the Kigali Amendment to the Montreal Protocol.

Recommendation 4: It is recommended to hire more national consultants to support SHs, speed up the technological conversion of end-users, and update the list of the enterprises that still adhere to the Project.

Recommendation 5: It is proposed the elaboration of two half-yearly progress reports considering the time cycles required for the conversion of the CHs, Individual enterprises and End Users.

Recommendation 6: It is suggested to hire a consultant to sustain and update the information flow through the website, brochures, videos and seminars to improve the communication with enterprises, public officials, NGOs, business associations, and the general public.

Recommendation 7: It is recommended the elaboration of a document (manual) containing the systematization of the procedures carried out in conversion projects of different kinds, good practices and lessons learned during the different phases of implementation.

Recommendation 8: It is recommended to include in the substantive review a column in the section referring to "Assumptions", i.e., prerequisites to be obtained for the achievement of Outputs and Outcomes, and their corresponding risk assessment rating if obtained within the proposed timeframe.

Lessons learned

Lesson learned 1: The Project design considered the previous experience with the Brazilian HPMP - Stage I which facilitated the initial stages of the Project in aspects related to management arrangements, monitoring systems, and focal points in enterprises and public agencies.

Lesson learned 2: The Project is based on the premise that each enterprise may decide on the substance to be adopted to replace ODS (HCFC-141b) and the corresponding technological conversion adjustments. However, it was overseen the fact that the Brazilian legislation does not prohibit the use of some non-ODS but that generate global warming (high GWP). Hence, an alternative plan B should have been proposed in those cases where those substances were chosen.

Lesson learned 3: The service contract model signed by UNDP and SHs involving end-users proved not to be suitable for its intended purpose. The introduction of long-term agreements (LTAs), after two years of implementation, facilitated this process giving greater agility and efficiency to end users' conversion processes.

Lesson learned 4: The participation of an international consultant with expertise and a vast experience in international projects promoted an exchange of ideas about similar projects in the region and gave confidence to entrepreneurs.

Lesson learned 5: The innovative initiatives (LTA, SH multipliers) undertaken in the Brazilian Project should be systematized in a formal document to be supported and presented by the MLF in the Excom meeting, and to be shared with other countries.

1. PROJECT CONTEXT:

1.1. Background

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international environmental treaty established in 1987 and ratified by 198 Parties. The Protocol aims to protect the ozone layer by phasing out the production and consumption of Ozone Depleting Substances (ODS).

Brazil has been developing measures to protect and recover the ozone layer for over three decades. The country joined the Vienna Convention and the Montreal Protocol through Decree 99.280 of June 06, 1990, committing to fully phasing out chlorofluorocarbons (CFCs), among other measures, pursuant to targets and indicators agreed upon in a National Plan. However, it should be stressed that Brazil has carried out actions to meet the goals of the Montreal Protocol since 1988.

From 1992 to 2015, several sector projects and activities were carried out, either in groups or individually, aimed to technology conversion in the Foams, Commercial Refrigeration, Solvents, Agriculture and Chemical industries. These projects allowed to phase out consumption of Chlorofluorocarbons (CFC), Halon, Carbon Tetrachloride (CTC) and Methyl Bromide (except for quarantine and pre-shipment uses) and to partially eliminate consumption of Hydrochlorofluorocarbons (HCFC).

In July 2002, the Brazilian government presented the National Plan for CFC Phase out (PNC, as per its Portuguese acronym) to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (ExCom). This Plan aimed at implementing strategies for phasing out CFC consumption in Brazil. According to the Ministry of Environment report, in 2007 the country had achieved 95% of decrease in CFC consumption, having met the goal of total elimination of CFCs in 2010, according to the schedule established for developing countries. Moreover, the country has been supported in the execution of several projects in this area with funds from the Multilateral Fund for the Implementation of the Montreal Protocol, which was created in 1990 and became a financial mechanism for technical and financial assistance to the Parties to Article 5 of the Montreal Protocol

It should be noted that between 1995 and 2020 several projects were approved for Brazil by the Montreal Protocol with non-reimbursable funds, resulting in the reducing CFC consumption in 95%, according to MMA 2007 report.

With the financial support of the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), the use of previously consumed CFCs in Polyurethane (PU) foam manufacturing and Refrigeration and Air-Conditioning (RAC) industries has been completely discontinued, as well in industrial applications in solvents, sterilization and pharmaceutical areas.

To implement actions aimed at phasing out HCFCs, the Brazilian HCFC Phase-out Program (Brazilian HPMP) has received financial support from the Fund. The Program, which has been implemented since 2012, is in its second phase, and Project BRA/16/G76 refers to the component that supports the polyurethane foam sector in its conversion process. Subsequent chapters will give special attention to this project.

Coordination of the activities to implement the Montreal Protocol in Brazil

Since the MLF provides financial assistance to developing countries through multilateral and bilateral agencies and governmental institutions, the United Nations Development Program (UNDP) in Brazil has been the lead agency for the implementation of MLF-supported projects in Brazil and the Ministry of Environment (MMA) is the coordinating agency. Besides UNDP, two other agencies are active in project implementation in Brazil, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the United Nations Industrial Development Organization (UNIDO).

As the formulator of the national environmental policy, MMA is the technical interlocutor on ozone under the Montreal Protocol, and has relied on the support of the Interminister Executive Committee for the Protection of the Ozone Layer (Prozon) to foster initiatives and design guidelines for the protection of the ozone layer in Brazil.

PROZON was created through the March 2003 Decree, which was revised in 2015 and concerned seven Ministries (Environment, Agriculture, Livestock and Supply (MAPA); Foreign Affairs (MRE); Development, Industry and Foreign Trade (MDIC); Finance (MF); Science, Technology, Innovation and Communications (MCTIC) and Health (MS)). The last ministerial reform renamed or integrated ministries into new organizations as is the case, for example, of the Ministry of Finance that became the Ministry of Economy, incorporating the MDIC. Prozon was extinguished by Decree 9,759 of April 11, 2019.

Moreover, the HCFC Working Group was established by Ordinance No. 41 of February 25, 2010, with the objective of assisting the Brazilian government in drafting and implementing the Brazilian HCFCs Elimination Program (Brazilian HPMP). Ordinance No. 179, dated June 24, 2015, recreated the HCFCs WG and kept it active until December 31, 2020. The HCFCs WG was composed of representatives of public and private entities and aimed to contribute to: (i) implementing actions to protect the Ozone Layer; (ii) meeting the goals set by the Montreal Protocol(iii) encouraging the use of substances that do not delete the ozone layer and of technologies with a low impact on the global climate system; and (iv) drawing up and implementing the Brazilian HCFC Phase out Management Plan (Brazilian HPMP) and its respective projects. The GT-HCFC was discontinued by Decree 9,759 of April 11, 2019.

The role played by IBAMA is also relevant in this scenario. The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), an agency attached to MMA, is responsible for controlling ODS production, import, export, and consumption in Brazil.

Among its attributions, IBAMA is responsible for controlling the Federal Technical Registry of Potentially Polluting Activities and/or Users of Environmental Resources (CTF / APP as per its Portuguese acronym) and for monitoring the ODS commercialization and use.

Technical Cooperation

At the same time, following the adoption of the Montreal Protocol and the adherence of the Brazilian Government to it, collaborations between MMA and UNDP were expanded through the direct execution by the UNDP, as the executing agency, of funds from the Multilateral Fund allocated for the phasing out of substances that delete the ozone layer, as is the case of the project to be evaluated.

Therefore, one of the objectives of this technical cooperation between UNDP and MMA is to support the actions aimed at allowing the Brazilian Government to meet the international commitments made to the Montreal Protocol and substantiated through this evaluation in the Brazilian HCFC Phase-out Program- Stage II, through the BRA/16/G76 Project.

BRA/12/G76 Project

It should be noted that prior to BRA/16/G76, the BRA/12/G76 Project - Brazilian HCFC Phase-out Program – Stage I - was executed between 2012 and June 2020. During 2020, the final evaluation of the latter, aimed at actions concerning the production of polyurethane foams, was carried out.

This Project supported actions relating to components (related to meeting Brazilian HPMP goals): Component 1: Regulatory Actions; Component 2: Investment Projects for technological conversion of enterprises in the foam sector; and Component 4: Monitoring and Evaluation Unit.

The following are the main conclusions of the evaluation of Project BRA/12/G76, from its final evaluation report[1]:

> *"Based on the XIX/6 decision agreed on at the 19th meeting of the parties to the Montreal Protocol on Annex C, Substances of Group I, the Parties agreed to anticipate the schedule for phasing out the production and consumption of HCFCs. For countries covered by Article 5 of the Montreal Protocol, which included Brazil, the following total reduction targets were agreed: (a) 10% by 2015; (b) 35% by 2020; (c) 67.5% by 2025; (d) 97.5% by 2030; (e) Allow the annual average of 2.5% for maintenance services during the period 2030-2040. The strategy outlined for Brazil included, in its first phase, the freezing of consumption in 2013 relative to the baseline, which was based on the average consumption in 2009 and 2010 (maximum consumption of 1,327.30 t ODP) and, in 2015, a total reduction of 16.60% (1,107.00 t ODP) from the baseline. In addition, a reduction rate of 32.36% was defined for HCFC-141b and 6.51% for HCFC-22, according to Normative Instruction (NI) IBAMA No. 14, of December 20, 2012."*
>
> *"The targets were successfully achieved and as of February 14, 2018, IBAMA published NI no.4, keeping the total quota for HCFCs phasing out at 16.60% up to 2019. As of January 2020, the total quota for HCFCs phasing out was decreased to 39.30% (806.10 t ODP) from the baseline, with 100% phase out projection by 2040 and the specific quota of HCFC-141b decreased to 90.03%, in addition to the ban on the HCFC-141b import for the foam manufacturing industry in 2020. However, limited imports of around 10% were still allowed for healthcare uses (manufacturing needles and other consumables) and use as a solvent."*

As to the BRA/12/G76 Project, its final evaluation was carried out in 2020 and stressed the high effectiveness level achieved:

> *"Regarding effectiveness, the Brazilian HCFC Phase-Out Management Plan (*Brazilian *HPMP) –BRA 12/G76 Project - Stage I - Foam Sector, the revised goal for phasing out the HCFC-141b consumption by 1.0%, which resulted in cutting down 164.38 t of ODP (Ozone Depleting Potential)."*
>
> Also, according to the final evaluation report of the BRA/12/G761 Project[1]:
>
> *"The initial target provided for the elimination of 168.88 t of ODP from HCFC-141b in the polyurethane foam manufacturing industry by 2020, and was later revised to 10162.88 t of ODP, due to three investment projects initially planned and not carried out, but the difference was reconciled by means of normative instruments established by the Brazilian Government, thus achieving the goal agreed upon with the Montreal Protocol."*
>
> *"The strategy initially adopted established that out of the total 168.8 tonnes of ODP, 32.35 tonnes corresponded to individual projects, with application in continuous panels; 86.81 tonnes, to individual and group projects with applications in Integral Skin Foam and Molded*

Flexible Foam; and 49.60 tonnes, to group projects, with applications in Rigid Polyurethane (water heaters, pipe in pipe insulation, thermo ware and packaging)."

"This was achieved through the technological conversion of 249 enterprises that used HCFC-141b and adopted new technologies, with Zero Ozone Depletion Potential - ODP, in addition to low Global Warming Potential - GWP and refer the actions implemented under Component 2 - Investment projects for the technological conversion of enterprises in the foam sector."

Thus, the execution of the BRA/12/G76 Project within the foam industry allowed the BRA/16/G76 Project to start its activities building upon important progress in the procedures that led to a more agile implementation, due in part to the lessons learned and the good practices of the Project.

It should be noted that since 1992 the MLF has supported almost a hundred projects with Brazil, with UNDP as the implementing agency. Several projects have been developed, always with the aim of implementing the commitments made by the Parties pursuant to the Montreal Protocol. At the same time, the projects were directly targeted to support enterprises, service areas or production processes that required major changes in the last decades, including support for changes in the legal framework and regulatory, as well as technical assistance to achieve these results and changes.

1.2. On Brazilian HPMP and the BRA/16/G76 Project

According to the Final Evaluation Report of the BRA/12/G76 Project, Stage II of the Brazilian HCFC Phase-out Program (Brazilian HPMP - Stage II) was prepared and detailed in 2013 and 2014 and went through broad debates and discussions that included organizations representing the public and private sectors. This process was completed after a Public Consultation held by Ministry of Environment, open to comments from any interested party. The document produced was entitled "Brazilian HCFC Phase out Program - Stage II" and was approved by Interminister Executive Committee for the Protection of the Ozone Layer (PROZON), which was disbanded in 2019.

According to the PRODOC[2], in November 2015, during the 75th Ordinary Meeting of the ExCom, the Executive Committee of the Multilateral Fund of the Montreal Protocol approved funds amounting to USD 35,963,970.00 to phase out HCFC consumption in Brazil by 35% by 2020 and 45% by 2021 (Decision 75/43 - Annex III). On that occasion, funding planning and tranches to be allocated for the execution of projects to be implemented by the UNDP, UNIDO and GIZ were defined, among which the new BRA/16/G76 Project, to be implemented by the UNDP.

As a consequence of the country strategy, the Brazilian HPMP aimed to meet the agreed-upon targets[2]: to enable a decrease 35% in the Brazilian HCFC consumption in 2020 and 45% in 2021, having as a baseline the average consumption in 2009 and 2010, which was of 1,327.30 t of ODP.

To achieve these goals, in accordance with the BRA/16/G76 PRODOC[2], the country committed to:

i) Phase out the consumption of 1.5 ODP tonnes of HCFC-22 in all industries and 131.82 ODP tonnes of HCFC-141b in the polyurethane foam manufacturing sector through Regulatory Actions (Component 1 of the Brazilian HPMP - Stage II),

ii) Phase out the consumption of 169,08 tonnes ODP t of HCFC-141b and 0.60 ODP tonnes of HCFC-22 in the Polyurethane Foam Manufacturing Sector (Component 2 of the Brazilian HPMP – Stage II),

iii) Phase out the consumption of 100 ODP tonnes of HCFC-22 in the Service Sector in RAC (Component 3 of the Brazilian HPMP - Stage2),

iv) Phase out the consumption of 61.06 ODP tonnes of HCFC-22 in the RAC Manufacturing Sector (Component 4 of the Brazilian HPMP - Stage II),

v) Carry out implementation and monitoring actions for Stage II of the HPMP (Component 5 of the HPMP - Stage II).

It is in this context of actions aimed to improve protection of the ozone layer that the BRA/16/G76 Project initiative is inserted, implemented nationwide, coordinated by Ministry of Environment and supported by IBAMA, under the direct execution of the UNDP and funding by the MLF.

The BRA/16/G76 Project was designed throughout 2015 and refined in 2016. It aimed at supporting the implementation of the Country Strategy within initiatives aimed at achieving components and targets agreed upon in Stage II of the Brazilian HPMP by providing support to: strategic management actions; adjustment of the regulatory framework (Component 1 of the Brazilian HPMP); investment projects for industrial conversion of enterprises in the polyurethane foam industry (Component 2 of the Brazilian HPMP); and assistance to components of the HPMP Stage I related to RAC services, as well as to generating information for the purposes of planning, monitoring and evaluation of progress in the areas supported by Stage II of the Brazilian HPMP, mainly enterprises supported by the BRA/16/G76 Project (Component 5 of the Brazilian HPMP).

This project was called the Brazilian HCFC Phase Out Management Plan (Stage II) in its Stage II, which continued the actions carried out during Stage I. Stage II has as its general objective the phase out of HCFC consumption in the polyurethane foam industry and aims to provide technical assistance to the Brazilian government to this end.

The Project started on the date it was signed, November 29, 2016, and should be completed by December 31, 2021, with the Subprojects for the conversion of System Houses and individual enterprises already partially completed by December 2020. However, the PAC approval meeting took place on May 19, 2016, and the MLF made the Tranche 1 funding available in 2015.

The project's resources total is US$ 17,020,000.00 (seventeen million, twenty thousand American dollars). It is being implemented by means of Annual Work Plans, linked to MLF disbursements, which have been carried out according to the Fund's own rules, agreed upon through Meetings[3]: *i) Tranche 1 (75th Meeting, Montreal 16-20 November 2015); ii) Tranche 2 (80th Meeting, Montreal, 13-17 November 2017); and iii)Tranche 3 (82nd Meeting, Montreal, 3-7 December 2018)*.

To date, three disbursements of the Fund, called Tranches, have been made, as requested by the Brazilian Government to the Fund, with the following amounts: US$ 3,078,900 (Tranche 1); US$ 2,627,704 (Tranche 2) and US$ 7,168,396 (Tranche 3). A new disbursement, equivalent to the last tranche of the Project, of US$ 3,895,000 has yet to be requested, meeting the MLF criteria for the release of this last disbursement.

By December 2020, US$ 8,077,161.42 had been spent, which would mean 63% of the resources already made available by the MLF[4] had been spent, which totals US$ 12,875,000. However, the Project's expenditures[5] by tranche indicate that 98.94% of the first tranche was

disbursed, 83.26% of the second tranche, and only 36.21% of the third tranche as of December 2020.

The Brazilian HPMP Country Strategy[1] agreed upon by the Brazilian Government and the MLF Executive Committee to comply with the Montreal Protocol for the phase out of HCFCs in Stage II of the Brazilian HPMP took into account the country's scenario in 2013, when the Brazilian consumption of HCFCs in ODP was due to approximately 46% from the manufacturing sector and 54% from the service sector. In terms of the ODS consumption profile, the refrigeration and air-conditioning service industry accounted for approximately 66% of total HCFC consumption in the country.

According to the information submitted for approval of the BRA/16/G76 Project Document, HCFC-141b consumption in the polyurethane foam manufacturing industry accounted for approximately 27% of HCFC consumption, and HCFC-22 consumption in the service sector accounted for 54.4% of total ODP consumption. The domestic refrigeration industry, which includes non-A5 capital multinational enterprises, accounted for 38.50 ODP tonnes of HCFC-141b consumption.

All information collected when preparing Stage II of the Brazilian HPMP confirmed that, unlike for HCFC-22, for HCFC-141b there are technologically and technically feasible alternatives with low global warming potential (GWP) and currently available on the market as hydrocarbon, methyl formate, methylal, water-based systems and hydrofluorolefins (HFOs).

Since no HCFCs are manufactured domestically, the HCFC-141b pathway in the foam manufacturing process begins with importing enterprises, some of which are also distributors, input producers for the foam industry or system houses. Others have their own distributor networks or sell directly to system houses and large individual consumers.

System Houses play a relevant role in the HCFC consumption circuit, due to their direct contact with consumers of all sizes. They buy HCFCs from importers or distributors, formulate and sell the systems to the user enterprises.

In this context, eligible domestic enterprises in the sector of rigid polyurethane foam for all applications, except those already included in Stage I of the Brazilian HPMP, would receive non-reimbursable funds from the Multilateral Fund to enable technological conversion of production processes, equipment and/or technologies. In order to participate, companies had to meet the eligibility criteria established in the Montreal Protocol. Stage I of the Brazilian HPMP included all rigid polyurethane manufacturing enterprises for continuous panel applications, and a few rigid polyurethane manufacturing enterprises for solar heaters, thermo sets, pipe and packaging coating, and integral skin and flexible molded foam applications.

1.3. Objectives

In this context, the strategy for the Stage II Project was defined, aiming at certain strategic objectives: provide support to achieving the Brazilian HCFC Phase out Program - Stage II goals; and help honor commitments made with the Montreal Protocol.

Therefore, actions developed within the scope of the BRA/16/G76 Project were based on the **Brazilian HPMP - Stage II Document and the Associated Agreement[5]**, especially with regard to its Annex 6-A, having as objectives:

General objective: ***Phase out HCFC consumption in the polyurethane foam industry and provide assistance to the Brazilian Government in the implementation of Stage II of the*** **Brazilian** ***HPMP***

Specific Objectives:

SO1. Directly execute actions that guarantee the implementation of Components 2 e 5;

SO2. Provide technical assistance to the Government, ensuring the implementation of Component 1;

SO3. Ensure the coordinated and articulated management of the activities listed under the five components that make up Stage II of the Brazilian HPMP under the coordination of the Brazilian government, thus ensuring their complementarities and execution according to the commitments made with the funding agent.

1.4. Strategic Outcomes

Specifically, for the **BRA/16/G76 Project**, the following 4 strategic outcomes were established:

Outcome 1: ***Project management is implemented (Component 5 of Brazilian HPMP – Stage II)***

Outcome 2: ***Regulatory framework is adjusted (Component 1 of Brazilian HPMP – Stage II)***

Outcome 3: ***Industrial Conversion Investment Projects are implemented (Component 2 of Brazilian HPMP – Stage II)***

Outcome 4: ***Assistance to Brazilian HPMP components– Stage II related to the RAC sector (Component 4 of Brazilian HPMP – Stage II)***

The following Outputs are linked to **Outcome 1**:

Output 1: Technical, operational, physical, and financial execution is completed.

Output 2: Progress Reports and Annual Work Plans prepared and submitted to the MLF Executive Committee.

Output 3**:** Implementation and Monitoring of Investment Subprojects completed.

Output 4: Annual data verification completed.

The following Output is linked to **Outcome 2**:

Output 1: Draft instruments and legal norms aimed at phasing out HCFCs completed.

As to **Outcome 3**, which concentrates almost all the Project resources, it encompasses the following Outputs, divided into System Houses and Individual Companies, each initiative with enterprises being classified as a subproject, totaling **27 subprojects, each one relative to one Output**.

Output 1: Investment Subproject AMINO Group (Rigid Foams) implemented up to 2018(year 3).

Output 2: Investment Subproject ARISTON Group (Rigid Foams) implemented up to 2018 (year 3).

Output 3. Investment Subproject BASF Group (Rigid Foams) implemented up to 2019 (year 4).

Output 4. Investment Subproject COMFIBRAS Group (Rigid Foams) implemented up to 2019 (year 4).

Output 5. Investment Subproject DOW Group (Rigid Foams) implemented up to 2019 (year 4).

Output 6: Investment Subproject ECOBLASTER Group (Rigid Foams) implemented up to 2018 (year 3).

Output 7: Investment Subproject FLEXÍVEL Group (Rigid Foams) implemented up to 2019 (year 4).

Output 8: Investment Subproject MCASSAB Group (Rigid Foams) implemented up to 2019 (year 4).

Output 9: Investment Subproject POLISYSTEM Group (Rigid Foams) implemented up to 2018 (year 3).

Output 10: Investment Subproject POLYURETHANE Group (Rigid Foams) implemented up to 2019 (year 4).

Output 11: Investment Subproject PURCOM Group (Rigid Foams) implemented up to 2018 (year 3).

Output 12: Investment Subproject SHIMTEK Group (Rigid Foam) implemented up to 2019 (year 4).

Output 13: Investment Subproject UNIVAR Group (Rigid Foam) implemented up to 2018 (year 3).

Output 14: Investment Subproject UTECH Group (Rigid Foams) implemented up to 2016.

Output 15: Individual Investment Subproject ANANDA METAIS (Rigid Foams) implemented up to 2018 (year 3).

Output 16: Individual Investment Subproject ÁRTICO (Rigid Foams) implemented up to 2019 (year 4).

Output 17: Individual Investment Subproject BULLTRADE (Rigid Foams) implemented up to 2019 (year 4)

Output 18: Individual Investment Subproject COLD AIR (Rigid Foams) implemented up to 2017 (year 2).

Output 19: Individual Investment Subproject FURGÕES IBIPORÃ (Rigid Foams) implemented up to 2019 (year 4).

Output 20: Individual Investment Subproject GELOPAR (Rigid Foams) implemented up to 2019 (year 4).

Output 21: Individual Investment Subproject IBF (Rigid Foams) implemented up to 2017 (year 2).

Output 22: Individual Investment Subproject ISAR (Rigid Foams) implemented up to 2017 (year 2).

Output 23: Individual Investment Subproject NIJU (Rigid Foams) implemented up to 2019 (year 4).

Output 24: Individual Investment Subproject REFRIMATE (Rigid Foams) implemented up to 2019 (year 4).

Output 25: Individual Investment Subproject SÃO RAFAEL (Rigid Foams) implemented up to 2021 (year 6).

Output 26: Individual Investment Subproject TECPUR (Rigid Foams) implemented up to 2021 (year 6).

Output 27: Individual Investment Subproject THERMOTELHAS E THERMJET (Rigid Foams) implemented up to 2021 (year 6).

The following Output is linked to **Outcome 4**:

Output 1: Equipment and parts for refrigeration systems needed for the implementation of five demonstration projects carried out.

The project relies on the Logical Matrix, which substantiates through the BRA/16/G76 Outcome and Resource Matrix, which includes indicators, targets, responsibilities and expected outputs that contribute to achieving outcomes and expected effects of project actions. This Matrix was used to prepare the 2019 and 2020 Annual Progress Reports, when tripartite meetings were held with the main project players and ABC. Please find Matrix in Annex 1.

The Project is national in geographic scope, since the beneficiary enterprises are from the five regions of the country, and the project deploys more direct action in the following Brazilian regions, states and municipalities where SHs and participating Individual Companies are located:

Southeast Region:

State of São Paulo: Bariri, Barueri, Diadema, Jundiaí, Louveira, Mococa, Osasco, São Paulo, Vinhedo.

State of Minas Gerais: Ibirité.

South Region:

State of Rio Grande do Sul: Novo Hamburgo, Porto Alegre.

State of Santa Catarina: Blumenau, Chapecó, Jaraguá do Sul.

State of Paraná: Araucária, Colombo, Ibiporã.

Northeast Region:

State of Ceará: Fortaleza.

To implement the BHP, the Brazilian government, stakeholders and partners faced strong initial challenges regarding projects that supported the execution of Stage I and BRA/16/G76 - Stage II. Many of the challenges concerned structuring and taking in account new policies and normative instructions aimed at allowing the expected changes in the project's strategic themes, as well as, articulating and awareness-raising among enterprises so that the latter would implement these projects and access the MLF financial and technical support.

Briefly, the Brazilian actions aimed at phasing out HCFCs were divided into three stages. **Stage I** of the Brazilian HCFC Phase-out Management Plan- **Brazilian HPMP**, completed in December 2019, established a detailed strategy for phasing out 220.3 ODP tonnes of the ozone depleting substances (ODS) by 2015, of which 168.8 tonnes, initially planned, concerned technology conversion projects in the integral skin foam and flexible molded foams industries, as well as rigid PU foams in continuous panels, water heaters, piping, thermal containers and packaging applications.

Similarly, according to the Report of the 75th ExCom Meeting, **Stage II of the Brazilian HPMP[2]** for the foam sector has been undertaking actions aimed at phasing out 464.06 ODP

tonnes of HCFCs, including 300.9 ODP tonnes of HCFC-141b still in use for rigid PU applications, by 2020. Finally, **Stage III** of the Brazilian HPMP, to be implemented starting in 2022, will address a comprehensive strategy and required actions to phase out the remaining HCFC consumption by 2040.

In order to minimize the economic, social and technical impacts of the HCFC-141b consumption phase out in the foam industry, the Project prioritized the selection of specific industrial subsectors that have received technical assistance and financial compensation to convert their industrial processes, switching to environmentally adequate raw materials instead of HCFC-141b.

The subprojects included technological conversion of enterprises that used HCFC-141b in their production processes so they can use ODS-free (Ozone Depleting Substances), low global warming potential (GWP) technologies. Costs associated with technological conversion encompassed equipment adjustment and/or acquisition, application in new operational processes, technical support and incremental operational costs. In return, enterprises committed to co-finance, if necessary, additional costs they would incur in order to stop using HCFC-141b to manufacture polyurethane foams, among other commitments described in the Term of Commitment agreed upon by parties.

Stage I of Brazilian HPMP[2]for the foam sector, (BRA/12/G76 Project), which included 23 (twenty-three) investment projects, of which 9 (nine) group projects and 14 (fourteen) individual projects, allowed 249 enterprises of the foam sector, of which 226 end-users, to convert.

Under Stage II of the Brazilian HPMP supported by the Project for the polyurethane foam industry, BRA/16/G76 includes 27 (twenty-seven) investment subprojects, of which 14 (fourteen) are group subprojects and 13 (thirteen) are individual subprojects. As of December 31, 2020, 9 (nine) individual subprojects were completed, two projects were under execution, one declined participation, and one was being contracted. Of the group subprojects (System Houses), 9 (nine) had already conducted the conversion, one had declined, one was being contracted and 3 (three) had not yet accepted to contract.[4]

From November 2016 to December 31, 2020, the Project allowed 98 enterprises in the foam industry to convert[6], of which 81 were end-users. By its completion, however, the Project aims to support the conversion of 445 end-users. The Project is initially scheduled to end on December 31, 2021.

For the execution of the project, institutional arrangements were achieved through articulation between MMA (general coordinating entity), IBAMA (player in charge of regulations and control of ozone depleting substances - ODS) and the UNDP (implementing agency of the Montreal Protocol and its MLF).

An Implementation and Monitoring Unit was set up within the UNDP; in the other public administration bodies involved, technical-administrative units were identified as focal points for the implementation of BRA/16/G76. It is worth mentioning the international coordination role of the Brazilian Cooperation Agency, under the Brazilian Ministry of Foreign Affairs, as the coordinator of international technical cooperation actions.

The BRA/16/G76 Project has worked on the four expected Outcomes, achieving progress in the four strategic axes; conversions have been made in System Houses (SH) and in individual enterprises, both end users and beneficiaries. It is worth mentioning that almost one hundred enterprises (around 98 of the 445 planned) have been converted, with HCFC-141b no longer

being used, both in system houses and in individual enterprises (close to 22% of the planned replacement level).

Important progress has been made so far in improving the legal and regulatory framework, with an important participation of MMA and IBAMA in the adoption and/or operating of new normative instructions with a bearing on the prevention of HCFC imports, which is limited to about 10% for use in the healthcare (needles and instrument parts) and solvent sector.

It is worth pointing out that the Project is national in scope, with a particular focus on the southern and southeastern regions of Brazil, and that, in the latter region, participants were mostly Individual Companies, System Houses and End Users.

To support project's actions, partnerships were established with Individual Enterprises and System Houses, which relied on a service contracting modality established between UNDP and the individual enterprises and system houses to execute their investment projects. These partnerships were necessary to achieve important progress in execution and fund disbursement, as well as to establish progress reports for each of the 27 subprojects. The status of the subprojects supported by BRA/16/G76 as of by December 2020is shown below:

Table 1: SH and IE Conversion Execution.

Projects			Selection of technology	Industrial Plant Conversion Plan	Industrial Plant Conversion	Certificate of Suitability	Finished Conversion (1) Yes; (0) No
U Rigid	1	AMINO	Executed	Executed	Executed	Executed	1
	2	ARISTON	Executed	Executed	Executed	Executed	1
	3	BASF	Empresa inelegível				0
	4	COMFIBRAS	Não iniciado	Não iniciado	Não iniciado	Não iniciado	0
	5	DOW	Empresa inelegível				0
	6	ECOBLASTER	Executed	Executed	Executed	Executed	1
	7	FLEXÍVEL	Executed	n.a.(2)	n.a.(2)	n.a.(2)	1
	8	MCASSAB	Executed	n.a.(2)	n.a.(2)	n.a.(2)	1
	9	POLISYSTEM	Not Started	Not Started	Not Started	Not Started	0
	10	POLYURETHANE	Executed	Executed	Executed	Executed	1
	11	PURCOM QUÍMICA	Executed	Executed	Executed	Executed	1
	12	SHIMTEK	Not Started	Not Started	Not Started	Not Started	0
	13	UNIVAR	Not elegible				0
	14	UTECH	Executed	Executed	Executed	Executed	1
PU Rigid	15	ANANDA METAIS	Not Started	Not Started	Not Started	Not Started	0
	16	ÁRTICO	Executed	Executed	Executed	n.a.(2)	1
	17	BULLTRADE	Executed	Executed	Executed	n.a.(2)	0
	18	COLD AIR	Executed	Executed	Executed	Executed	1
	19	FURGÕES IBIPORÃ	Executed	Executed	Executed	n.a.(2)	1
	20	GELOPAR	Executed	Executed	Executed	n.a.(2)	1
	21	IBF	Executed	Executed	Executed	Executado	1
	22	ISAR	Executed	Executed	Executed	Executado	1
	23	NIJU	Executed	Executed	Executed	n.a.(2)	1
	24	REFRIMATE	Executed	Executed	Executed	n.a.(2)	1

Source: IMU/UNDP. Tripartite Meeting. 2020.

The BRA 16/G76 Project document points out the strategies to be developed for the due engagement of stakeholders, allowing an alignment of expectations of each participating institution, including enterprises who would benefit from the Outcomes defined in the Project Outcomes and Resources Matrix[7], which constitutes its Logical Framework.

The project institutional arrangement included three institutions -ABC/MRE, MMA and UNDP/IMU-, which acted as pillars of institutional articulation, general coordination, and Project implementation, respectively. It is worth mentioning the technical support offered by IBAMA, which institutionally plays the role of controlling and inspecting imports of substances detrimental to the ozone layer by means of the Federal Technical Registry (CTF, as per its Portuguese acronym).

Project beneficiaries participated through specific Service Delivery Contracts between the UNDP and the enterprises (System Houses and Individual Companies), as provided for by the initial project. This contract modality posed several difficulties for end users conversion, because this mechanism did not allow migration of the funds earmarked to end users conversion, when necessary and swiftly, from a contract with a System House to a contract with a different System House and/or End User enterprises; the IMU/UNDP looked for alternative solutions to lessen these difficulties enterprises pointed out.

To this end, as of July 2019 Contracts of the Long Term Agreement (LTA) modality were used; Annex 2 shows the respective operational flow. This type of contracts, approved in May 19, 2019for use in Montreal Protocol projects and already being used by the UNDP, allowed the payment or transfer of funds received from the project to different enterprises, pursuant to rules and regulations already widely used by the international body.

According to the interviews carried out, it was possible to expedite their implementation and allow provide flexibility to end users, taking into account the alternation of suppliers (System Houses) by end users, a characteristic of the polyurethane foam manufacturing industry.

2. EVALUATION METHODOLOGY

The objectives of the mid-term evaluation are stated below, as per Annex 3:

(i) Conducting the project mid-term evaluation emphasizing relevance, project design, effectiveness, efficiency,

(ii) Preparing a document containing lessons learned and detailed recommendations regarding implementation strategies; implementation processes; resources used; partnerships and cooperation,

(iii) Analyzing the data on project expenses, vis-à-vis the outcomes achieved relative to the resources made available annually; these resources are relative to the annual work plans for the development of the project, identifying promoting and obstructing factors for achieving its effects and sustainability,

(iv) Proposing a set of actions to be undertaken after the completion of cooperation, strengthening appropriation, replication and sustainability of the Project's effects.

The evaluation was carried out by analyzing the following points in an interdependent manner: (i) quality of the project conception and design; (ii) efficiency of the project in achieving the planned objectives, including the capacity to mobilize and manage resources (budget, inputs, activities and human resources); (iii) whether unexpected positive or negative effects were brought about by the project as a result of its implementation; (iv) identification of lessons learned and good practices that can be used in future actions for formulating public policies and planning new initiatives.

At the same time, recommendations were formulated considering the need for follow-up actions to contribute to enhance sustainability or to improve the effects up to project completion.

The evaluation identified to what extent the implementation process (structure, arrangements and mode of administrative and financial operation) led to the achievement of the project's inputs and activities, outputs and strategic objectives. At the same time, an evaluation of technical outputs allowed to check the different degrees of achievement of the outputs so far.

The methodology used took into account the United Nations Evaluation Group (UNEG) guidelines for mid-term evaluation of technical cooperation projects. Therefore, this document considered the evaluation criteria of relevance, efficiency and effectiveness to look into the project, designing an Evaluation Guideline Matrix, as per Annex 4.Emphasis has been placed on a complementary evaluation criterion that should gather additional information on the project design.

These evaluation criteria are defined in the documents used to methodologically guide evaluations carried out within the UN system:

(i) relevance is related to the degree to which an initiative and its expected outputs and effects are in line with national and thematic policies and priorities, as well as to the extent to which it meets beneficiaries needs.

(ii) effectiveness is the extent to which the project has achieved the expected outcomes (outputs and effects) and the extent to which it has made progress towards achieving these effects

and outputs. This evaluation involves cause and effect analysis, i.e., whether it is possible to attribute certain changes to the project's outputs and effects.

(iii) efficiency measures whether the inputs or resources (funds, experience, time, and opportunity) have translated into outputs in an economical way. A project is efficient when it uses resources appropriately and economically to generate the desired outputs. Efficiency is important to make sure that resources are used appropriately and to state whether they could have been used more effectively.

This evaluation contemplated the following moments:

(a) *Identifying the achievement of key outputs agreed upon in the Project development axes for the 2016/2020e period* and check the validity of processes and instruments used to implement work plans and achieve outcome/performance indicators. (Baseline).

(b) *Examining the implementation process* aimed at achieving the agreed indicators and outcomes for this period, allowing the identification of factors that contributed to achieving the outcomes or decreased their reach.

(c) *Looking into elements, outcomes and management processes* that contributed to achieving immediate effects and likely long-term impacts, as well as into actions taken to promote better ownership of the effects achieved so far.

(d) *Identifying the causal relationships* to establish factors that facilitated or hindered effectiveness and efficiency in achieving the outcomes/objectives, which allows to identify lessons learned and general recommendations on this topic.

For this evaluation, online interviews were carried out with the main players and beneficiaries of the project: MMA (3); IBAMA (3); ABC (1); IMU/UNDP (2); System Houses (4); Individual Enterprises (5); End Users (7); ABIQUIM (1) International Consultant (1). For this purpose, 3 interview guide/scripts were prepared according to interviewees' typology, included in Annex 5.Interviewguide/ scripts were prepared according to the characteristics of the player: (i) ABC, MMA, IBAMA and IMU/UNDP; (ii) SH; IE and EU; and (iii) ABIQUIM.

The following criteria were used to select enterprises executing the 3 types: SH; Individual Enterprise and End User: (i) from the set of 9 SH subprojects, 4 enterprises were selected by consumption, stage and number of EU to be supported; Poly Urethane; Ariston; Univar; and Ecoblaster; (ii) from the 13 Individual Enterprise subprojects the following 5 were selected by consumption and execution profile: São Rafael; Bulltrade; Furgão Ibiporã; Ananda Metais; and Tecpur; (iii) End User: from the set of 81 enterprises, 7 were selected: FKL; Fachini; Mega Brasil; Thermolex; Refribrasil; Isonoxe Diana Refrigeração.

The selection of players to be interviewed was agreed upon with the IMU/UNDP based on the criteria proposed by the evaluator to achieve representativeness of company typologies, stages of implementation and decrease in HCFC-141b consumption.

3. PROJECT EVALUATION

Based on the evaluation of the project mid-term evaluation criteria, which are stated in the Terms of Reference and adopted by the UNEG, this evaluation must take into account the criteria of Relevance, Effectiveness and Efficiency, as they will be further analyzed in the mid-term evaluation.

Annex 3 includes the Evaluation Methodology, which was presented in Output 1 of this consultancy, relative to the presentation of the Work Plan and Methodology to be used.

Annex 4 presents the evaluation guiding questions, as well as the instruments and procedures used to obtain information and answers to the Evaluation Matrix.

3.1. Relevance

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international environmental treaty established in 1987 and ratified by 198 Parties. The Protocol aims to protect the ozone layer by phasing out production and consumption of Ozone Depleting Substances (ODS).

For over three decades, Brazil has been developing measures to protect and recover the ozone layer. It joined the Vienna Convention and the Montreal Protocol through Decree No. 99.280, dated June 6, 1990, by which the country committed to totally eliminate chlorofluorocarbons (CFCs), among other measures, pursuant to targets and indicators agreed upon as part of a Brazilian Program. However, since 1988, Brazil has carried out actions to achieve the Montreal Protocol goals.

From 1992 to 2015, several sector projects and activities were carried out, in groups or individually, aimed at technological conversion in the Foams, Commercial Refrigeration, Solvents, Agriculture and Chemical Industries. These projects allowed to phase out consumption of Chlorofluorocarbons (CFC), Halon, Carbon Tetrachloride (CTC) and Methyl Bromide (except for quarantine and pre-shipment uses) and to partially eliminate consumption of Hydrochlorofluorocarbons (HCFC).

In 2002, the Brazilian government approved the Brazilian CFC Phase out Plan (PNC) whose goals, set for up to 2010, and were successfully achieved. It should be noted that, between 1995 and 2020, several projects were approved for Brazil by the Montreal Protocol with non-reimbursable funds, resulting in the phase out of 95% of CFC consumption, as per the 2007 MMA report.

These actions aimed at enhancing protection of the ozone layer constitute the context for this Project initiative, implemented nationwide under the coordination of the Ministry of Environment, executed by the UNDP, and funded by MLF.

The BRA/16/G76 Project encompasses initiatives aimed at achieving components and goals agreed upon for Stage II of the Brazilian HPMP, supporting: strategic management actions; adjustment for regulatory framework ; industrial conversion investment projects; assistance to Brazilian HPMP- Stage II components related to the RAC services industry; and information generation to be used for planning, monitoring and evaluating progress in the areas supported by Brazilian HPMP- Stage II, with an emphasis on enterprises supported by the BRA/16/G76 Project.

Ministry of Environment (MMA) and IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) have collaborated with the United Nations Development Program (UNDP) for over twenty years in the execution of projects in the modality form of National Execution; these projects have supported structuring, planning, monitoring and formulation of public policies in different areas of interest.

At the same time, following the adoption of the Montreal Protocol and the adherence of the Brazilian government to it, collaboration between MMA and the UNDP was expanded by means of the direct execution by the United Nations Development Program, as the executing agency, of the funds from the Multilateral Fund allocated for phasing out substances that deplete the ozone layer, as is the case of the project being evaluated.

Therefore, one of the objectives of this technical cooperation between the UNDP and MMA is to support the Brazilian government's actions aimed to meet its international commitments in relation to the Montreal Protocol and substantiated in this assessment of the Brazilian HCFC Phase-out Program - Stage II, through the BRA/16/G76 Project.

The improvement of the regulatory framework on the non-use of HCFCs has so far allowed the Brazilian Government to meet its international commitments concerning the targets agreed upon in the Stage II of the HPMP.

According to the PRODOC[2], since no HCFCs are manufactured domestically, the HCFC-141b pathway in the foam manufacturing process begins with importing enterprises, some of which are also distributors, input producers for the foam industry or System Houses. Others have their own distributor networks or sell directly to system houses and large individual consumers. System Houses play a relevant role in the HCFC consumption circuit, due to their direct contact with consumers of all sizes. They buy HCFCs from importers or distributors, formulate and sell the systems to the user enterprises.

Thus, this scenario has changed due to the fact that IBAMA's Normative Instruction (NI) no. 48[8], became effective as of January 1, 2020. According to it, imports of HCFC-141b would no longer be allowed for use by enterprises within the polyurethane foam industrial park in the entire national territory. Two years prior to this NI, a different NI warned Brazilian entrepreneurs that imports would be discontinued as of January 2020.

Furthermore, by December 2020, the Project had already ensured the conversion of eight System Houses, out of the fourteen initially planned (three became ineligible), thus promoting a decrease in consumption by December 2021 of 68.14 ODP/year, whereas the total cut down by the end of the Project is 169.08 ODP/year. At the same date, 81 end users were converted out of the total of 445 enterprises to be converted by the end of the Project. Moreover, nine of the thirteen participating Individual Companies were converted with individual projects.

It should be pointed out that the initial design of the Project matched the socio-economic reality of the country and met the need for plant technological conversion in order to allow the adequate substitution of HCFC-141b according to different types of enterprises. By means of interviews, it was possible to confirm this design adequacy in terms of agreed goals, strategy adopted by System Houses and funding to support the conversions. Interviews also confirmed the Project's relevance for the enterprises to continue their production activities while processing conversions agreed upon in Projects.

Therefore, after 5 years of Project execution, the strategy adopted, the objectives and the expected outputs of the Project, as well as the proposed design are still valid and remain relevant

in the current stage of national socio-economic reality, meeting the demands and the installed capacity in the area of foams.

It should be pointed out that the enterprises relied on technical support from the Project to make feasible their choices in technological conversion to replace HCFC-141b taking into account the national and international markets in 2016-2020. According to interviewees, in 2020-2021, the pandemic entailed difficulties in input supply, after conversion, for a number of enterprises on the domestic market, a situation that is independent of the Project's direct action and stresses the relevance of the Project.

Thus, by means of different interviews, it is possible to evaluate as high the relevance of this Project for honoring the Brazilian Government's international commitments in relation to the goals agreed upon with the Montreal Protocol for this Brazilian HPMP - Stage II Project. It also retains, to a certain degree, great relevance for the success of public policies concerning the Project's contribution to the attainment of existing goals established in Brazilian HPMP and other documents for the protection of the Ozone Layer, by phasing out HCFCs in the foam sector, as indicated in MMA website.

This Project is even more relevant when the same scenario faced by the enterprises in the polyurethane foam industry participating in the Project and distributed throughout the national territory is evaluated for 2016-2019.The Project had not started, which meant limited funds to invest in technological conversion in an immediate and strategic way, with no specialist guidance as to priorities in technological options and initiatives to face the new conversion challenges. Moreover, enterprises had to act and respond, in an agile and efficient way, to meet demands associated with the implementation of policies (INs) of non-use of HCFC-141b that were in the process of being approved and were eventually adopted. The relevance of the Project was confirmed by all the interviewed enterprises, which are the direct beneficiaries of the 27 subprojects implemented under BRA/16/G76.

It is important to highlight the Project's contributions to the achievement of targets related to Sustainable Development Goals (SDGs) and Agenda 2030; its execution in this global and national context has a certain degree of relevance. The Agenda 2030 is an action plan for the development of people, for the planet and for enhanced social, economic and environmental balance, seeking to strengthen human peace by means of freedom. The eradication of poverty in all its forms and dimensions, including extreme poverty, is one of the great global challenges in the coming decades and an important requirement for sustainable development. The Agenda 2030 includes seventeen SDGs with 169 associated goals, which are integrated and indivisible.

The actions in this project also engage in a cross-dialogue with 08 of the 17 Sustainable Development Goals (SDGs): 3, 9, 11, 12, 13, 14, 15 and 17. Indirectly, the Project's initiatives help achieving SDGs 3, 11,14, 15 and 17:

(i) Goal 3: Good health and well-being: the absence of ODS emissions helps decrease the number of skin cancers, of blindness cases and avoids weakening the immune system in the population,

(ii) Goal 11: Sustainable cities and communities: enterprises in the foam industry that have carried out the technological conversion become more environmentally sustainable, favoring a responsible and more sustainable production for cities and societies,

(iii) Goal 14: Life below water: the absence of ODS emissions helps avoiding deterioration of marine life (aquatic organisms and phytoplankton),

(iv) Goal 15: Life on land: the absence of ODS emissions helps avoiding deterioration of life on land (plant growth),

(v) Goal 17: Partnerships for the goals, means of implementation: non-reimbursable resource transfer mechanisms in support of technological conversion.

The Project relates most directly to the SDGs 9, 12 and 13:

(i) *Goal 9 – Industry, innovation and infrastructure*: wide dissemination of technologies alternative to ODS for the production of polyurethane foams, with zero ODP and low GWP, aa well as the implementation of investment projects for industrial conversion, help disseminate new environmentally appropriate technologies for the improvement of the infrastructure and operational safety of the foam industry;

(ii) *Goal 12 – Responsible consumption and production*: awareness-raising and dissemination of information to the general population and to the productive sector regarding the importance of not using ODS in goods, services and production processes in order to raise awareness about the importance of responsible consumption and production;

(iii) Goal 13 – Climate action (against global climate change): in addition to their Ozone Depletion Potential, HCFCs are greenhouse gases (GHG) with high GWP. Actions taken by the Project to phase out or eliminate the use of ODS in old equipment, as well as the technological conversion of industries that use these substances as an input, are important measures to mitigate adverse impacts on the climate regime. Until the completion of this project, it is planned that the emission of about 2.1 million tonnes of CO2 equivalent will be avoided.

During the evaluation process, a majority of interviewees confirmed the relevance and adequacy of the Project to beneficiaries needs, highlighting the outputs of the Project's action and the sustainability of technological conversions and HCFC-141b replacement.

At the same time, the Project also worked together with other initiatives undertaken by Brazilian enterprises and institutions associated in the area of industrial development; as well as worked together with other partners, aimed at strengthening entrepreneurial and technical capabilities.

Mid-term Conclusions:

Therefore, it can be evaluated that the Project had a high degree of relevance for achieving the goals established in the Brazilian HPMP Stage II Project and for supporting the enterprises directly involved in it. At the same time, it generates examples of successful conversions conducted by enterprises participating in the Project, with a high degree of replication, as long as funds for strategic investments are provided, even if dependent on entrepreneurial decisions.

3.2. Project Design Quality

The initial design of the Project[2], due to its characteristics, fits into a project that has a defined set of subprojects aimed to meet the need for conversion of 27 enterprises[9] directly and 445 enterprises indirectly, having as inputs the information, management structure and lessons learned from the implementation of the previous Project BRA/12/G76 - Stage I of the Brazilian HPMP, also funded by the MLF and running in the foam sector. Although it was partially carried out at the same time, the above-mentioned project preceded the proposal for the design of Project BRA/16/G76 - Stage II of the Brazilian HPMP. It should be noted that the goals and objectives of Stage II had already been agreed with the Fund at ExCom meetings.

In this regard, the activities and outputs of Project BRA/16/G76 were directly related to the national technical and institutional needs to meet the technological conversions and replacement of HCFC-141b by Brazilian enterprises, in order to achieve the goals agreed upon under the Montreal Protocol. At the same time, it presented a previous definition of activities and outputs aimed at reaching the initial strategic Objectives, which were concentrated in 2 technical and final Outcomes (normative institutional framework and enterprise subprojects), 1 mid-term Outcome (Project management) and 1 residual technical Outcome of Project BRA/12/G76 (executed by another cooperation agency) aimed at the acquisition of equipment.

The Project's objectives were clear, being suitable to the period and desired goals to be achieved with the execution in five years, since the actions developed under Project BRA/16/G76 were based on the **Brazilian HPMP – Stage II Document** and the **Associated Agreement**, with the following objectives:

General Objective: ***Phase out the consumption of HCFCs in the polyurethane foam industry and provide assistance to the Brazilian Government in the execution of Stage II of the Brazilian HPMP.***

Specific Objectives:

SO1. Directly carry out actions that ensure the implementation of Components 2 and 5;

SO2. Provide technical assistance to the Government, ensuring the implementation of Component 1;

SO3. Ensure the coordinated management of the activities listed in the five components that make up Stage II of the Brazilian HPMP, under the coordination of the Brazilian Government, ensuring their complementarity and execution in accordance with the commitments signed with the funding agent.

In this context, the Project design quality has to be evaluated by focusing on the four Outcomes contained in the PRODOC, which have proven to be suitable so far, since they have not been subject to a Substantive Revision.

It is important to highlight that there was an improvement in the design of the subprojects' implementation arrangements involving a more suitable, agile, and flexible procedure to enable the establishment of Service Contracts through Long Term Agreements (LTA) with the System Houses (group subprojects), allowing them to work by supporting the technological conversion of plants and HCFC-141b replacement by End-User enterprises, as well as with Individual Enterprises (individual subprojects).

The Project has proven to be suitable to support Brazilian enterprises in meeting changes in national policies and standards for the mandatory replacement of HCFC-141b in (rigid) polyurethane foam enterprises, with the ban on national imports of this substance, which occurred on January 1st, 2020. Therefore, the strategy adopted in the initial design of the Project to gradually support the enterprises proved to be adequate and well-timed, according to the interviews conducted.

The initial design stage of the Project was proposed aiming to approach a significant number of enterprises that had already had previous successful experiences of executing subprojects with the UNDP and the MLF in past years, including the 1990s. Accordingly, the strategy designed to influence new industries to join the project proved to be technically and operationally valid, with strong technical and enterprise support from an international consultant and the UNDP technical team. Through interviews, it was reported that this initial support was a key driver for the enterprise's individual decision to join the Project. As well as the strategy of using System Houses as strategic vectors of technical support and disseminators of new technologies, processes and substances that were suitable for replacing HCFC-141b in the plants of each end-user enterprise of large Brazilian suppliers.

It should be noted that the cooperation was proposed and prepared by a team of the UNDP, MMA and an international consultant that put forward the Project Document, and later the support of the UNDP staff was technically adequate for the final detailing of the annual Work and Resources Plans[4], all of which were approved by MMA. National players and partners outside MMA were not consulted or participated in the proposition of the cooperation design, since the Brazilian HPMP had been previously subject to Public Consultation and dialogue with the business sector. Throughout the cooperation implementation process, the same procedure was adopted in the successive updates of Work and Resources Plans, that is, the UNDP management team worked under the guidance of MMA and as agreed with the Montreal Protocol.

During the evaluation process, it was possible to identify the existence of proposed indicators for Project Outcomes and Outputs for each of the Subprojects corresponding to each of the System Houses and their End Users, and for each of the Individual Enterprises with their goals. These indicators proved to be relevant for achieving the national goals agreed with the MLF of the Montreal Protocol, as well as success indicators were proposed for the contributions of each enterprise or System House in the 27 Subprojects.

The design was also adequate, with a detailed description of responsibilities, the structure and dynamics of the monitoring and evaluation process of the Project's implementation, through technical follow-up, management and decision-making involving Tripartite Meetings, Planning and Management Adjustment Meetings[9], Reports to the Fund[3] and Progress Reports[11].

Based on interviews conducted, it was made clear that, in the Project implementation strategy, each of the 27 Subprojects was subject to the conception of a technical, financial and operational project. These instruments per enterprise were proposed from the beginning of the Project’s design, allowing the creation of monitoring and verification means, together with the technical missions and visits to the Subprojects, which were defined annually due to the certainty of the MLF tranche disbursements, in accordance with international cooperation standards.

The original proposal for the development of resulting actions contained a logical matrix or theory of change with a description of the Project's final scenario. Its indicators were the general and immediate objectives of the Brazilian HPMP Stage II, with the respective Outcomes and associated Outputs to be achieved.

Based on adjustments in the Brazilian economic scenario and more detailed analyses of the capital composition of some System Houses, the list of Subprojects should present changes from a revision to be made in 2021. For different reasons, some enterprises will have to be replaced, considering the availability of funds to be transferred to the technological conversion and replacement with non-ozone depleting substances that do not contribute to global warming and climate change.

It should be noted that non-ozone depleting substances that replace HCFC-141b (e.g.: HFCs – hydrofluorocarbons) are being used in the Brazilian market, but they contribute to climate change by emitting gases that contribute to global warming.

These substances are not prohibited for use by enterprises under Brazilian legislation and standards, as Brazil has not yet ratified the Kigali Amendment to the Montreal Protocol, approved in 2016 by Parts under Montreal Protocol

The Federal Government currently has numerous legislative initiatives under consideration by the National Congress aimed at combating climate change. In June 2018, the then President of the Republic sent the Congress a message with the text of the Kigali Amendment to the Montreal Protocol, approved in 2016. The international provision aims to control hydrofluorocarbons (HFCs), used in refrigeration and air-conditioning systems. The substance has been disseminated among the industry as a technological alternative that is harmless to the ozone layer and cheaper than substances that meet the criteria of ozone layer protection and of not contributing with greenhouse gases to worsen global warming.

In this scenario, for the selection of the participating enterprises, the initial design of the Project considered that they should simultaneously meet the two criteria for financial support from the MLF: (i) technological conversion to a non-ozone depleting substance and (ii) to a substance with no global warming potential substance (climate change/Paris Agreement).

However, since 2018, the Kigali Amendment continues to be analyzed by the National Congress and, as a result, many Brazilian enterprises have been replacing HCFC-141b with substances that are non-ozone depleting but that contribute to climate change. Through interviews, it was pointed out that the costs of these substances favored entrepreneurial decisions to adopt them, since they are not legally prohibited for use throughout the country.

These observations indicate that the Project's design was adequate in 2015, and its revision in light of the current stage of the Kigali Amendment should await the National Congress' position on the subject, which is independent of the Project execution. Therefore, the revision of the Project should consider the degree of likelihood of ratification of such Amendment in the coming months.

The Project's design followed similar guidelines as for projects funded by the MLF of the Montreal Protocol. All the necessary elements for a phase-out project were included in the PRODOC, in the Brazilian case, making it efficient for the MLF's funding. It should also be noted that the lessons learned from the previous project were taken into account in the design of this Project.

The Project's design considered the diagnosis made specifically for the sector in Brazil as an input for action planning, meeting the deadlines and indicators agreed upon with the Fund to fulfill the established commitments, since Brazil is a signatory to the Montreal Protocol.

The original design of the cooperation had a baseline in 2016, as it can be identified in the Outcome and Resource Matrix (Logical Framework)7 and in the Progress Reports produced by the Project. Accordingly, the inclusion of expert consultants to assess the progress of key

indicators for the description of Stage II of the Brazilian HPMP (Project BRA/16/G76), which affords the status of HCFC-141b use reduction, providing data obtained both directly and indirectly, was important for the Project's design. These indicators on the performance of enterprises and System Houses have greatly supported the process of monitoring the Project's achievements for Brazilian contributions in the international scenario on this topic. The Reports are available for consultation with MMA and IMU/UNDP teams.

It is important to make clear that this Project design has been facing a reality quite different from what would be expected, with the years 2020 and 2021 presenting COVID-19-related health crisis situations in the Brazilian and global scenarios. And, even with the pandemic, no adjustment has been made to the original design, so far.

It also had a highly satisfactory monitoring and evaluation system with MLF, UNDP and ABC, in relation to the Project's development axes, focusing on the outputs produced and activities carried out. Enterprises were required to submit reports on the activities and outputs of the contracts under the Project. These contracts have similar structures in terms of presentation of four outputs, which are presented by the enterprises and associated with the respective disbursements owed by the Project to the enterprises. Accordingly, there is a step-by-step monitoring of the physical and financial progress of each individual Contract or LTA. These reports also served as alert systems for the correction of difficulties and technical or operational support from the IMU team.

In interviews, it was pointed out that, due to the entrepreneurial nature of the decisions made by enterprises, no exit strategy was proposed under the Project (actually, 27 Subprojects) regarding the completion of BRA/16/G76, since it did not allow for this planning, as enterprises had already made investments in technological conversion of plants and replacement of HCFC-141b, and the continuity would depend on each enterprise's strategic decisions. As a safeguard instrument for the future, the Project's design provided for enterprises to sign a document of commitment to continue using substances and technologies that are non-ozone depleting and have no global warming potential substances and technologies in the future. Therefore, an instrument was designed to ensure ownership by the Project's beneficiaries, along with the procedure of changing production processes, thus ensuring greater sustainability and impact generation. These documents of commitment of each participating enterprise are available for consultation with the UNDP.

The feasibility for implementing the Project's design required effective coordination between different national and international players and the focal points in different Brazilian cities and states where the enterprises were located, as well as a permanent dialogue between enterprises and IMU/UNDP and MMA, involving the managers who, directly or indirectly, were working to achieve the Project's outcomes. Through interviews, all the interviewed enterprises of System Houses and Individual Enterprises reported the permanent contact and support from the Project's technical team for the successful execution of each enterprise's subprojects.

The institutional coordination between MMA, ABC and UNDP and the maintenance of the Project's quality were carried out by Project Assessment Committee (PAC), proposed in the initial design, which worked much more strategically and at specific moments of annual, national and international planning (ExCom of the MLF).

Although they were not included in the Project's initial design, MMA and UNDP agreed to use synergy with another MLF Project of institutional strengthening and executed by MMA, in order to support the actions of information dissemination and communication of advances in the Project, including websites.

The issue of promoting information dissemination and data communication should have been introduced in the initial Project design, if there was no other Project to meet this need to add a communicator to the Project's team to perform these activities. MMA's national coordination team and IMU/UNDP's support team worked as privileged interlocutors with the enterprises, enabling certain information under the Project to be shared more fluidly among the different enterprises.

The risk management and monitoring in the Project's implementation were carried out through meetings between MMA and IMU/UNDP teams, aimed at the preparation of annual Work and Resources Plans, as well as Progress Reports for each of the enterprise Subprojects and Normative Instructions on the subject.

Perhaps, one of the key points to work on, after the next meeting of the ExCom of the MLF, is the proposal of a Project adjustment strategy considering the revision of the Subprojects in light of: (i) replacement of Individual Enterprises, End Users and System Houses in view of the pandemic continuity scenario still in 2021/2022 in Brazil; (ii) the domestic market and unit cost per ton of substances to be used in replacement of HCFC-141b by meeting the two MLF criteria; and (iii) the likelihood that the Brazilian ratification of the Kigali Amendment of the Montreal Protocol will not yet be achieved in the next 3 years.

The likelihood of the Kigali Amendment not being approved in the short term could be dependent on the emergence of other national priorities more focused on combating the pandemic. Other priorities can be economic and fiscal balance; addressing social issues related to job creation; and the holding of national, state, and local elections in the next two years. Accordingly, the climate change and ozone layer protection issues could become secondary in the current political context. The future scenario may produce changes in national authorities and a renewal of part of the National Congress, which may or may not pose difficulties for moving forward certain topics in the Committees active in the Congress, such as the Environment Committee.

The financial and administrative execution was carried out by IMU/UNDP, directly in Brasília, which was decided upon the signing of the Project, in accordance with the modality of direct execution of Projects of this nature by UNDP. The technical coordination of the Project was performed by MMA, also located in Brasília. The Project execution relied on enterprises distributed in several regions of the country.

Thus, it is possible to note that the expected changes with the Project were being developed annually through the Work Plans and the detailing of enterprise Subprojects (corresponding to each of the 27 Outputs of Outcome 3). From the interviews and data analysis, it was possible to see the important progress already made in meeting the conditions established for the fulfillment of the Project's goals and its contribution to achieving the national goals agreed with the MLF of the Montreal Protocol, considering the pandemic conditions in Brazil as of 2020.

The Project has clearly defined, measurable and verifiable indicators, and the Outcomes can be achieved over time. Furthermore, these indicators are relevant to honor the commitments agreed upon between the Brazilian government and the Montreal Protocol, without causing economic dysfunctions or maladjustments in the sector and in the enterprises.

Therefore, one can note that the initial design of the Project was suitable to the technical and institutional priorities established by MMA and agreed with the MLF of the Montreal Protocol in relation to Project BRA/16/G76 (Stage II) of the Brazilian HPMP and the 2030 Agenda, as well as to the technical cooperation guidelines at that time.

This type of design is suitable to situations of greater previous definitions about the activities and outputs to be produced and, at the same time, it presented the necessary flexibility for the design of each enterprise subproject due to each enterprise's individual adoption of the type of technology and substance to replace the use of HCFC-141b. It should be remembered that a subproject design was adopted for being in compliance with the reference guides and manuals prepared by MLF, indicating the phases and estimated funds needed to support the changes to be made by each enterprise, taking into account the different technologies and substances to be adopted according to each enterprise's production capacity and characteristics.

The Project has supported the following: changes in the ozone layer protection policy at the national level and in each enterprise; enterprise evaluation processes; formulation of inputs and technological conversion of enterprises; new priorities for investments and maintenance of industrial systems and plants; and dissemination of information necessary for the decision-making and strategic process of Brazilian enterprises in the rigid polyurethane foam (RPF) sector.

This suggests that the shorter the execution time of a cooperation, the closer it remains to the political and institutional priorities in place.

There was an execution lag in relation to the Project's annual physical and budget planning, especially in 2019 and 2020. These gaps were identified by analyzing the original annual plans and disbursement forecasts related to the activities and outputs to be carried out per year.

These gaps were more significant in these two years as they represent execution reductions over the plan of around 66% and 55%, respectively, due to: no ban on HFC use by enterprises; commercial availability and competitive pricing of HFCs; changes in federal authorities; and the COVID-19 pandemic.

Therefore, the initial design can be considered suitable by proposing work plans consistent with the existing technical cooperation management capacities, when compared to the number of activities planned annually for execution and the existing annual demands, as well as the Brazilian execution capacity for the other projects with the Fund.

The Project has not formally set strategies to replicate this experience to other Brazilian states and other countries in Latin America. However, MMA has used the South-South cooperation meetings to do this dissemination of best practices. It is suggested that an activity to systematize best practices and lessons learned from Project BRA/16/G76 be included, with support from MMA's institutional strengthening project, backed up by the MLF, which has already been providing assistance to the communication processes.

Intermediate conclusions:

It can be said that the Project's design was very satisfactory and consistent with the needs indicated in the national diagnosis and with the modality of direct execution by UNDP, using annual work plans, structure and institutional arrangement agreed with MLF. This Project design has supported the following: adoption of new technologies and use of other substances to replace HCFC-141b by national enterprises in the rigid polyurethane foam (RPF) sector; creation of standards aimed at the non-use of HCFCs by enterprises of this sector in Brazil; and development of capabilities and production of knowledge to monitor fulfilment of international commitments assumed by Brazil with MLF of the Montreal Protocol in relation to this Project.

3.3. Effectiveness

Due to the characteristics of this Project, the effectiveness evaluation will be presented considering the Logical Framework, the Work Plans agreed upon annually, in direct relation to the funds made available by the tranches disbursed by the MLF and taking into account the Outcomes achieved; as well as the Outputs have contributed to obtaining the Outcome indicators.

It should be noted that Project BRA/16/G76 is included in Stage II of the Brazilian HPMP, and its main objective would be to phase out the use of HCFC-141b, in accordance with the goals and deadlines agreed with the MLF, thus producing significant ODS reductions through the Brazilian contribution in this second stage, in terms of converted amounts of ODS used in the rigid polyurethane foam sector.

The analysis of the Project's expected Objectives allows us to note that the instruments, processes and methodologies for achieving Outcomes and Outputs in this Stage II also included a set of initiatives focused on Outputs, which, in the case of the Project's direct action, were called Subprojects, totaling in the initial forecast 27 initiatives for technological conversion and HCFC-141b replacement in the industrial process of each enterprise, involving several players.

Therefore, in final terms, the Project was developed in two strategic axes of action, allowing the execution of outcome-generating activities in order to obtain measurable indicators. Thus, for the purposes of this evaluation, quantitative indicators will be used, whose annual Work Plans included success indicators. In the case of the Subprojects, they were evaluated based on the accomplishment of the processes for technological conversion and replacement of HCFC-141b with new substances in compliance with the use criteria agreed upon through the contracts approved under the Agreement with the MLF of the Montreal Protocol.

Concerning the Project, it can be said that the initiatives have contributed to the long-term achievement of the General Objective of Stage II of the Brazilian HPMP: *Phase out the consumption of HCFCs in the polyurethane foam sector and provide assistance to the Brazilian Government in the execution of Stage II of the* Brazilian *HPMP.*

At the same time, the Project's actions were carried out in order to support the initiatives for implementing Stage II of the Brazilian HPMP (only those described in the Project Document and included in the Logical Framework of BRA/16/G76), by working together with the national enterprises to accomplish technological changes and substance replacement in order to reach the goals agreed for Stage II. These actions were characterized by high effectiveness, according to the achievement of the goals of the indicators established in each of the contracts with the participating enterprises that joined this national effort, as shown in the table in Annex 1, prepared and monitored by the IMU/UNDP.

From interviews conducted and reading of technical reports, it can be stated that the Project has been implemented in such a way that, upon its completion, its Outcomes will have contributed to achieve this General Objective, having taken the support to Brazilian enterprises to a very advanced stage.

The contributions to achieving each of the expected Outcomes of BRA/16/G76 and the respective contributions to achieving the strategic objectives of the Brazilian HPMP Stage II, under the agreements and plans agreed with the MLF, are indicated below.

The four Outcomes expected to be achieved with the implementation of Project BRA/16/G76 are evaluated below, one of which would be for Project Management:

Outcome 1: Project Management implemented (Component 5 of the Brazilian HPMP – Stage II)

Concerning Outcome 1, the following indicators were selected, with the baseline and goal survey:

Indicator	Baseline	Goals
# of technical, operational, physical and financial execution reports prepared	0	4
# of Progress Reports and Annual Work Plans – Executive Committee of the MLF	0	4
# of investment subprojects implemented	24	51
# of data verification reports prepared	0	4

Output 1: Technical, operational, physical and financial execution carried out.

Output 2: Progress Reports and Annual Work Plans prepared and submitted to the Executive Committee of the MLF for consideration.

Output 3**:** Implementation and Monitoring of the Investment Subprojects carried out.

Output 4: Annual data verification performed.

This Outcome, aimed at ensuring the Project management, was achieved through MMA's Coordination and the IMU's operational, administrative, and technical efforts for the implementation of the Project. They relied on national and international technical resources to help address the issues related to compliance with the conditions established by the MLF (funding agent) and, at the same time, the management procedures and mechanisms of UNDP (implementing agency).

Regarding Output 1, the following processes contributed to the Project management: annual planning with the updating of Work Plans and respective budgeted funds; physical-financial monitoring and internal and MLF evaluations, which were carried out periodically; tripartite meetings with MMA, ABC, and UNDP; meetings of the Executive Committee of the MLF of the Montreal Protocol.

It is also worth highlighting the technical visits and missions to the enterprises participating in the Project to technically support and monitor the enterprise subprojects, which included the participation of the IMU/UNDP team, an international consultant and MMA. This execution was also carried out through video conferences, use of different multimedia applications and support from IMU and an international consultant to the entrepreneurs throughout the implementation process of each subproject. General revisions of fund adjustments were made per budget line, per annual funds forecast and incorporation of the tranches disbursed by the MLF to the Project, in compliance with the criteria.

The IMU has used existing UNDP project follow-up mechanisms for the execution of 17 enterprise subprojects so far, including 8 for systems houses and 9 for individual enterprises, and 27 subprojects are expected to be implemented by the end of Project BRA/16/G76. The service contracts and LTAS entered into with each of the enterprises were executed in accordance with the UNDP guidelines for the subject, specifically prepared for the Montreal Protocol and GEF projects. For each stage of the subproject, the enterprise presented a technical, financial and operational report to the IMU/UNDP, allowing the monitoring of progress, correction of difficulties and preventive actions by the Project managers.

As part of the contractual obligations with the MLF, the outcomes of the verification of the data on import and export, production and phase-out of Hydrochlorofluorocarbons (HCFCs) for

the base years 2017, 2018 and 2019, listed in appendix 1-A of the Agreement between the Government of the Federative Republic of Brazil and the Executive Committee of the Multilateral Fund for the HCFC consumption reduction, in compliance with Stages 1 and 2 of the Brazilian HCFC Phase-out Management Plan (Brazilian HPMP), were presented to the Fund. To this end, two consultants were hired, and they prepared the aforementioned reports within the scope of Project BRA/16/G76 – Brazilian HCFC Phase-Out Management Plan – Stage II.

At the same time, IBAMA and MMA officials updated the regulatory framework on HCFC consumption and the HCFC import and export control procedures in Brazil. They also made a quantitative survey on Brazil's official HCFC import and export data, issued by IBAMA, and compared the official information on national consumption, issued by the Montreal Protocol Secretariat, with the import and export authorization data provided by IBAMA/MMA, and prepared by the consultants hired by the Project to draw up the HCFC Consumption Verification Report in Brazil.

So far, as a result of permanent monitoring of the Project's progress, the following indicators have been achieved: two Progress Reports were prepared for the presentation to ABC/MRE; four Progress Reports and Annual Work Plans were submitted to the Executive Committee of the MLF (80th, 82nd and 86th Meetings); and four Annual Expenditure Reports (Combined Delivery Report – CDR) containing the financial execution for the years 2016, 2017, 2018, and 2019, demonstrating the IMU's ongoing follow-up of the Project management progress. Additionally, three reports on the outcomes of the verification of the data on import and export, production and phase-out of Hydrochlorofluorocarbons (HCFCs) in Brazil, for the years 2017, 2018 and 2019, were prepared by consultants and presented to the Executive Committee of the MLF. There were four coordination meetings, held in 2016, 2017, 2018 and 2019, for presentation of outcomes from the previous year (technical, operational, physical, and financial execution) and/or planning of activities for the current year.

Considering the data presented in the Progress Report of BRA/16/G76, dated August 2020 and sent to the MLF[11], the last verification made concluded that "the commitments assumed by the Brazilian Government through the Brazilian HPMP were fulfilled in accordance with the last Progress Report and Action Plan, submitted to the Executive Committee of the Multilateral Fund in August 2020"[12].

Through interviews, reading of documents and reports, it was possible to evaluate that the Project BRA/16/G76 management has been implemented effectively (or rather, efficiently), so far having achieved the Outcome 1 indicators according to the current Project execution schedule, which presented a significant delay due to factors not controlled by the Project management.

These factors include: consequences of the pandemic globally and in the country, in 2020 and 2021; the rising increases in unit values per kg/ton of certain substances that are non-ozone depleting and have no global warming potential in the domestic market for inputs of rigid polyurethane foam industries; and competitive and attractive prices for enterprises operating in the sector of that do not deplete the ozone layer but contribute to global warming/climate change, since they can be marketed under Brazilian legislation.

Outcome 2: Regulatory framework adjusted (Component 1 of the Brazilian HPMP – Stage II)

Indicator	Baseline	Goal
# of Normative Instructions for regulating HCFC imports into the country, updated	NI 14/2012	NI 14/2012
# of Normative Instructions for the proper management of ODS, established	0	1
# of Technical Standards prepared and submitted to ABNT	0	2

# of Legal instruments designed to regulate the manufacture, import and export of formulated polyol and foam containing HCFC-141b and import of equipment containing HCFC-22	0	2

Concerning Outcome 2, the only contributor is:

Output 1: Drafts of legal instruments and rules aimed at HCFC phase-out prepared.

According to the Progress Report, the HCFC Data Verification Reports in Brazil[12] and the interviews conducted, it was found that the Regulatory Framework has been adjusted. Normative Instruction no. 14/2015 was updated, and IBAMA's Normative Instruction no. 4/2018 was generated, with relevant effects on the import of HCFC-141b into the country, which became prohibited, from January 1st, 2020, for the foam sector. In this context, as Brazil is not a producer of HCFCs, the use of HCFC-141b will no longer occur as soon as domestic stocks are depleted at the enterprises in the sector.

Listed below are the regulatory initiatives with important consequences for the dynamics of the sector, with the replacement of HCFC-141b with other substances, as well as the extinction of the HCFC Working Group (GT-HCFC) in 2019, which had been created in 2015.

(i) Publication of Ordinance no. 197, of July 6, 2015, appointing the representatives of the HCFC Working Group (GT-HCFC), created by Ordinance no. 179/2015.

(ii) Publication of Ordinance no. 326, of July 26, 2016, which changes the representative of the Ministry of Foreign Affairs in the HCFC Working Group (GT-HCFC).

(iii) Publication of Ordinance no. 565, of December 30, 2016, which changes the representative of the Ministry of Industry, Foreign Trade and Services and the alternate representative of the National Association of Electro-Electronics Manufacturers (ELETROS) in the HCFC Working Group (GT-HCFC).

(iv) Publication of Ordinance no. 171, of June 19, 2015, which changes the members of the Ministry of Science, Technology and Innovation (MCTI) and Ministry of Health (MS) in the Interministerial Executive Committee for the Protection of the Ozone Layer (PROZON).

(v) Publication of Ordinance no. 563, of December 30, 2016, which changes the alternate representative of the Ministry of Industry, Foreign Trade and Services in PROZON.

(vi) IBAMA Normative Instruction no. 4, of February 14, 2018, which regulates the control of imports of Hydrochlorofluorocarbons – HCFCs and blends containing HCFCs, in compliance with Decision XIX/6 of the Montreal Protocol, and makes other provisions.

(vii) IBAMA Normative Instruction no. 5, of February 14, 2018, which regulates the environmental control of the exercise of potentially polluting activities regarding substances subject to control and phase-out according to the Montreal Protocol.

(viii) Decree no. 9,398, of June 4, 2018, which amends the Decree of March 6, 2003, which creates the Interministerial Executive Committee for the Protection of the Ozone Layer, with the purpose of establishing guidelines and coordinating actions related to the protection of the ozone layer.

(ix) Decree no. 9,759, of April 11, 2019, which extinguishes and establishes guidelines, rules and limitations for collegiate bodies of the federal public administration.

(x) Decree no. 10,223, of February 5, 2020, which revokes the Decrees of 03/06/2003 and no. 9,398 of 06/04/2018.

Both PROZON and the HCFC Working Group (GT-HCFC) were extinguished, according to the guideline issued by Decree no. 9,759. The activities resulting from these groups continue to be carried out under the coordination of Ministry of Environment within its scope of authority, according to the interview conducted.

As seen, Brazil does not produce HCFC-141b. So, the ODS control actions takes place at the import and export of these substances by enterprises. The Brazilian Institute for the Environment and Renewable Natural Resources – IBAMA is the federal agency responsible for controlling the substances marketed and used in Brazil so that the country fulfills its part in the Montreal Protocol.

On February 14, 2018, IBAMA Normative Instruction (IN) no. 4 was published, which dealt with the control of imports of Hydrochlorofluorocarbons – HCFCs and blends containing HCFCs, in compliance with Decision XIX/6 of the Montreal Protocol. Legal entities that import, export, resell, and technically use these substances, as well as enterprises that recycle, regenerate, and incinerate controlled substances, should be registered in the Federal Technical Cadaster of Potentially Polluting Activities and/or Users of Environmental Resources (CTF/APP) and provide the necessary information, according to this Normative Instruction. Legal entities should also register in the categories of activities developed by the enterprise and inform which activities related to the Montreal Protocol they are engaged in, according to the table indicated in the regulation.

From interviews conducted, it was possible to see that improvements are currently being made to the regulation of Normative Instruction no. 4, in order to better guide entrepreneurs, after some years of experience in the operationalization of the NIs on the subject. It should be noted that indicator 2 of Outcome 2 was met by IN no. 5.

Therefore, IN no. 4 revised the import limits for HCFCs and blends containing the compound, reducing the total HCFC import quota by 39.30%, as of January 1st, 2020, and with a further reduction of 51.60%, as of January 1st, 2021. Specifically, for the polyurethane foam sector, IN no. 4 also determined the ban on HCFC-141b imports, as of January 1st, 2020.

Whereas IN no. 5 regulated the environmental control of activities that use substances that are harmful to the ozone layer and established the procedures that enterprises and users of these compounds must follow in order to remain in compliance with the legislation applicable to the topic.

Both normative instructions reflect the efforts made by Brazil to meet the goals set by the Montreal Protocol and are the result of a joint process between the Government, society, and the productive sector.

Also, in relation to the improved Regulatory Framework, in 2018, a seminar was held in Brasília to encourage the international exchange of information on the replacement of HCFC-141b – an ozone-depleting substance – in the polyurethane foam sector. It had the collaboration of the international consultant and expert in the field, Miguel Quintero, who presented the Colombian demonstration project for the use of HFO as a blowing agent in the manufacture of discontinuous panels.

This Project initiative aimed to provide information to around 40 specialists and entrepreneurs in the polyurethane foam manufacturing sector, in order to prepare themselves in business terms for the new regulatory framework and expand adherence to the Brazilian HCFC Phase-out Management Plan (Brazilian HPMP) – Stage II, supporting the productive sector technically and financially in replacing HCFCs with environmentally suitable substances.

With IBAMA's Normative Instruction no. 4/2018, as of January 1st, 2020, the total import quota for HCFCs would be reduced by 39.3% and the specific import quota for HCFC-141b would have a reduction of 90.03%. For the polyurethane foam sector, the NI also determined a ban on the import of HCFC-141b for foam manufacturing, as of January 1st, 2020, and a ban on the import and export of formulated polyol containing HCFC-141b in Brazil, as of January 1st, 2021.

According to studies conducted in recent years, HFOs are considered to be one of the alternatives to HCFC-141b for the sector because, unlike CFCs and HCFCs, they have no ozone depleting potential. Additionally, HFOs have no global warming potential either and, therefore, are an environmentally suitable substance.

It should be noted that from the last "Report on Verification of HCFC Consumption Targets in Brazil", covering the years 2018 and 2019 and released in August 2020, consultant Eng. Carlos Alberto Ferreira Rino, PhD.[12], reported that "total HCFC consumption in Brazil in 2018 and 2019, considering imports minus exports, was 824.96 and 838.85 tonnes of ODP, respectively. Therefore, the reductions were 37.85% and 36.80%, respectively, in relation to starting point, values far above the targets for 2018 and 2019". The data is shown below as per tables prepared by the aforementioned consultant[12]:

Table 2: HCFC Consumption Comparison 2018

Starting point for consumption reductions (ODP tonnes)	Target for 2018 (ODP tonnes)	Target for 2018 (%)	Consumption in 2018 (ODP tonnes)	Reduction in 2018 (%)
1,327.3	1,194.6	**10.0**	824.96	**37.85**

Table 3: HCFC Consumption Comparison 2019

Starting point for consumption reductions (ODP tonnes)	Target for 2019 (ODP tonnes)	Target for 2019 (%)	Consumption in 2019 (ODP tonnes)	Reduction in 2019 (%)
1,327.3	1,194.6	**10.0**	838.85	**36.80**

Source: Rino, Carlos Alberto. Relatório de Verificação de Metas de Consumo 2028 e 2019. MMA. Brasília, 2020

In this context, it can be assessed that the Brazilian HPMP Coordination actions of MMA, along with the collaboration of IBAMA, were very effective in bringing about substantial improvements in the Regulatory Framework aimed at banning the import of HCFC-141b by Brazil, as of January 2020, with the entry into force of the update of IBAMA's NI no. 4 in 2018.

At the same time, the coordination of MMA, collaboration of IBAMA and technical and managerial support from UNDP (Project implementing agency) have been following up the meetings of Brazilian Association of Technical Standards (ABNT), by providing information and data to the work of the Association's Technical Committees aiming at drafting standards involving topics related to the non-use of ODS in different industrial processes. However, no normative instruction or other legal instrument of interest to the Montreal Protocol was formalized.

On this topic, the Progress Report for Stages I and II of the Brazilian HPMP, prepared for the period 2017-2018 and presented to the ExCom of the MLF in August 2019, reports that: "Regarding flammable alternatives, the Brazilian Government, together with UNDP and GIZ, has been promoting awareness campaigns on the safe handling of alternatives with a low negative impact on the global climate system that present some degree of flammability".

Additionally, the Government has supported ABNT in developing specific technical standards to ensure nationwide “standardization of the handling, installation and maintenance of equipment using flammable substances alternative to HCFCs”. The main initiatives include: (i) revision of the ABNT NBR 16069 standard on “Security in refrigeration systems”; according to the latest version of the international standard ISO 5149; (ii) preparation of a technical standard on terminology and safety classification of refrigerants based on ANSI/ASHRAE 34; (iii) preparation of a standard for “Installation of residential split and compact AC systems”; and (iv) revision of the ABNT NBR 15833 standard on “Reverse production of refrigerators”.

It should be noted that, for technological conversion projects in the polyurethane foam sector, the adoption of national and international industrial safety parameters, proven by a safety certification issued by a qualified entity, is a necessary condition for approval of the technological conversion and release of funds to the Brazilian HPMP’s beneficiary enterprises opting for flammable alternatives. Currently, a proposal for a technical standard for the safe use of flammable blowing agents in the production chain of the polyurethane foam sector is being prepared for submission to ABNT.

The safety certification issue continues to be evaluated by the Project’s executors as a critical point for completion of the Stage II Projects and the transfer of funds planned to support some SHs and respective end users, as well as individual enterprises participating in BRA/16/G76.

In relation to the indicator of legal instruments designed to regulate the manufacture, import and export of formulated polyol and foam with HCFC-141b and the import of equipment containing HCFC-22, progress has been made within IBAMA, and through its website and interviews conducted it is possible to see that proposals for legal instruments in this field are still under study, together with the Federal Revenue Service working on these topics in order to complement IBAMA's NI no. 4.

However, in terms of regulatory framework, two important consultative bodies for advances in the implementation of the Montreal Protocol, with a variety of relevant players and public, private and non-governmental partners, such as PROZON and the GT-HCFC, were extinguished in recent years. In interviews with MMA representatives, it was clarified that, even though these committees and working groups are no longer formally constituted, consultations and contacts continue to be made with some regularity by the Coordination.

Outcome 3: Industrial Conversion Investment Projects implemented (Component 2 of the Brazilian HPMP – Stage II)

Indicator	Baseline	Goal
# of investment subprojects completed	24	51
# of beneficiary enterprises with HCFC consumption above 100 kg/year converted to HCFC-free technologies if low GWP	250	720

For **Outcome 3**, which concentrates almost all Project's funds, there are 27 Products, divided into System Houses and Individual Enterprises, classified by enterprise as a subproject, totaling 27 subprojects, each one corresponding to one of the 27 Outputs in the Project's Logical Framework.

Regarding the Outcome, which deals with the technological conversion of enterprises in the polyurethane foam sector that use or used HCFC-141b, there is a list that was prepared and attached to the approved PRODOC[2], detailing the following:

a) Investment project to phase out HCFC-141b and HCFC-22 in rigid foam manufacturing subsectors for the technological conversion of system houses and small and medium enterprises (SMEs) end users of polyurethane systems,

b) Investment project to phase out HCFC-141b in rigid foam manufacturing subsectors for the technological conversion of individual enterprises.

Funding for technology conversion and transfer activities was specifically earmarked for enterprises eligible through a consultation process and approved by the Executive Committee of the Multilateral Fund for Implementation of the Montreal Protocol for consumption phase-out in this Stage II. The initial list of enterprises that were part of the investment group of System Houses or Individual Enterprises was defined in the preparation of PRODOC, using the information and the existing diagnosis from Stage I of the Brazilian HPMP and updated during the preparatory phase of Stage II. For changes in the funding amount to enterprises or changes in enterprises who receive funding for implementing modifications, the IMU must comply with the clauses of the Agreement signed with the Fund.

Actions prior to the start of BRA/16/G76 implementation, as facilitators to increase effectiveness in obtaining outcomes:

For the effectiveness analysis: due to the specific characteristics of this Project design, which includes 27 subprojects, and certain System House subprojects would generate new technical assistance, that is, these are umbrella projects, which could generate 30-50 new subprojects for end users (new individual enterprises) by each one of the System Houses.

For this reason, in order to set the amount of the service contracts and/or contracts that were established with each of the enterprises belonging to the two investment groups in the project design stage, the limits of action and scope of the investments in each enterprise were defined in accordance with the handbooks and guidelines prepared by the MLF.

The Project's structure was designed according to the investment baseline collected from the end beneficiary: system house, end user and individual enterprises. All beneficiaries committed to phase out HCFC-141b and HCFC-22 from their production process by signing a specific document, that is, a document of commitment.

Therefore, the Brazilian HPMP Stage II Project's priority was to ensure the complete phase-out of HCFC-141b consumption in the polyurethane foam sector through:

a) Investment projects for the rigid polyurethane foam subsector,

b) A regulatory action banning the import of HCFC-141b by the polyurethane foam industry as of January 1st, 2020.

c) A regulatory action banning the import and export of formulated polyol containing HCFC-141b as of January 1st, 2021.

The adoption of this strategy was justified by the following characteristics observed for the subsector in Brazil, based on the data collected in Stage I of the Brazilian HPMP (Project BRA/12/G76), according to that project's Final Evaluation Report[1]:

a) Predominance of micro, small and medium enterprises with A-5 capital (Montreal Protocol classification), which, in many cases, worked with multiple applications,

b) System Houses were the only suppliers for this market and, therefore, the end-user enterprises were highly dependent on them, although changing suppliers is frequent,

c) 57.45 ODP tonnes of HCFC-141b used by the rigid polyurethane foam subsector in 2013 were consumed by ineligible enterprises in that subsector, all of which being virtually dependent on system houses,

d) 8.7 ODP tonnes of HCFC-141b, imported by Brazil in 2013, were exported to other countries in the form of formulated polyol.

This avoided market distortions by not allowing only a small number of ineligible enterprises to continue using HCFC-141b, while the rest of the market was converted. The complete phase-out of HCFC-141b used in the foam sector was in line with Decision 74/50 of the Montreal Protocol, which recommended prioritizing the phase-out of high-ODP HCFCs. Furthermore, it significantly contributed to achieving the country's goal of reducing global HCFC consumption by 35%, by 2020, and 45%, by 2021, according to the latest HCFC Consumption Verification Report sent to the Fund, with 2019 as the base year.

As one of the requirements for receiving MLF funds, enterprises should fulfill obligations related to the Brazilian environmental legislation, especially as to:

a) obligations related to ODSs, including the corresponding state and/or municipal environmental licenses required for their operation,

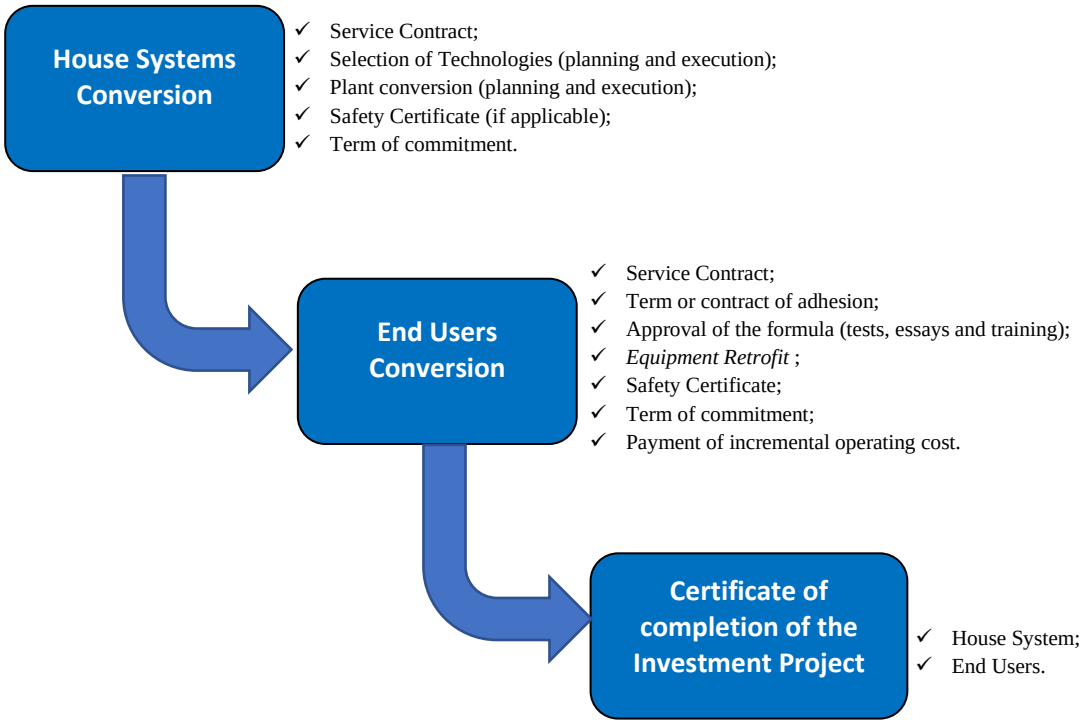
b) being registered in the correct category of the CTF/APP – IBAMA,

c) being up-to-date with ODS purchase, sale, transfer and use reports;

d) being up-to-date with the Certificate of Good Standing issued by the CTF/APP - IBAMA.

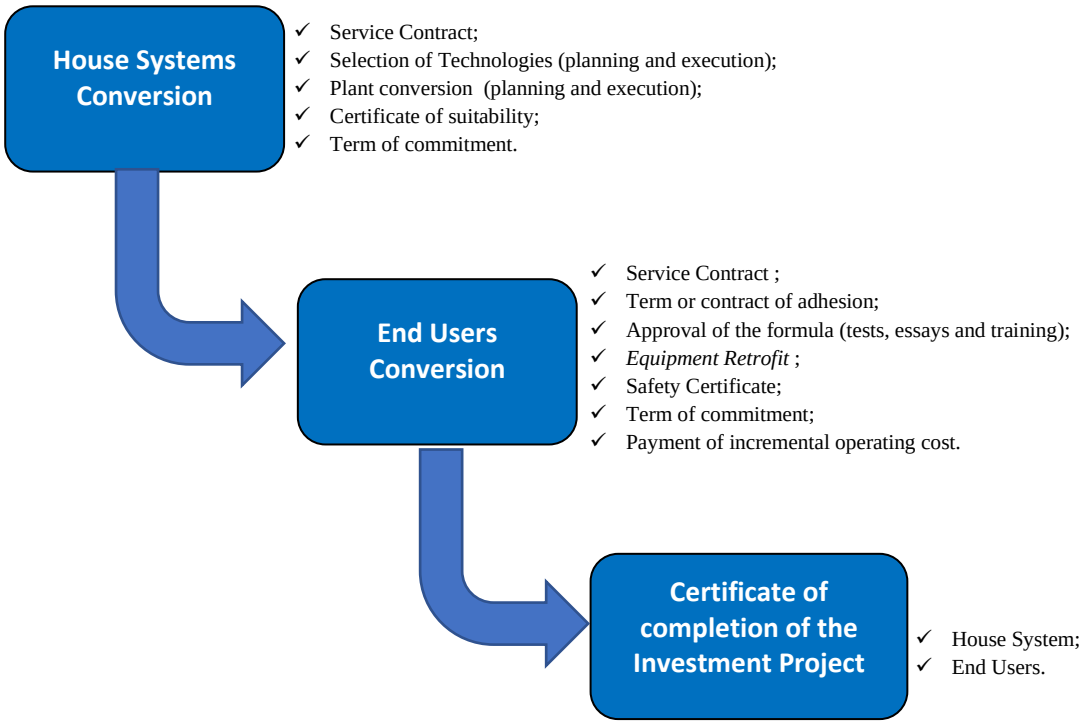
As agreed with MLF for this Project BRA/16/G76 - Stage II of the Brazilian HPMP, 169.08 ODP tonnes of HCFC-141b and 0.60 ODP tonnes of HCFC-22 should be phased out by the end of its execution through two approaches: group subprojects and individual subprojects. The execution stages of technological conversion for each type of enterprise in the Project are summarized below, according to the IMU/UNDP's presentation at the last Tripartite Meeting, held in 2020:

Figure 1: System House and End User Subprojects Stages



Source: Progress Report. IMU/UNDP. 2020

Figure 2: Individual Enterprise Conversion Contracts Stages



Source: Tripartite Meeting Presentation. IMU/UNDP. 2020

Group subprojects have been led by System Houses, which provide technical support to end users of the formulated systems and have been prepared in accordance with the criteria and guidelines established by Decision XIX/6 and Decision 74/50 of the Executive Committee (ExCom) of the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol.

These subprojects have been prepared based on information provided by the System Houses and the following eligibility criteria: a) A-5 capital enterprise (Montreal Protocol); b) Enterprise established by September 21, 2007; c) HCFC-141b consumption lower than 20 tonnes/year, considering the 2013 baseline (Brazilian HPMP Stage II).

During their preparatory stage, relevant information was presented to help System Houses make decisions about the technology to replace HCFC-141b that best suits their needs. However, the final decision was up to them as it involved strategic corporate business plan decisions.

The end-user enterprises supported by System Houses were classified into three categories, according to their level of consumption, based on information from the year 2013[5]:

a) Consumption higher than or equal to 500 kg/year;

b) Consumption lower than 500 kg/year and higher than or equal to 100 kg/year;

c) Consumption lower than 100 kg/year.

Through PRODOC it has been estimated "that approximately 927 end-user enterprises will be converted under 14 projects, led by 11 A-5 capital System Houses and 3 non-A-5 capital System Houses (national capital). However, only 445[2] of those with consumption higher than 100 kg in 2013 had funds related to incremental capital cost and incremental operating cost approved by the MLF for their conversion."

The 27 subprojects approved by the MLF for investment, either by Group (SH) or Individual enterprise, within the scope of the Project are listed below.

Output 1: AMINO Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 2: ARISTON Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 3: BASF Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 4: COMFIBRAS Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 5: DOW Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 6: ECOBLASTER Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 7: FLEXÍVEL Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 8: MCASSAB Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 9: POLISYSTEM Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 10: POLYURETAHNE Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 11: PURCOM Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 12: SHIMTEK Group Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 13: UNIVAR Group Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 14: UTECH Group Investment Subproject (Rigid Foam) implemented by 2016 (year 3).

Output 15: ANANDA METAIS Individual Investment Subproject (Rigid Foam) implemented by 2018 (year 3).

Output 16: ÁRTICO Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 17: BULLTRADE Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 18: COLD AIR Individual Investment Subproject (Rigid Foam) implemented by 2017 (year 2).

Output 19: FURGÕES IBIPORÃ Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 20: GELOPAR Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 21: IBF Individual Investment Subproject (Rigid Foam) implemented by 2017 (year 2).

Output 22: ISAR Individual Investment Subproject (Rigid Foam) implemented by 2017 (year 2).

Output 23: NIJU Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 24: REFRIMATE Individual Investment Subproject (Rigid Foam) implemented by 2019 (year 4).

Output 25: SÃO RAFAEL Individual Investment Subproject (Rigid Foam) implemented by 2021 (year 6).

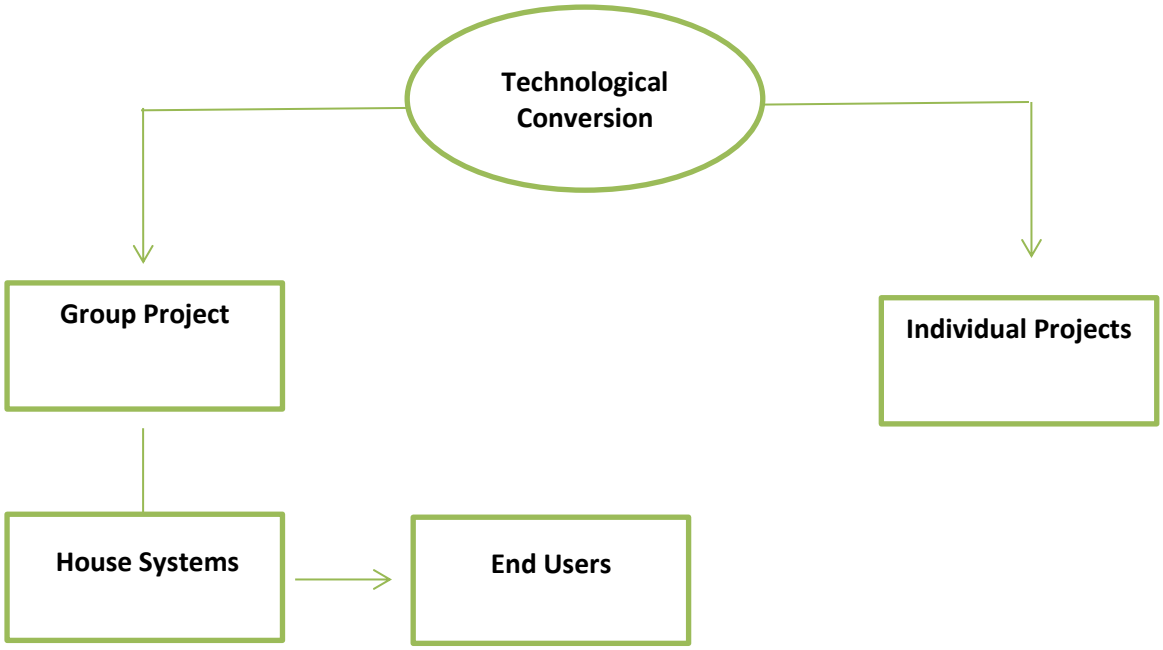
Output 26: TECPUR Individual Investment Subproject (Rigid Foam) implemented by 2021 (year 6).

Output 27: THERMOTELHAS E THERMJET Individual Investment Subproject (Rigid Foam) implemented by 2021 (year 6).

Current stage of implementation of the 27 proposed subprojects, according to existing Contracts.

The Project effectively started in 2016, with a total budget of US$ 17,020,000, US$ 14.7 million of which were planned to be used in conversion projects of 27 industrial conversion subprojects – 14 subprojects in the SH group and 13 individual subprojects – where the conversion of about 470 enterprises in the polyurethane foam sector was expected, especially micro, small, and medium enterprises (MSME), with a nationwide distribution and with a focus on the rigid PU foam sector.

Figure 3: Strategy for Enterprise Conversion in the PU Foam Industry



Source: Presentation Brazilian HPMP. SRI/MMA.2019.

Therefore, the strategy adopted was for the IMU to sign Service Agreements with each of the SH group and individual enterprises, having the MLF determine the amounts allocated for conversion, for each technological conversion and for assistance to end users, as well as the amounts to be passed on to the enterprises and users as ICC and IOC compensation, as well as of ICC of the SH. For consultation purposes, the agreements signed with the SH group enterprises, Individual Enterprises and End Users instruments are available at the IMU/UNDP. These agreements describe the procedures adopted in terms of stages, time, activities, expected outcomes and associated costs.

Thus, IMU/UNDP followed the UNDP implementation manual approved by MLF, which had been tested and revised during Stage I of the Brazilian HPMP (Project BRA/12/G76) and had the support of an international consultant for technical or strategic decisions of each of the participating enterprises, had previously approved and standardized models and instruments to be used in the implementation of the Project, and had performance schedules for each of the conversion projects based on the individual Plan developed by each participating enterprise.

Three System Houses would not receive support from the Project for technological conversion because they did not meet the requirements established by the Agreement with the Montreal Protocol, in terms of capital composition, two were multinational enterprises: DOW and BASF. A third enterprise, Univar, was also ineligible, allowing only participation in actions with end users. Both BASF and DOW play an important role in the domestic market of rigid polyurethane foam production and are input suppliers for a large percentage of industries in the sector. By the end of 2020, the UNDP was unable to advance in negotiations with these two enterprises in order to sign the Long-Term Agreement.

According to interviews conducted, the Service Agreement (Direct Contracting) signed with the SH group enterprises and individual enterprises proved difficult to be used with SH enterprises for the transfer of funds to the end-user enterprises of the SH. Direct contracting

through service agreements proved appropriate in the case of plant technology conversion projects for HCFC-141b replacement in SH group enterprises and individual enterprises.

This issue was only resolved by the Project starting in July 2019, after the Assessment Committee Project (ACP) approved the use of Long-Term Agreements to support the technology conversion services of small and medium enterprises in the polyurethane foam sector for HCFC-141b replacement, which relied on the direct action of the Project SHs. This type of contract had the advantage of allowing extending the execution period or adding two additional years without having to be approved by regional decision-making bodies in the development of the Project.

Thus, in general, in the first half of 2017, conversion agreements were signed with six SHs: Amino, Ariston, Ecoblaster, Flexível (formulation), Polyurethane and Univar (validation of end-user information). As of 2019, these enterprises would sign Long Term Agreements (LTAs) to provide services for the conversion of eligible beneficiary enterprises in the polyurethane foam sector. IMU and the international consultant played a major role in providing technical support to enterprises in implementing these agreements, as well as acting to resolve questions of different natures presented by SH enterprises or end users, according to interviews carried out with enterprises benefiting from the Project.

As an example of the analysis carried out on the contribution of each SH enterprise and the IMU follow-up system to achieve the effectiveness indicators agreed upon in Outcome 3 of the Project, the SH enterprise Amino carried out the agreement for conversion of its plant in 2017/2018, at US$ 337,200.00. Through a new LTA, it committed to convert 46 end users between 07/26/2019 and 07/26/2021, signing an agreement totaling US$ 904,389.20. By 12/31/2020, the enterprise had completed its plant conversion and the conversion of six end users. Therefore, it had executed about US$ 147,873.86 of the agreement for EU conversion, that is, only 16.4% of the agreement funds; and 13.0% of the total of converted EU enterprises, having eliminated 1.2 ODP metric tonnes of expected 12.37 ODP metric tonnes, including conversion.

As of March 2020, the national production sector faced difficulties due to the pandemic, where several enterprises suspended activities or disappeared; they faced supply obstacles; and technical and on-site assistance was difficult to be carried out with end users so as to materialize the technological conversion changes. Through the presentation of the Project at the Tripartite Meeting held in October 2020, the status of the Project in terms of SH Subprojects and Individual enterprise Subprojects is indicated below:

Figure 4: Table of SH enterprises and execution status 1.

Product	Enterprise	Material	Tecnology	Status
1	Amino	PUR	Methylal	Conversion already done. In process of conversion of users end.
2	Ariston	PUR	Methylal	Conversion already done. In process of conversion of users end.
3	Basf	PUR	HFO	Not in process of adhesion to the Project.
4	Comfibras	PUR	HFO	Environmental license not yet obtained.
5	Dow	PUR	HFO	Not in process of adhesion to the Project.
6	Eco Blaster	PUR	Methyl Formate	Conversion already done. In process of conversion of users end.
7	Flexível	PUR	HFO	In process of conversion of users end.

Source: Presentation Tripartite Meeting. IMU/UNPD. 2020.

Figure 5: Table of System Houses and execution status 2.

Product	Enterprise	Material	Technology	Status
8	M. Cassab	PUR	CO_2	Conversion already done. In process of conversion of users end.
9	Polisystem	PUR	Methyl Formate	Not interested in participating Stage II .
10	Polyurethane	PUR	Methyl Formate	Conversion already done. In process of conversion of users end.
11	Purcom	PUR	Methyl Formate	Conversion already done. In process of conversion of users end.
12	Shimtek	PUR	HFO	Invitation letter to enterprise to be elaborated.
13	Univar	PUR	Methylal	Conversion already done. In process of conversion of users end.
14	Utech	PUR	Methyl Formate / HFO	Conversion already done. In process of conversion of users end. Waiting to solve problem with CFH use in the Stage I to begin end users conversion.

Source: IMU/UNPD. 2020.

The analysis of this information allows us to verify that in October 2020 five enterprises had not joined the Project and of the remaining nine, eight SH enterprises carried out their industrial conversion process with support from the Project and one SH enterprise, as it was ineligible to receive funds from the MLF, carried out its industrial conversion with its own resources. Of the nine enterprises, only one had not started the conversion of end users.

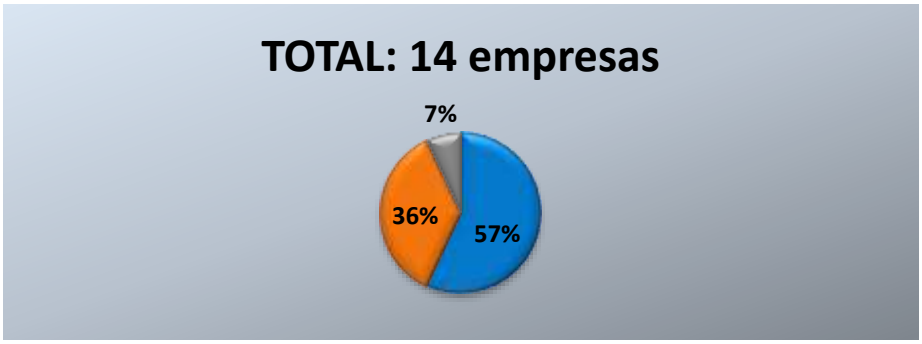
Regarding SH enterprises and their action with End Users, the data that IMU prepared for the 2020 Tripartite Meeting are presented below, describing what had been planned and executed in the conversion of End Users. By October 2020, 80 End Users had been converted. One more End User was converted totaling 81 end users by December 2020.

Figure 6: Table of SH Conversion: Estimated and Completed by October 2020.

PRODUCT	Enterprise	CONVERSION				HCFC-141b Eliminated (ODP tonnes)	
		Planned SH	Finished SH	Planned EU	Finished EU	Planned	Finished
1	Amino	1	1	46	6	12,37	1,20
2	Ariston	1	1	28	0	3,27	0
3	Basf	-	0	8	0	3,02	0
4	Comfibras	1	0	12	0	0,80	0
5	Dow	-	-	11	0	12,88	0
6	Eco Blaster	1	1	31	3	8,91	0,59
7	Flexível	1	1	33	7	8,23	2,55
8	M. Cassab	1	1	23	3	7,08	1,83
9	Polisystem	1	-	47	-	13,09	-
10	Polyurethane	1	1	34	24	4,06	5,16
11	Purcom	1	1	73	26	15,03	6,75
12	Shimtek	1	0	23	0	5,08	0
13	Univar	-	-	84	11	24,63	11,10
14	Utech	1	1	5	0	0,95	0
TOTAL		11	8	458	80	119,4	29,18

Source: IMU/UNPD. Tripartite Meeting. October 2020

Figure 7: Chart for SH Subgroup and Adherence to Project



Source: IMU/UNPD. Presentation Tripartite Meeting. 2020.

As can be seen in the figure 7: 57% are in process of conversion, 36% not yet confirm their adhesion to the Project and 7% are facing other problems.

Therefore, still in October 2020, around 36% of SH enterprises (5 out of 14 enterprises) had not joined the Project, compromising the long-term achievement of the Project indicators according to PRODOC and the commitments to the Montreal Protocol.

According to this table prepared by IMU, in October 2019 the six SH enterprises disbursed around US$ 1,176,000.00 by October 2019 on the conversion agreements for their plants and in the other cases, the amounts also involve End Users conversion.

This table includes: (i) four enterprises that had not signed the agreements: BASF, Comfibras, Shimtek, and Polisystem (indicated as zero); (ii) Basf, with an agreement signed for EU conversion, since it was ineligible for plant conversion by the MLF; (iii) Comfibras and Polisystem: the amount includes SH plant conversion and support to End Users; (iv) Dow had not signed a conversion agreement as it was ineligible for plant conversion; (v) M. Cassab had not signed a plant conversion agreement. This situation of non-eligibility of two SH plus the withdrawal of another SH enterprise (Polisystem) by December 2020 entailed decisions to be made by the enterprises and the Project management in the process of replacing or not replacing enterprises previously selected and approved in the Project document, by the MLF ExCom, in 2015/2016.

Figure 8: Table of Contracts with SH and Performance in 2019.

Product	Enterprise	Contract amount (US$)	Performance 28/10/2019 (US$)	% Finished
1	Amino	337.200,00	337.200,00	100,00
2	Ariston	98.600,00	98.600,00	100,00
3	Basf*	277.319,90	0	0
4	Comfibras*	146.658,90	0	0
5	Dow	-	-	-
6	Eco Blaster	238.200,00	238.200,00	100,00
7	Flexível	36.600,00	36.600,00	100,00
8	M. Cassab	-	-	-
9	Polisystem*	950.561,53	0	0
10	Polyurethane*	235.600,00	235.600,00	100,00
11	Purcom	124.000,00	124.000,00	100.00
12	Shimtek*	211.113,50	0	0
13	Univar	16.800,00	16.800,00	100,00
14	Utech	89.000,00	89.000,00	100,00
TOTAL		**2.761.653,83**	**1.176.000,00**	

Source: Presentation at Tripartite Meeting. IMU/ UNPD. October/2019

In terms of Long-Term Agreements (LTA), they represent approximately 56% of total funds of the 3 Tranches disbursed for the Project, by the MLF, which reached the amount of US$ 13,125,000. This percentage would be 43% if the total amount of the Project, which is US$ 17,020,000, was considered. As of October 2019, approximately 10% of the amounts contracted under the LTAs for End User conversion had been disbursed. This was due to the short time elapsed from the period in which the contracts were signed, as the use of LTAs was initiated in July 2019, following the approval of this instrument for use in the Project.

Figure 9: Table of EU conversions by SH in October 2019.

Product	Enterprise	Converted End Users	Contract amount (US$)	Performance 28/10/2019 (US$)	% Finished
1	Amino	2	904.389,20	71.599,37	8
2	Ariston	0	457.004,03	0	0
3	Basf**				
4	Comfibras**				
5	Dow**				
6	Eco Blaster	0	731.004,06	0	0
7	Flexível	0	794.433,21	0	0
8	M. Cassab	0	506.101,18	0	0
9	Polisystem**				
10	Polyurethane	5	688.221,26	269.023,11	39
11	Purcom	24	1.098.067,81	381.288,90	35
12	Shimtek**				
13	Univar	0	2.162.813,63	0	0
14	Utech				
TOTAL		**31**	**7.342.034,38**	**721.911,38**	

Source: IMU/UNPD. Tripartite Meeting. October 2019

Figure 10: Table of Progress in converted SH and End Users.

PRODUCT	Enterprise	CONVERSION				HCFC-141b ELIMINATED (ODP tonnes)	
		Planned SH	Finished SH	Planned EU	Finished EU	Planned	Finished
1	Amino	1	1	46	6	12,37	1,20
2	Ariston	1	1	28	0	3,27	0
3	Basf	-	0	8	0	3,02	0
4	Comfibras	1	0	12	0	0.80	0
5	Dow	-	-	11	0	12,88	0
6	Eco Blaster	1	1	31	3	8,91	0,59
7	Flexível	1	1	33	7	8,23	2,55
8	M. Cassab	1	1	23	3	7,08	1,83
9	Polisystem	1	-	47	-	13,09	-
10	Polyurethane	1	1	34	24	4,06	5,16
11	Purcom	1	1	73	26	15,03	6,75
12	Shimtek	1	0	23	0	5,08	0
13	Univar	-	-	84	11	24,63	11,10
14	Utech	1	1	5	0	0,95	0
TOTAL		**11**	**8**	**458**	**80**	**119,4**	**29,18**

Source: IMU/UNPD. Tripartite Meeting. October/2019.

Comparing the two tables regarding the conversion of EU and their SH, in October 2019 and October 2020, we see that in 2019 EU were converted by action of three SHs, while in 2020, 80 EU had already been converted by action of seven SHs. By December 2020, another EU was converted, totaling 81 converted EU since the beginning of the Project. During 2019 and 2020, HCFC-141b phase-out remained at 29.18 ODP tonnes of expected 119.4 ODP tonnes, which represented consumption reduction of 24.4 % from the total planned by the end of the Project.

In 2020 certain enterprises showed better physical performance: (I) SH Polyurethane with the conversion of 26 EU and (ii) Purcom with the conversion of 24 EU. These enterprises reduced HCFC-141b consumption by 11.91 ODP tonnes. At the same time, SH Univar carried out the conversion of 11 End Users, eliminating 11.10 ODP tonnes. SH Polyurethane had planned to eliminate 4.06 ODP t and reached 5.16 ODP tonnes, exceeding the initial forecast.

Figure 11: Table of SH Conversion in October 2020.

PRODUCT	Enterprise	CONVERSION				HCFC-141b ELIMINATED (ODP tonnes)	
		Planned SH	Finished SH	Planned EU	Finished EU	Planned	Finished
1	Amino	1	1	46	6	12,37	1,20
2	Ariston	1	1	28	0	3,27	0
3	Basf	-	0	8	0	3,02	0
4	Comfibras	1	0	12	0	0.80	0
5	Dow	-	-	11	0	12,88	0
6	Eco Blaster	1	1	31	3	8,91	0,59
7	Flexível	1	1	33	7	8,23	2,55
8	M. Cassab	1	1	23	3	7,08	1,83
9	Polisystem	1	-	47	-	13,09	-
10	Polyurethane	1	1	34	24	4,06	5,16
11	Purcom	1	1	73	26	15,03	6,75
12	Shimtek	1	0	23	0	5,08	0
13	Univar	-	-	84	11	24,63	11,10
14	Utech	1	1	5	0	0,95	0
TOTAL		**11**	**8**	**458**	**80**	**119,4**	**29,18**

Source: IMU/UNPD. Tripartite Meeting. October 2020.

The table below shows the status in October 2019 regarding the Individual Enterprises subprojects, according to data reported by IMU/UNDP during the October 2019 Tripartite Meeting:

Figure 12: Table of execution stages of Individual Enterprise conversion. 2019.

Product	Enterprise	Material use	Technology	Status
15	Ananda Metais	PUR (discontinuous panels)	HC - Pentane	Enterprise not yet took a decision to participate in the Project.
16	Artico	PUR (discontinuous panels)	CO_2	Finished conversion Nov/2018.
17	Bulltrade	PUR (discontinuous panels)	HFO	Conversion planned to Dec/2019. Difficulties to stabilize material to produce blocs
18	Cold Air	PUR (discontinuous panels)	Methil Formate	Finished conversion Jun/2017.

19	Furgão Ibiporã	PUR (discontinuous panels)	HFO	Finished conversion Set/2019.
20	Gelopar	PUR (commercial refrigeration)	HFO	Finished conversion Set/2019.

Source: IMU/UNPD. Tripartite Meeting. 2019.

Figure 13: Table of execution stages of Individual Enterprise conversion. 2019.

Product	Enterprise	Material use	Technology	Status
21	IBF	PUR (discontinuous panels)	Methyl Formate	Finished conversion Jun/2017.
22	Isar	PUR (use material in blocs and spray)	Methyl Formate and Methylal	Finished conversion Jan/2018.
23	Niju	PUR (refrigeration in transport)	HFO	Signed Contract Out/2019, in process of conversion.
24	Refrimate	PUR (discontinuous panels)	HFO	Planned conversion to Dez/2019. Difficulties do adhesion of material to the blocs.
25	São Rafael	PUR (commercial refrigeration)	CO_2	Signed contract Set/2019, conversion in process.
26	Tecpur	PUR (material use in blocs)	HFO	Conversion in process. Difficulties to commercialize product. Contract will be finished Dez/2019.
27	Thermjet/ Thermotelha	PUR (discontinuous panels and spray)	HFO	In process of conversion. Contract will be finalized Dez/2019.

Source: IMU/UNPD. Tripartite Meeting. October/2019.

The data provided by IMU/UNPD shows that from the 13 individual enterprises in October 2019: (i) four had difficulties in completing the conversion process; (ii) one had not decided to participate in the Project, (iii) six had completed converting, and (iv) two were just starting.

As for the performance of the technological conversion agreements by these enterprises, their financial physical performance was more advanced than the conversion of SH enterprises (plant complexity, size of machinery to be replaced/modified, continuity of production as suppliers) for different factors.

Figure 14: Table of performance of Individual Enterprise conversion agreements.

Product	Enterprise	Contract amount (US$)	Performance 28/10/2019 (US$)	% Finished
15	Ananda Metais	0	0	0
16	Artico	673.454,31	673.454,31	100
17	Bulltrade	197.500,00	142.500,00	72
18	Cold Air	156.526,00	156.526,00	100
19	Furgão Ibiporã	300.000,00	300.000,00	100
20	Gelopar	504.015,00	504.015,00	100
21	IBF	136.441,00	136.441,00	100
22	Isar	954.028,06	954.028,06	100
23	Niju	195.710,00	0	0
24	Refrimate	258.635,04	216.807,77	84
25	São Rafael	211.175,00	0	0
26	Tecpur	120.900,00	70.140,00	58
27	Thermjet/ Thermotelha	407.465,00	248.732,50	61
TOTAL		**$ 4.115.849,41**	**$ 3.402.644,64**	

Source: IMU/UNPD. Tripartite Meeting. October/2019.

Therefore, at the funds secured through agreements with 12 individual enterprises to be used in their conversions, we note that: (i) Ananda Metais had not signed an agreement; (ii) enterprises Niju and São Rafael had not made disbursements; and (iii) enterprises Artico, Cold Air, Furgão Ibiporã, Gelopar, IBF, and Isar had already concluded their respective agreements.

Thus, out of the 12 agreements signed with IE in the amount of US$ 4,115,849.41, only 82.7% had been performed, that is, US$ 3,402,644.64. Meanwhile, of this total performed, six enterprises had concluded agreements worth US$ 2,724,464.37, representing about 80% of the amounts executed in individual agreements. Of the total amount of 12 agreements, only 66% of US$ 4,115,849.41 had been concluded.

Regarding the progress made until December 2020 (data coinciding with the October 2020 Tripartite Meeting), the IMU reported decisions made by individual enterprises in relation to October 2019 and progress observed in relation to agreement performance, as shown below:

Figure 15: Table of execution stages of Individual Enterprise contracts. 2020.

Product	Enterprise	Material use	Technology	Status
15	Ananda Metais	PUR (discontinuous panels)	HC - Pentane	Invitation to be send.
16	Artico	PUR (discontinuous panels)	CO_2	Finished conversion nov/2018.
17	Bulltrade	PUR (discontinuous panels to blocs and injection)	HFO	Planned conversion to jul/2021. Difficulties to stabilize the material to use in blocs.
18	Cold Air	PUR (discontinuous panels)	Methyl Formate	Finished conversion nov/2018.jun/2017.
19	Furgão Ibiporã	PUR (discontinuous panels)	HFO	Finished conversion nov/2018.set/2019.
20	Gelopar	PUR (commercial refrigeration)	HFO	Finished conversion nov/2018.set/2019.

Source: IMU/UNPD. Tripartite Meeting. October 2020.

Enterprise Ananda Metais showed interest in participating in the Project and is currently in the process of responding to the Letter of Invitation sent by UNDP. Bulltrade continues to carry out improvement procedures for the stabilization of material to produce blocks using HFO.

Figure 16: Table of conversion stages of Individual Enterprise contracts. 2020

Product	Enterprise	Material use	Technology	Status
21	IBF	PUR (discontinuous panels)	Methyl Formate	Finished conversion jun/2017.
22	Isar	PUR (use in blocs and spray)	Methyl Formate and Methylal	Finished conversion jan/2018.
23	Niju	PUR (transport refrigeration)	HFO	Finished conversion may/2018.
24	Refrimate	PUR (discontinuous panels)	HFO	Finished conversion aug/2018.
25	São Rafael	PUR (commercial refrigeration))	CO_2	Contract signed set/2019, already present Products 1 and 2.
26	Tecpur	PUR (use in blocs)	HFO	Will not participate in the Project.
27	Thermjet/ Thermotelha	PUR ((discontinuous panels and spray)	HFO	In process of conversion. Contract will be finished Dez/2019.

Source: IMU/UNPD. Tripartite Meeting. October/2020.

From the set of 13 individual enterprises, it can be observed that:

(i) Tecpur declined the contract, which had been partially performed until 2019 for different reasons, being relevant the fact that the input to be used did not meet one of the MLF criteria for funding,

(ii) enterprises Bulltrade, Thermjet, and São Rafael were still in the conversion process,

(iii) Ananda Metais started in 2020 to respond to the UNDP Invitation Letter,

(iv) eight individual enterprises completed their conversions in: two enterprises in 2017; two enterprises in 2018; two enterprises in 2019; and two enterprises in 2020.

Figure 17: Table of contract performance and HCFC-141 b phase-out. 2020.

PRODUCT	Enterprise	CONVERSION		HCFC-141b ELIMINATED (ODP tonnes)		%Contract Execution
		Planned	Finished	Planned	Finished	
15	Ananda Metais	1	0	6,93	0	0
16	Artico	1	1	2,62	2,62	100
17	Bulltrade	1	0	3,03	0	72,00
18	Cold Air	1	1	2,81	2,81	100
19	Furgão Ibiporã	1	1	5,28	5,28	100
20	Gelopar	1	1	7,13	7,13	100
21	IBF	1	1	2,52	2,52	100
22	Isar	1	1	4,97	4,97	100
23	Niju	1	1	3,09	3,09	100
24	Refrimate	1	1	4,22	4,22	100
25	São Rafael	1	0	2,5	0	46,24
26	Tecpur*	1	0	1,43	0	58,00
27	Thermjet/ Thermotelha	1	1	6,98	0	76,63
TOTAL		**13**	**9**	**53,51**	**32,64**	

Source: IMU/UNPD. Tripartite Meeting. October/2020.

This table shows that 32.64 ODP t of HCFC-141b were eliminated (60.99% of the total expected for the 13 enterprises) through conversion carried out in eight enterprises by concluded contracts, with 53.51 ODP t expected to be eliminated by the end of the project. Therefore, if Tecpur is replaced, then 20.87 ODP t should still be eliminated, i.e., 39% should still be eliminated by the end of the project.

The number of end users converted by December 30, 2020[13] amounted to 81 compared to the target of 445 by the end of the Project, where 31 end users were converted by October 2019 by the nine SH participating in the Project. As December 30, 2020, nine SH and eight individual enterprises had been converted, which would mean that 98 enterprises (SH, EU and IE) had been converted.

In this scenario, it should be pointed out that by December 2020, the indicator of 98 enterprises converted out of 470 foreseen by December 31, 2021[2] - when the Project is scheduled to end - had been reached. This represents the achievement, by December 2020, of 20.64% of the target established in PRODOC as a success indicator for this Outcome.

The second success indicator for Outcome 3 refers to the completion of 27 investment subprojects by the end of December 2021. By December 2020, 17 investment subprojects were performed, where technological conversion of the plant of nine group subprojects and eight individual enterprise subprojects was carried out.

However, the SH investment subprojects aimed at supporting the technological conversion of end-user enterprises are still under way and far from the agreed indicators for each of the investment subprojects for service delivery.

Therefore, the consumption elimination rate[13] has been so far 68.14 ODP tonnes out of the 169.08 ODP tonnes agreed, leaving, therefore, 100.94 ODP tonnes to be eliminated by the end of the Project. Thus, from 2016 to December 2020, approximately 40.3 of the agreed target for the indicator by the end of the Project was eliminated.

It should be noted that the modest achievement of agreed numbers in terms of investment projects and HCFC consumption elimination was the result of a series of factors, particularly the COVID-19 pandemic in 2020 and early 2021 (while this report was being prepared), causing major delays in the performance of service actions in group projects (SH) with the end users of these enterprises.

According to interviews conducted, the Covid-19 pandemic during implementation affected part of the implementation of enterprises, especially the System Houses, as visits to customers to perform trials and tests were hindered.

Also, the availability of HFC-365/227 in the domestic market at competitive prices compared to HFOs and water-based outputs; the strong marketing strategy implemented in the past associating HFC to ecological technologies; and the belief that HFCs will still be used for a long period, until the country defines its schedule for reducing the use of these substances, have influenced the decision of beneficiary enterprises to join the Project, making it difficult to guarantee that planned numbers be reached for conversion subprojects.

Entrepreneurs indicated that part of the Brazilian foam market requires more specificity in the properties of the final product, and that is has been difficult to absorb the higher costs of HFO, having opted for the use of HFC. There were remaining stocks of HCFC-141b in the domestic market, which also affected the decision of beneficiary enterprises to join the Project at that time.

The Brazilian polyurethane market is fragmented, making it difficult to coordinate information regarding the HCFC phase-out schedule in the country. There is also a certain difficulty in disseminating successful experiences from other countries, and among national enterprises there is a relative asymmetry in obtaining information, which has influenced decision making, by many enterprises that today are not benefited by the Project, about their future participation in the Project, meeting the conditions of the MLF for the implementation of the Montreal Protocol.

Below are two examples of strategic decisions made by two enterprises in the conversion process. According to the Progress Report[11] submitted in 2018 for the 82nd Meeting of MLF ExCom, there were "2 enterprises temporarily using polyol systems containing high GWP HFCs: two system houses – Shimtek and U-Tech – which have requested authorization for the temporary use of polyol systems containing high GWP HFCs, with a commitment to discontinue use, with their own resources, as soon as HFOs are available on the market and polyol systems with HFOs have been developed and optimized. Through the Report submitted to the 82nd meeting of the MLF ExCom, the enterprises reported the following progress:

a) Shimtek: the HFC 365/227 blend is being used temporarily instead of HCFC-141b. Tests conducted by the enterprise in 2018 with liquid HFO showed satisfactory results. However, the enterprise reports that current costs in the domestic market would make it impossible for Shimtek to produce competitively priced systems. Furthermore, contrary to what producers of the substance claim, Shimtek reports that HFO is not widely available.

b) U-Tech: HFC-134a is temporarily replacing HCFC-22, which was previously used by the enterprise in the production of the foam system. The first tests conducted with gaseous HFO in October 2017 showed instability in the polyurethane system, which resulted in loss of reactivity and collapse of the foam. Possibilities of adjusting the formulation by replacing additives in the system were discussed with the supplier. However, further testing in 2018 did not show satisfactory results either, as the system stability and reactivity problems remained. The enterprise is currently awaiting delivery of new samples of gaseous HFO and additives that are being imported by U-Tech to Brazil for further testing. "They also report that in the current scenario of HFO gaseous costs, replacement would make it impossible for the enterprise to operate in this market segment."

Another point highlighted in the interviews was the fact that geographic distribution and the number of enterprises benefiting from the Project throughout the regional and national territory made it difficult to implement the SH group subprojects with End User enterprises, which sometimes depend on suppliers far from their locations.

It should be noted that the legal framework actions approved by IBAMA normative instructions, prohibiting the import of HCFC-141b[8] starting January 1st, 2020, allows us to state that the Project was important to ensure that these Project indicators agreed with the MLF through Stage II of the Brazilian HPMP will be achieved in the short term, even though an extension of the performance period will be required for the BRA/16/G76 Project so as to ensure technical support to the enterprises that choose to carry out the technological conversions, meeting the criteria established by the Montreal Protocol and the Contract signed for this Project.

Thus, the Project, through its actions, has allowed a very satisfactory degree of efficiency to be obtained in relation to the indicators of Outcome 3, considering the difficulties faced in the performance of the Project as a result of the measures adopted in the pandemic, which did not depend on the direct action of the Project, and also because of the characteristics of the decision-making process of each enterprise, which requires more time as it is related to technological decisions which affect the production system and the cost composition of each enterprise and which have a medium and long term strategic nature in the entrepreneurial segment of the polyurethane foam sector.

During the pandemic, the IMU/UNDP team held frequent meetings with the enterprises, trying to understand the needs that hindered the implementation progress, as well as to offer support and guidance about the identified needs. All meetings were held virtually, using online meeting tools and applications available in the enterprises (Skype, Zoom, and Teams), as well as telephone conversations. Meanwhile, regular meetings were held between the IMU/UNDP team and the international consultant so as to define lines of action to improve the implementation of these projects, in pandemic and pre-pandemic periods.

It is worth highlighting the progress achieved by the Project in the initial stage of action by SHs in relation to end-user enterprises in 2019, which allows us to say that, if there was no pandemic in 2020, there would certainly have been conditions to expand the conversion to a greater number of end-user enterprises, since the initial experiences and methodologies of action

had been implemented by SHs, indicating that considerable effectiveness would have been achieved with increased enterprise conversion outcomes in 2020 and 2021.

Therefore, this Outcome has been contributing to the achievement of goals, with permanent records of progress, has been monitored and assessed on a permanent basis, and the team has tried to find effective, flexible, and creative solutions in order to improve Project efficiency.

Outcome 4: Assistance to Brazilian HPMP components – Stage II related to the RAC sector

Indicator	Baseline	Target
Number of lots of equipment and parts for five demonstration projects in the RAC services sector procured	0	30

Also within the scope of Component 2 of the Brazilian HPMP – Stage II, through Outcome 4 of BRA/16/G76, the bilateral agency GIZ has been supported by the Project in meeting the commitment made during Stage I of the Program (Project BRA/12/ G76) and purchasing of equipment for enterprises in the commercial refrigeration services sector (supermarkets) required for the performance of demonstration projects is being conducted.

It should be clarified that, within the scope of Stage II of the Brazilian HPMP, an agreement was made between UNDP and GIZ, as well as the transfer of necessary funds, so that UNDP, as lead agency, could assist GIZ in the process of implementing the above-mentioned demonstration projects with regard to the procurement of components, equipment, tools and consumables for refrigeration systems, equipment, and engagement of specialized consultants.

This Outcome will be achieved through the contribution of the following Output:

Output 1: *Equipment and parts for refrigeration systems required for the implementation of five demonstration projects carried out.*

Three pilot projects were purchased, two of which were cancelled by MMA, and the indicator should be revised from five to three in the next substantive revision of the project.

Thus, purchasing processes related to demonstration projects were carried out in supermarkets located in Belém/PA, Hortolândia/SP, and Natal/RN. GTZ, together with MMA, decided to cancel the other two demonstration projects.

In order to ensure the execution of the resources foreseen in this outcome, UNDP, GIZ and MMA agreed on engaging an IC consultant who coordinated, supervised, followed up and monitored the implementation of the demonstration projects for better containment of HCFC-22 in supermarkets located in Belém/PA, Hortolândia/SP and Natal/RN.

To execute this Output, four international bidding processes were carried out between 2016 and 2017, in order to ensure the purchase of equipment and parts for the three pilot projects. Hiring a consultant improved the quality of this Output. The supermarket pilot project in Natal/RN was subsequently cancelled. The components and equipment purchased for this supermarket where the project was cancelled were donated to seven vocational schools.

In this context, the goals to be achieved in this Output were reduced, but the adjustment was necessary from the perspective of GIZ and MMA. Thus, we could say that the outcome was achieved as agreed and that these three pilot projects and the donation of equipment to vocational schools will support the dissemination and training of other enterprises in the sector, so as to

reduce the consumption of HCFC-22 in the short and medium term in the supermarket chain, helping meet the goals and targets of the Project.

Intermediate conclusions on the Project efficiency:

The Project proved to be highly efficient as it has ensured HCFC phase-out in the percentages agreed with the MLF for the foam sector, according to the standards and regulatory framework adjusted and approved with support from the Project (Outcome 2), having so far made the conversion of 17 enterprises (SH and individual enterprises), 81 end-user enterprises, and reduced about 70 t/year of HCFC-141b consumption in the rigid polyurethane foam sector, promoting immediate effects and contributing to the expected long-term impacts.

3.4. Implementation efficiency and management quality

This efficiency assessment will provide information on how budget funds and other inputs (human, physical and financial resources) were used to produce and achieve the Outcomes. It will focus mainly on analysis of the relationship between costs, time, opportunity, and adequacy for the production of those short-term effects of the Project.

The four Outcomes and 31 Outputs executed were technically adequate to the needs of the sector, being produced, in general, on time, with adjustments in the performance schedule, generating deadline extensions without increases in the cost of the activities and Outputs; and with reasonable costs according to MLF manuals.

Implementation and respective strategy have so far helped promote favorable conditions for the performance of the Project, aiming at achieving the Goal, Outcomes and targets agreed upon in the Project Document, in relation to the contribution to achieving Stage II of the PHB, with respect to BRA/16/G76.

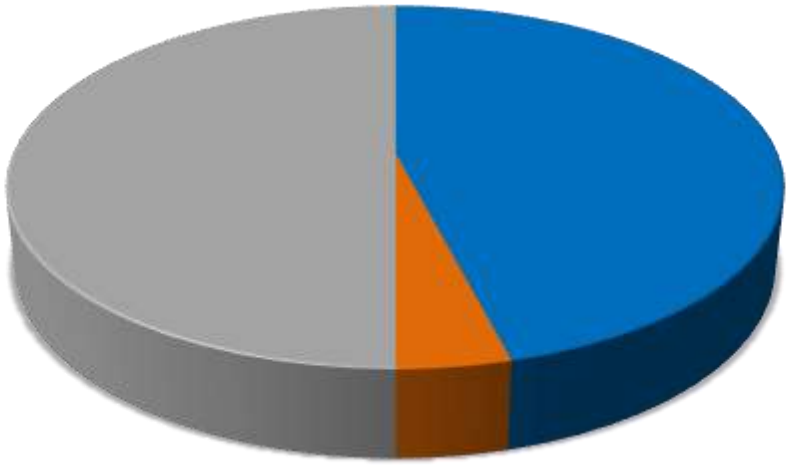
The Project Outcomes and Resources Matrix has proven to be adequate; however, as of 2020, the Annual Operating Plan has extended the Output execution deadline and consequently changed the pace of expected disbursements; as well as the pace of performance of the activities planned in most of the 27 subprojects supporting the enterprises.

It should be noted that the funds forecast since the approval of the Project reached the amount of US$ 17,020,000.00 of which the MLF for the Implementation of the Montreal Protocol has so far transferred three Tranches out of a total of four agreed upon with the Brazilian Government. Until December 2020, US$ 13,125,000.00 had been transferred, representing three Tranches in the amount of: (i) US$ 3,328,900.00 - Tranche 1; (ii) US$ 2,627,704.00 - Tranche 2; and (iii) US$ 7,168,396.00 - Tranche 3. There would still be the last Tranche 4 in the amount of US$ 3,895,000.00.

Therefore, funds equivalent to 77.1% of the total budget of the Project have already been made available. Due to the conditions for disbursement of each of the MLF Tranches, it should be noted that 98.94% of Tranche 1 has already been executed; 83.26% of Tranche 2, and 36.21% of Tranche 3. In appendix 6 you will find a table with these values.

This means that approximately US$ 8,077,160.00 of US$ 13,125,000.00 has already been executed or committed. This would mean, if Tranche 4 is added, the need to execute still around US$ 5,047,840 (balance of Tranches 1, 2 and 3) and US$ 3,895,000 (balance of Tranche 4), which would total the amount to be executed in the next years of US$ 8,942,840, in case of a substantive revision and extension of the performance deadline (Stage II of the PHB can be concluded until 2024), since the Project would end on December 31, 2021.

Figure 18: Budget Execution Chart.



Project	Validity	Budget	Executed	Commitments	Balanced
BRA/16/G76	31/12/2021	USD 17.020.000,00	USD 7.863.846,65	USD 611.903,63	USD 8.544.249,72

Source: IMU/UNDP Tripartite meeting, 2020

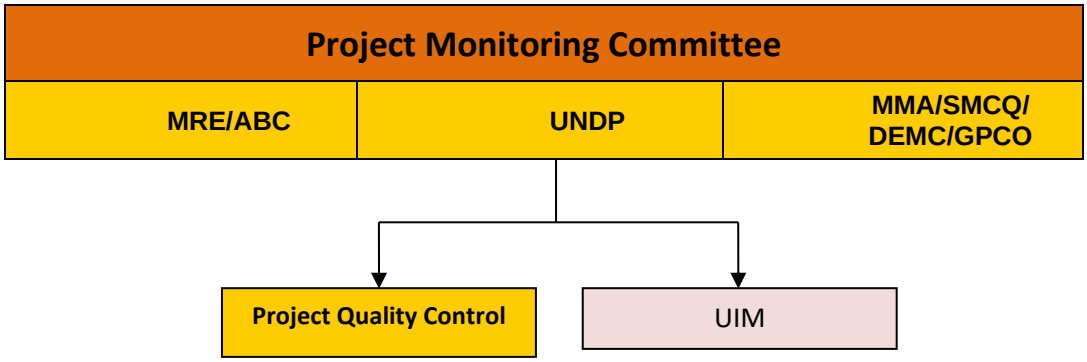
In the figure 18, it is possible to identified in blues that the Project had executed 46%; in gray the balance of the project is 50% and in orange color the 4% of the budget committed.

From 2016 to 2020, the annual average disbursement was US$ 2 million, considering that in 2018 and 2019 (with LTA) it was US$ 2.4 million. In theory, this situation would require the addition of at least three years for the completion of the current Project design, with 27 investment subprojects, with the current technical team and installed and available capacity in the SH to support the conversion of the total number of end users.

Currently, the implementing agency and MMA are evaluating alternatives to adapt the implementation of the Project in times of pandemic; as well as studying the broadening of end users support capacity in their respective conversion processes, reinforcing with consultants the technical performance of SH, which assist hundreds of enterprises as input suppliers.

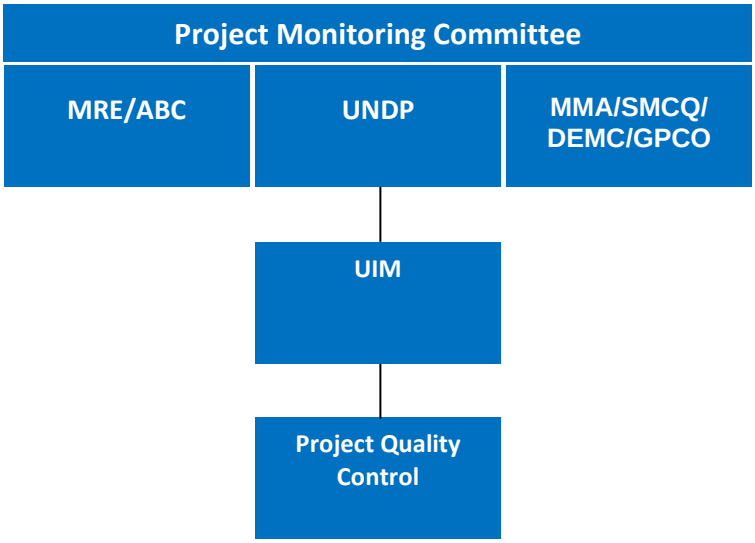
As previously indicated, the organizational structure of the Project remains the same as what was proposed in the project's[2] design, with functions and responsibilities shared in a smooth and collaborative manner between the participants of the project's implementation, monitoring and evaluation.

Figure 19: Initial Organizational Chart of the Management Structure



Source: PRODOC, 2016

Figure 20: Updated Organizational Chart of Management Arrangements



Source: UNDP. Atlas 2019. Final Evaluation Report BRA/12/G76.

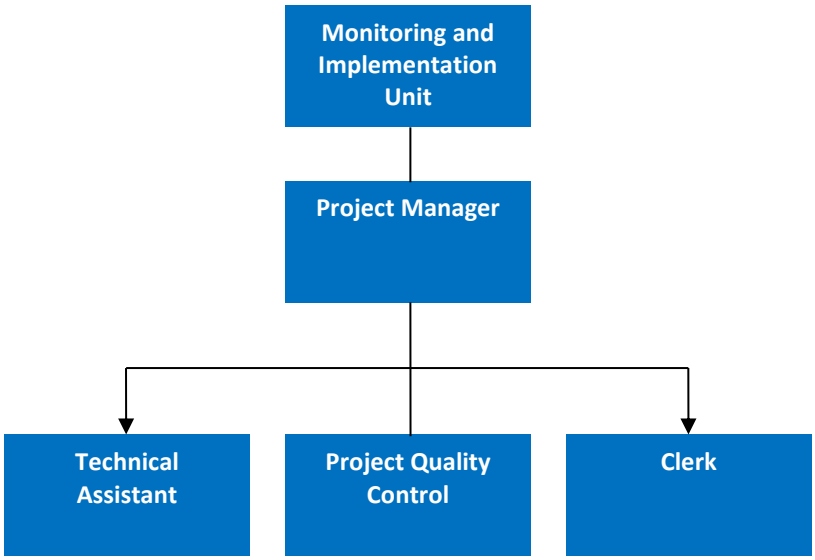
The original proposal for the composition of the general coordination of MMA relied on five collaborators, and there was a change in the location of this unit in MMA, which became part of the Secretary of Climate and International Affairs, through the Department of Climate, relying on a structure dedicated to the Ozone Project. Currently, this coordination relies on a team of four public employees, who provide support to the Projects and the Agreement with the Montreal Protocol, through different existing, ongoing projects on the topic. Today, the team dedicated to this topic relies on a Coordinator, Mr. Luiz Paulo Oliveira Silva and three environmental analysts: Mrs. Magna Luduvice, Mrs. Tatiana Lopes de Oliveira Pereira, and Mr. Frank Amorim.

The Brazilian Cooperation Agency has been working as coordinator of international cooperation and participates in the Project Monitoring Committee, especially through tripartite meetings and permanent monitoring of the Project. It takes place through the Project Monitoring Management Information System, which constitutes a physical, technical, and financial monitoring system that contemplates the information and data MMA provides to the ABC. Directly involved with the Project, the ABC relies on three professionals, from its initial design, maintaining

the same composition over the last five years: Mr. Márcio Correa, Mrs. Alessandra Ambrósio and Mrs. Tania Jardim, recently replaced by Mrs. Alda Ferreira

Regarding the IMU, located in the UNDP, which works as the implementing agency of the Montreal Protocol, it initially relied on five national consultants and the collaboration of an international consultant, under the UNDP Thematic Coordination of Mrs. Maristela Baione, in charge of projects of this nature. The IMU currently relies on four national consultants and the collaboration of an international consultant, who is not part of the IMU. Between 2016 and 2017, the Project management was carried out by Mrs. Marina Ribeiro who was replaced by Mrs. Ana Paula Pinho Rodrigues Leal, who has three collaborators: Mrs. Raquel Martins Rocha (Technical Advisor); Cleonice Araújo (Project Assistant) and Mr. Sady Fauth (Clerk).

Figure 21: IMU/UNDP Organizational Chart



Source: IMU/2021

The implementation arrangements sought close collaboration between the IMU/UNDP, MMA and ABC as far as the monitoring and evaluation processes of the Project, holding annual tripartite meetings in 2019 and 2020, and the minutes were written contemplating the adjustments and recommendations agreed upon. It is worth highlighting that Progress Reports were produced in 2019 and 2020 for the tripartite meetings with the ABC, MMA and IMU/UNDP.

The Project monitoring has been following the UNDP manuals and procedures, which meet the demands and conditions established by the MLF, as far as physical, budgetary, and financial advances. The Project has also been monitored by the Project Monitoring Management Information System. Its objective is to organize the information on the monitoring of international technical cooperation projects in a structure directed to strategic decision making, providing a broad view of the project.

At the same time, whenever necessary, the IMU and the Montreal Protocol team in MMA held meetings to discuss issues that needed actions from the Project, which provided greater efficiency to obtain solutions and referrals for the Project management quality.

Regarding the procedures required by the agreement with the MLF, coordinated by MMA, the Project develops Progress Report together with the UNIDO and GIZ agencies, since 2017, presented in the Executive Committee of the Fund meetings, contemplating technical and

financial aspects of the Projects' implementation, which composes the Stage II of the Brazilian HPMP.

This instrument is an important element for the planning, monitoring and has supported the release of Tranches for the implementation of the Project; as well as the monitoring to reach the goals agreed upon with the Montreal Protocol. These reports are available for consultation at the IMU and MMA. The financial reports follow the UN service rendering system, accepted internationally by auditing systems from several different agencies and international funds.

To date, there have not been any Project Substantial Reviews; however, the annual plans of activities and resources have been updated, for the Reports presentations to the MLF and Tripartite Meetings. Regarding Budget Reviews, nine Reviews14 have been made14, between 2017 and 2020, promoting adjustments in the amounts planned and carried out per year in the Project, on the following dates: (i) General Review of 27/11/2017; (ii) General Review: 27/03/2018; (iii) General Review: 24/09/2018; (iv) General Review: 21/12/2018; (v) General Review: 12/07/2019; (vi) General Review: 24/09/2019; (vii) Review of Initial Budget: 17/12/2019; (viii) Review of Initial Budget: 30/06/2020; (ix) General Review: 06/11/2020.

The initial Work Plan of the Project approved with PRODOC, in 2016, foresaw the full execution of the Project until December 31st, 2021. However, as previously seen, several factors at work ended up causing important differences in the rhythm of execution of the 27 enterprise subprojects (equivalent to 27 Outputs of Outcome 3), generating the need for adjustments in time, in the service agreement modality (LTA) and in the amounts.

Next, we indicate the values agreed upon in the Planning of Activities and Resources over the six years of execution, for the purposes of this evaluation. In attachment 01, you can find the tables of values agreed upon in the PRODOC and successive general budget reviews between 2016 and 2021, considering that only three of the Tranches agreed upon with the Fund have been released, and with the four Tranches the funds would total US$ 17,020,000.00.

The chart below should be analyzed, in which the three Tranches total up to date approximately US$ 12,879,750 and the Tranches were made effective on the following dates:

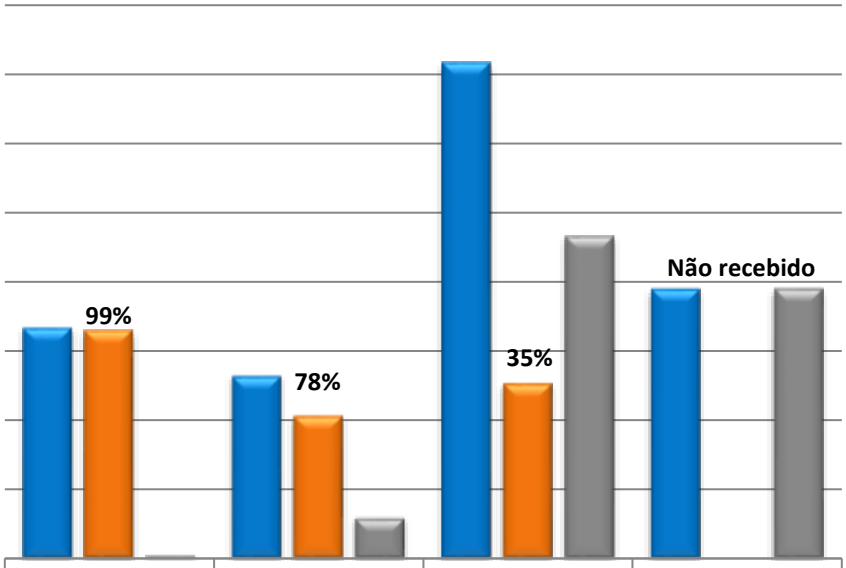
(i) Tranche 1 of the MLF was made available on May 19th, 2016, amounting to US$ 3,078,900.00

(ii) Tranche 2 of the MLF was made available on January 30th, 2018, amounting to US$ 2,627,704.00 (RAC and Foam)

(iii) Complementary Tranche 1 was made available on March 27th, 2018, amounting to US$ 250,000.00(Italy);

(iv) Tranche 3 of the MLF was made available on March 12th, 2019, amounting to US$ 7,168,396.00 (Regulatory and Foams).

Figure 22: Budget Execution Chart of the 4 Tranches



	1st tranche	2nd tranche	3rd tranche	4th tranche
Valor do Tranche	USD 3.328.900,00	USD 2.627.704,00	USD 7.168.396,00	USD 3.895.000,00
Executado	USD 3.293.590,78	USD 2.052.420,33	USD 2.517.835,54	USD -
Saldo	USD 35.309,22	USD 575.283,67	USD 4.650.560,46	USD 3.895.000,00

Source: IMU/UNDP. Tripartite Meeting. 2020

In the figure 22 it is possible to identify in blue the amount of each tranche; in gray the project balance and in orange the executed budget.

Therefore, the values foreseen in the Annual Work Plan for 2019 reflect in part the advance of the approximately US$ 7 million made available, when the Project was facing operational difficulties to provide agility to the SH contracts to work in the future conversion of end users, and thus waited for the approval of the new LTA modality to replace the old contract model of the SH – end user conversion support.

Next, we present the amounts from annual reviews, to identify existing differences in the estimates between planning and what was actually executed:

Table 4: Annual Work Plan vs. Annual Execution 2016/2021.

Document	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
PRODOC	**866,123.24**	**3,874,677.44**	**6,167,378.48**	**4,931,741.75**	**512,323.29**	**667,755.63**
Rev. Nov 2017	33,922.10	1,693,841.11	2,473,425.03	6,945,012.87	5,163,458.75	710,340.14
Rev. Sep 2018	33,922.10	1,380,173.14	2,721,481.24	2,550,631.59	5,895,100.04	4,438,691.69
Rev. Sep 2019	33,922.10	1,380,173.14	2,437,966.06	3,346,392.88	5,068,455.76	4,753,090.06
Rev. Nov 2020	**33,922.10**	**1,380,173.14**	**2,437,966.06**	**2,556,600.20**	**2,047,489.58**	**8,523,848.92**
Difference PRODOC and last Review	28 times lower	2,8 times lower	2,5 times lower	1,3 times lower	4 times higher	14 times higher

Source: IMU/UNDP. General Reviews of the Project.

Thus, we verify that there was reduced execution over the first year, due to awareness-raising activities, information exchange and development of documents to be signed, while the

second year of execution had to face difficulties to implement contracts with the SH, as well as the lack of flexibility of these instruments. At the same time, the second and third years provided better efficiency to the instruments and procedures used, as well as identified difficulties faced that needed operational management improvements.

As of 2019, with the new contract instrument with SH through the use of LTAs, it was possible to come closer to what had been originally planned in 2016, through contracts with a certain number of individual enterprises and end users beginning the execution of their respective conversions.

However, it is worth mentioning that until April 2020 there was a period of greater speed in the implementation of contracts, and after April there has been a relative stall of SH technical assistance actions for the conversion of end user enterprises, including the temporary or definitive shut down of many enterprises in the sector.

According to IMU data, the conversion of end users between July 2019 and September 2020, that is, after the adoption of better suited and more flexible LTA contracts with the SH for technical assistance and to support end user conversion, there has been a great advance in this process, showing better operational efficiency, in the achievement of Output and established goals, with greater disbursement speed of Tranches 2 and 3 of the MLF. Next, we present the conversions of end users with the improvement trend of what had been planned and executed to reach the Objective, Outcomes and Outputs:

Table 5: Total number of End User Conversions 2019/2020.

Period	Number of enterprises converted (end users)
July to September/2019	31
October to December/2019	20
January to March/2020	13
April to June/2020	9
July to September/2020	5
October to December/2020	2
Total	81 (18.2%)
Commitment Stage II	445

Source: IMU/UNDP. Tripartite Meeting Presentation. 2020.

A very positive point that brought greater efficiency to the Project management was the adoption of LTA contracts with the System Houses, as of July 2019, and if it were not for COVID-19 (as of mid-March 2020), there would be a high probability of more end user conversions (average of 20 users converted per month) with the possibility of the Project reaching the goal of approximately 350 to 380 end users until August 2021.

That would bring the reaching of goals much closer to the expected outcomes, with proper Project management, since the update and review of the end users list of each System House would be performed in 2021(2021estimate of likely cancelling of 23 end user enterprises for not meeting the criteria or declining to participate in the Project due to national market conditions). Therefore, instead of 445 end users converted there would be an immediate reduction in the total number of end users totaling approximately 422 end users in the Project completion.

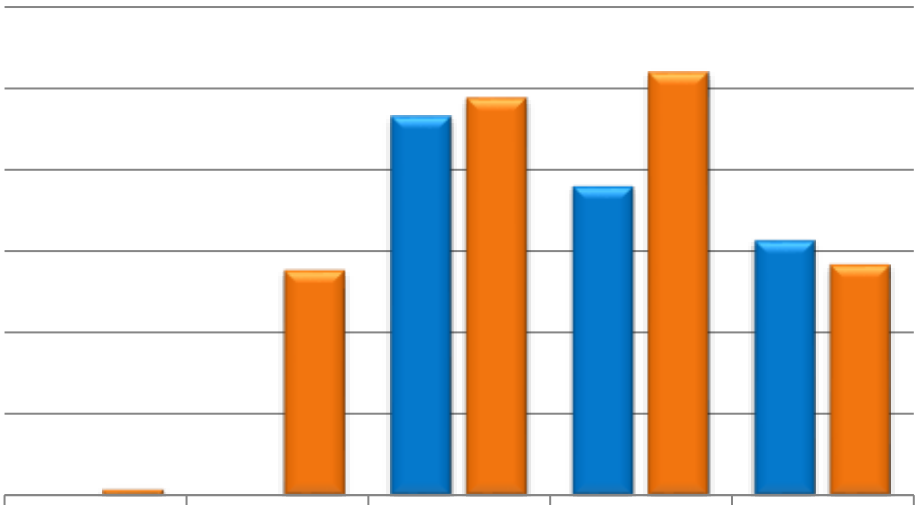
It is still worth mentioning that the level of the implementation efficiency (proper resources, implementation time and response/solution opportunity) and the management quality (processes, dynamics, and instruments) would tend to be effectively higher if the Brazilian Government had ratified the Kigali Amendment to the Montreal Protocol, which was approved in 2016.

As previously mentioned, the original Project execution schedule was updated by the annual Action Plans elaborated by UNDP and agreed with MMA, ABC, and the MLF. From 2019 onwards, the outputs and implemented actions foreseen in the Action Plans became more aligned with the actual execution and management capacity of this type of Project, still highly dependent on tests and laboratory results, and the decisions made by each enterprise about the execution of the activities proposed. The capacity not only to monitor test related initiatives, but also to provide technical support for output validation and the dissemination of results. Also, the IMU role in articulating partnerships with Systems Houses and SMEs to support Project initiatives.

Nevertheless, it can be observed that the disbursement of approximately US$ 8.5 million planned for the year 2021, represents about 50% of the total funds to be transferred by the MLF to the Project, considering the four Tranches planned. This fact would require a substantive revision of the Project, with an extension of the execution period. At the same time, the revision should aim at redistributing the funds allocated to each subproject envisioning to increase of support to end users for short periods of time during the adherence and conversion stages. In this way, it would be possible to increase the Project's execution capacity until 2024.

This gap between the available funds and the execution timeline is also reflected in the significant mismatch between the foreseen budget and the disbursements made each year up to the time of the evaluation. This situation has led to a systematic reduction of the foreseen annual disbursements for the last five years, except for the year 2019 when the use of LTA type contracts was approved.

Figure 23: Adjusted Budget Execution Chart 2016/2020



	2016	2017	2018	2019	2020
Estimado			USD 2.331.822,	USD 1.900.000,	USD 1.566.784,
Executado	USD 33.922,10	USD 1.380.173,	USD 2.437.966,	USD 2.596.600,	USD 1.415.185,

Source: IMU/UNDP. Tripartite Meeting. 2020

In the Figure 23 it is showed the year budget adjusted regarding amounts indicated in bleu is the estimated and, in the orange, is the executed amount.

During the interviews, it was highlighted the permanent and qualified work of the IMU team and the international consultant in providing timely and quick answers to the doubts or requests for guidance regarding conversion processes and contract implementation.

The technical-operational execution strategy adopted by the Project was based on the identification of focal points in System Houses, end-users, or individual enterprises; and involved pre-existing focal points of enterprises that had or were still participating in Project BRA/12/G76 - Stage I of the Brazilian HPMP.

This arrangement required the IMU to be in permanent contact with at least 27 focal points, while the System Houses oversaw the contact with end users. Through the interviews, it was possible to identify that the SH commercial agent (in charge of supplying inputs and technical assistance) was facing difficulties in meeting the emerging demands of an expressive number of enterprises that were carrying out their conversion processes, and unable to visit end users in geographically distant regions to provide advice, do follow-up and validate conversion stages.

The four Outcomes, especially Outcome 2 (regulatory framework- ABNT) and Outcome 3 (27 subprojects), were technically well executed, meeting the needs of the sector, and with some deadline extensions. Costs were reasonable considering the achievements attained by the Project throughout the last five years of execution. In 2020, there was a reduction in the expected number of conversions to be implemented by end users.

The original Outcome Matrix, Resources allocated, and the corresponding Outcomes could be assessed as appropriate if conditions had remained normal, without the pandemic, and if the new LTA contract modality had been approved in 2018 instead of mid-2019. It is expected that by the end of the Project these situations will have been resolved and that the pace of implementation will be resumed as it used to be in previous stages of the project.

The estimates for each of the activities in the 27 Subprojects proved to be adequate for the fulfilment of the Project's goal. The amounts agreed with the Fund were not surpassed. It should be noted that some enterprises signaled that the amount approved by the Fund as a subsidy during the first 12 months of the technological conversion would not be sufficient to cover the related expenses, putting at risk their ability to compete in the national market.

Additionally, the contract signed by the enterprises guarantees the continuity of the conversion process through the technical and financial aid provided by the MLF and constitutes an important element in the efficient achievement of the Project´s Outcomes.

According to the interview, it took less time to obtain the inputs required to perform Subproject activities (SH, End Users and Individual enterprises) allowing for better outcomes when compared to the ones observed in other Latin American countries. Execution times resembled those observed in projects ran in countries with a similar foam sector, although the size of the enterprises and their pulverization all over Brazil may differ from the size and distribution array found in Colombia or Chile. The execution time resembles the one originally established for the Project BRA/12/G76 (2012/2016) that was granted a three-year extension, until 2019.

It should be noted that in relation to Outcome 4 (remaining from Project BRA/12/G76), the scope of output 1 suffered an important reduction. The project originally included the procurement of equipment for five demonstration projects in supermarkets. However, after the completion of the Brazilian HPMP Project- Stage I by GIZ, and partly due to the complex UNDP bidding

processes which included international bids, it was agreed between the Project management and MMA to reduce the number of bids to three, with the delivery of the equipment to two supermarkets and the donation of the remaining equipment to technical schools.

The financial and administrative management of the Project, carried out by IMU/UNDP, was considered highly efficient. Accomplished professionals with a vast experience in Project implementation and previous experiences in the foam sector timely responded to project development needs and duly performed strategy adjustments in a transparent and collaborative manner with enterprises and partners of the sector.

The effective and fluid communication between the different players, collaborators and direct beneficiaries has been key to the success of the program. MMA, UNDP, IBAMA and the international consultant have worked collaboratively to efficiently manage the project, implement initiatives and give a timely response to the demands and special needs of the different types of beneficiaries.

The coordinating body dealt with external and internal factors that impacted operational aspects in different ways, many of them derived from changes in the national scenario due to the pandemic. The Project had sufficient budget; and it provided efficient solutions through instruments that allowed end users implement their technological conversion.

The average costs to carry out activities related to technical assistance, HCFC-141b consumption annual reports, awareness raising campaigns, technical visits and missions, training, events and seminars, and monitoring and assessment activities were reflected those practiced in the Brazilian market. However, it was observed that in the last two years, and due to reasons external to the project, the amounts disbursed were lower than the ones planned, and the execution schedule suffered delays.

In practice, approximately 68.5 % of the funds made available for the project had been executed/ committed until December 2020. The remaining US$ 8.5 million, including the amount corresponding to the last tranche- which is still pending- would be disbursed over the next three years, extending in this way the project's execution period.

The project efficiency made possible the achievement of the expected outcomes through the attainment of the corresponding outputs and activities. It is expected that further outcomes will be achieved through the technical cooperation to be received till the end of the program. The project’s short and mid-term outcomes were attained within the expected budget and with some degree of delay.

Long-term objectives and goals have been guaranteed through the improvement of the institutional framework, and it is hoped that by the end of the Project, greater benefits may be obtained if national decisions and strategies are taken towards the Brazilian ratification of the Kigali Amendment.

The funds disbursed until December 2020 vs the budget approved by outcome for the period 2016 – 2020 was as follows:

Outcome 01: Out of US$ 1,594,155.00 approved, US$ 748,931.67 were disbursed (3 Tranches).

Outcome 02: Out of US$ 120,000.00 approved, US$ 66,082.33 were disbursed.

Outcome 03: Out of US$ 14,705,844.92 approved, US$ 6,697,153.64 were disbursed.

Outcome 04: Out of US$ 600,000.00 approved, US$ 564,990.78 were disbursed.

The percentages of the budget executed by Outcome stands as follows:

Outcome 01:46.0 %

Outcome 02: 55.0 %

Outcome 03: 45.5 %

Outcome 04: 94.1 %

The implementation process was collaboratively carried out by MMA, ABC and UNDP who were in permanent communication. Their joint efforts highly contributed to the improvement of implementation aspects. The financial management was performed with transparency through the presentation of financial reports by UNDP. Transparent mechanisms were also observed in bidding processes, direct contracts with enterprises (LTA), minutes made available, and selection of consultants hired by internal committees.

Mid-term conclusions:

The efficiency of the implementation and management of the project can be assessed as very satisfactory in view of the significant efforts made by project collaborators throughout its execution. However, due to factors beyond the control of the project, disbursements were lower than the originally planned in some years; and delays were observed in the execution schedule despite the high degree of monitoring and evaluation of activities, outputs and outcomes achieved. The Project executed 64% of the available funds. During these five years, expected outcomes were attained with adequate costs, human and financial resources and some delay.

4. CONCLUSIONS

The Project BRA/16/G76 envisages the improvement of the ozone layer protection. It is funded by MLF, coordinated at national level by Ministry of Environment and IBAMA institute and directly implemented by UNDP.

The Project encompasses initiatives aimed at achieving the goals agreed for the Brazilian HPMP - Stage II, through the support provided to: strategic management actions; adjustments of regulatory framework; investment projects to perform technological conversion and demonstration projects of Brazilian HPMP - Stage I related actions in the RAC sector; and the generation of information for planning, monitoring and evaluation purposes.

As previously mentioned, the project started in 2016, and it is expected to be fully executed by December 31, 2021. The allocated funds were agreed at US$ 17,020,000 to be disbursed in four tranches. To date, three tranches have been disbursed accounting for US$13,125,000, out of which US$8,000,000 were executed by December 2020.

The present evaluation confirmed the high relevance of the project given its contribution to international commitments made by the Brazilian government in relation to the Montreal Protocol goals. It has also proved to be highly relevant to the promotion of public policies that contribute to the Ozone Layer protection, and the phase-out of ODS in the foam sector, as it can be verified in project related documents posted in MMA portal.

To date, the Project has allowed the technological conversion of eight Systems Houses out of the 14 SHs initially scheduled -three of which turned to be ineligible for the project; and nine individual enterprises out of the 13 originally planned. These conversions have promoted a ODP reduction of 68.14t. by December 2020, out of the 169.08 tonnes estimated by the end of the Project. In terms of end-users, 81 of them performed their technological conversion out of the 445 enterprises scheduled to be converted by the end of the Project.

It should be noted that the objectives and Outcomes of this collaborative venture are contributing to the achievement of eight out of the 17 Sustainable Development Goals, namely: (i) Goal 9 - Industry, Innovation and Infrastructure; (ii) Goal 12 - Responsible Consumption and Production; (iii) Goal 13 - Action Against Global Climate Change through the technological conversion of Brazilian enterprises and the replacement of HCFC-141b by other substances that do not deplete the ozone layer and do not contribute to global warming (low GWP).

IMU/UNDP direct actions made possible the dissemination of alternative technologies to replace the use of ODS by others with zero ODP and low warming potential in the polyurethane foam production. The implementation of investment projects for technological conversion helped in the dissemination of new environmentally appropriate technologies and promoted the improvement of infrastructure and operational safety of the foam sector industries (Goal 9 - Industry, Innovation and Infrastructure).

Initiatives addressing the general public and the production sector to raise awareness and disseminate information on the importance of the use of non-ODS, promoted more responsible consumption and production practices (Goal 12 - Responsible Consumption and Production). ODS phase-out actions also contributed to the mitigation of adverse impacts on climate. (Goal 13 - Action Against Global Climate Change).

The Project supported improvements in the regulatory framework enacted by IBAMA/MMA through updates in normative instructions IN #14/2018, IN #4/2019, and IN #5/2018 that prohibited the import of HCFC-141b for the manufacture of foam as of January 1, 2020; and the import and export of polyol formulated with HCFC-141b as of January 1, 2021.

The new regulations alerted national enterprises about the need to adjust their technologies to the use of non-ozone depleting substances by 2020. In this context, the Project's efforts in providing financial and technical support to Brazilian enterprises since 2016, became even more relevant.

It is worth mentioning that the Project initial design was adapted to suit the socioeconomic reality of the country and to meet the needs of technological conversion to substitute the use of HCFC-141b in enterprises of varied types. Thus, the strategy, objectives and expected outcomes remain relevant and valid after five years of implementation meeting the demands and business capabilities of the foam sector.

The project has allowed the transmission of technical information on the subject as well as the dissemination of MLF objectives and conditions to provide financial support for technological conversion; and it has raised awareness among entrepreneurs on issues related to ozone layer protection, climate change and sustainable development through meetings, communications and mailing lists. A website was developed, and information and awareness raising campaigns were broadcasted in urban public transportation in different cities. Having a specialized international consultant promoted the exchange of information about similar international projects. All these initiatives attested the project´s relevance in spreading the word about these topics among the general public and the business sector.

During the interviews, it was possible to confirm that many enterprises that carried out their technological conversion and substituted HCFC-141b, would not have been able to do so without the support of the Project.

It is important to highlight that the Project is aligned with other projects and initiatives promoted by the Ministry of the Environment in the area of sustainable development; and that the Brazilian Association of Chemical Industries also supported the Project by means of the facilitation and promotion of communication and awareness raising initiatives.

According to the interviews, some enterprises faced difficulties in the supply of inputs after the technological conversion due to the pandemic in 2020 and 2021.

Project outcomes have proved to be highly relevant in this context and have significantly contributed to the fulfillment of international commitments and national policies that seek the protection of the ozone layer.

The project design responds to national specificities and local enterprises characteristics; and has contributed to the goals set for the Brazilian HPMP - Stage II and the Brazilian commitments agreed with the Montreal Protocol.

The implementation strategy adopted proved to be efficient in its approach of differentiating three categories of enterprises implementing the technological conversion and the substitution of HCFC-141b. A list with the enterprises to be benefited by the Project was made during the execution of the Project BRA/12/G76 (Brazilian HPMP- Stage I) that preceded the current Project. Many of the enterprises participating in Stage I also joined BRA/16/G76. A preliminary survey was carried for the Brazilian HPMP by which 1655 enterprises operating in the Foam sector were assessed.

Therefore, the 27 subprojects had already been selected when the Project started in 2016. They were divided into two categories: 14 subprojects were group investments (Systems Houses or umbrella subprojects that supplied inputs to end users) and 13 subprojects were individual investments. The strategy adopted was to use the Systems Houses as technical assistance hubs to support the conversion of their customers of inputs, identified as end users (EU), with the objective of converting a total of 445 EU by the end of the Project.

Regarding the project execution, it was proposed that all SHs and individual enterprises would be converted first. After SHs conversions, end users linked to each SH would be converted. A UNDP Service Contract was the instrument that enabled the financial and technical support for the SHs and Individual enterprises conversions. However, this contract model presented some operational difficulties for the transfer of Project funds to end-users, that require the UNDP to first transfer the funds to the SHs, and only then the end-user would receive the funds from the corresponding SHs.

In this context, it was necessary to revise the use of this contract model and approve a new one by the Assessment Committee Project (ACP). This situation led to a time lag between the completion of the SHs and Individual enterprises' conversion and the adoption of an LTA type contract in July 2019 by the two Projects: BRA/12/G76 (in its final phase) and BRA/16/G76.

Regarding monitoring and evaluation procedures, the Project relied on UNDP pre-existing systems that required the presentation of Progress Reports for the ABC and MLF tripartite meetings in Brazil, and the MLF ExCom meetings; procedures that were all attended by the Project. Missions and technical visits to monitor the subprojects were also observed. One of the constraints of the Project design was not considering how distant and disperse end users were from their respective SHs, posing a challenge when technical assistance was required.

One of the suggestions to be evaluated in a possible Substantive Revision is to review the list of EUs that were initially allocated to each SH and reorganize them considering the criteria of geographical proximity; or to appoint consultants that could promptly travel to support SHs actions.

The initially estimated amounts allocated to each of the conversion subprojects (27 individual and group subprojects, and 445 end users) remain valid to date. They were budgeted in dollars and benefited from exchange rate variations between 2016 and 2020.

The clear definition of four Outcomes and 33 outputs, baseline, outcome indicators, and targets to be reached by the end of the implementation stage, facilitated follow-up activities and the mid-term evaluation of the Project.

The implementation process as defined in the initial project design proved to be very satisfactory. The parts involved collaboratively performed their stipulated activities with efficiency, attending new demands or making the necessary adjustments throughout the implementation. The direct execution modality adopted by UNDP, who acted as the implementing agency, presented important comparative advantages in terms of workflow and the use of internationally recognized procedures and guidelines.

All in all, the project design can be assessed as very satisfactory, appropriate and relevant in view of its implementation and the outputs and outcomes attained so far. However, some topics deserve to be revised, such as: dissemination and systematization of project execution procedures and good practices; establishment of new partnerships and networks involving public and private players that may benefit from initiatives that promote the ozone layer protection and

the prevention of climate change; alternatives that may guarantee the continuation of the project regardless the ratification of the Kigali Amendment to the Montreal Protocol in the next 12 months.

Regarding the project effectiveness, it was verified that the Outcomes achieved so far have satisfactorily contributed to the attainment of the General Objective of the Brazilian HPMP - Stage II: to phase-out HCFC consumption in the polyurethane foam sector and to assist the Brazilian Government in the implementation of the Brazilian HPMP - Stage II.

This high degree of effectiveness is also reflected in the efforts to comply with the percentages of HCFCs to be phased-out in the foam sector agreed upon with the MLF, and the support provided to promote and update the regulatory framework (Outcome 2) envisioning long-term effects; also in the technological conversion of approximately 98 enterprises by December 2020 with the corresponding reduction of 1/3 of the HCFC-141b to be phased-out by the end of the Project, with the conversion of 470 enterprises.

The actions to achieve Outcome 3 were carried out as described in the Project Document and in compliance with the Logical Framework of the Brazilian HPMP – Stage II BRA/16/G76 in a joint effort with the national enterprises that agreed to implement the technological changes required to substitute the use of Ozone depleting substances and therefore attain the project goals through the indicators established in each of the contracts, including the adjustments in the contract model to better assist the conversion of 445 end users by 14 SHs.

Regarding Outcome 1, project management initiatives can be evaluated as very satisfactory although the assessment of this item could also be included as part of the analysis of the project's efficiency. Project management procedures, instruments and resources included: on-going monitoring and evaluation system; baseline with clear and measurable indicators; targets to monitor indicators; progress reports and annual consumption verification reports presented to the MLF of the Montreal Protocol; planning and tripartite meetings with key national stakeholders and the Fund; missions and technical visits to sub-projects; improvement of instruments for the implementation of 27 sub-projects (SHs and individual enterprises) with the execution of 81 end-user conversions. It should be highlighted that the management and execution of the Project was highly successful, despite the very small staff -four professionals- in the IMU/UNDP office dedicated to the various projects with the MLF.

Many external factors, beyond the control of the Project, have contributed to a major delay in the conversion processes, especially those of end users, namely: (i) the local impact of the global pandemic in 2020 and 2021; (ii) the local increasing cost per kg/ton of certain non ODS and GWP inputs used in rigid polyurethane foam industries; (iii) the competitive and attractive prices of substances that do not deplete the ozone layer, but that negatively contribute to global warming/climate change, (iv) the commercialization of substances still accepted in the Brazilian legislation, due to the still pending ratification of the Kigali Amendment by the National Congress.

Regarding Outcome 2, aimed at improving the regulatory framework, two Normative Instruction updates (IN 4/2018 and IN 5/2018) were approved by Brazilian authorities and came into force between 2016 and 2020 regulating the banning of HCFC-141b importation, coming into effect on January 1st, 2020; and the prohibition to import or export HCFC-22 as of January 1st, 2021.

It should be noted that the fact that Brazil does not produce HCFC-141b, automatically allows the attainment of the reduction of HCFC-141b consumption goal agreed upon with the Fund; similar is the case of HCFC-22, which in addition is prohibited to be sold to other countries which continue to consume it, especially in Latin America.

Therefore, MMA and IBAMA initiatives proved to be highly effective in improving the regulatory framework. However, some external factors had a negative impact in this regard, namely: (i) the non-approval by the ABNT of standards and guidelines on the conditions and use of certain flammable substances in the foam and RAC sector; (ii) the dissolution of two governmental entities (PROZON and GT-HCFC)involved in the implementation of the Montreal Protocol and the protection of the Ozone layer by decree No. 9,759, issued by the Federal Government on April 11, 2019.

Outcome 3, aimed at supporting the phase-out of HCFC-141b consumption at national level, encompassed indicators and targets agreed with FML through 27 outputs that would allow the conversion of 13 SMEs and 14 Systems Houses sub-projects that would also assist approximately 445 downstream foam enterprises. It should be clarified that out of the 14 SH Projects, two of them are multinational enterprises and therefore ineligible to receive funds for their conversions, however they will still support the conversion of downstream enterprises. Furthermore, one of the enterprises in the SH group is still deciding whether it will participate or not in the project.

These were the technological conversion projects implemented by December 2020: 9 Individual and 8 SHs subprojects, totaling 17 out of the 27 subprojects to be executed by the end of the Project; and 81 end-users out of a total of 445.

This scenario reflects the conversion of 98 enterprises out of the 470 foreseen by December 31, 2021 -the conclusion date of the Project-, representing the achievement of 20.64% of the corresponding indicator for this Outcome, as stablished in the PRODOC.

The second indicator of success for Outcome 3 refers to the achievement of 27 investment sub-projects by the end of December 2021. By January 2021, 17 of those investment subprojects had been executed, being 9 SHs enterprises and 8 individual enterprises.

However, many SH investment subprojects that would support the conversion of end-user enterprises are still under execution and still very far from reaching the indicators agreed. This gap responds in part to the inappropriateness of the service contract model adopted until July 2019 to support the technical assistance and the transfer of funds from SHs to end-users.

Long-Term Agreements (LTA) were then adopted by IMU/UNDP after the CAP approval to speed up the conversions of a large numbers of end-users in a short period of time.

To date, 68.14 ODP tonnes. out of the 169.08ODP tonnes agreed have been phased out, leaving a balance of approximately 100.94 ODP tonnes to be phased out by the end of the Project. Approximately 40% of the agreed target for the indicator has been achieved from 2016 to December 2020.

It is worth pointing out that the COVID-19 pandemic, in 2020 and 2021, was another important factor that contributed to the low levels of HCFC phased-out and the delays in the execution of end-users´ conversions to be assisted by SHs.

Advertising pieces, folders, brochures, and videos were produced and disseminated throughout the Project to support communication and the circulation of information, facilitating the adherence of enterprises to the project. These materials can be found on the Project's website.

The effectiveness of this important Outcome, that accounts for over 70% of the project approved funds, was favored and impacted by different external factors, namely:

(a) factors that enhanced effectiveness:

(i) prior diagnosis and identification of large consumer enterprises; **(ii)** Project BRA/12/G76 being still in execution which favored the adherence and contact with enterprises; **(iii)** a technical team and an international consultant that assisted the enterprises in their technology conversion decisions; **(iv)** a permanent monitoring system and technical visits that facilitated the identification of needs and the provision of high quality technical support in a timely manner; **(v)** standardized MLF cost estimates, and Project support for the technological conversion, including financial compensation during the first 12 months after the conversion; **(vi)** regulatory framework favorable to technological conversion until 1/1/2020; **(vii)** availability of funds for execution, provided that the requirements of the agreement with the MLF were met **(viii)** fluid communication with the different types of enterprises and dissemination of information on the topic; **(ix)** implementation strategy envisioning multiplication, counting on the Systems Houses as input suppliers to end users; **(x)** interest of the enterprises in the possibility of increasing their base of consumers by means of the adoption of substances that do not deplete the ozone layer and do not contribute to global warming; **(xi)** the understanding that the adherence and conversion implementation rates directly depend on the individual decisions made by the national enterprises; **(xii)** the adoption of the LTA contract model, that allowed more flexibility to meet the conversion needs of end user enterprises.

(b) factors that reduced effectiveness:

(i) adjustment time to the use of new substances and formulas; **(ii)** the time taken by enterprises of diverse typologies to join the Project: **(iii)** excessive number of forms to be filled out and submitted to the IMU by enterprises that demanded extra support; **(iv)** termination of consultancy support dedicated to the communication and updating of Project information, by orientation of MMA; **(v)** long time taken by the National Congress to ratify the Kigali Amendment to the Montreal Protocol; **(vi)** dissolution of collegiate instances at federal level that used to attend issues related to the Montreal Protocol; **(vii)** difficulties faced by SHs to provide technical assistance to end users, since the person in charge of this task was in general the same person that was also in charge of sales; **(viii)** the outbreak of the COVID-19 pandemic since March 2020; **(ix)** stocks of the substance to be replaced for up to 12 months in some cases; **(x)** the existence of low cost non- ozone depleting substances in the local market to replace HCFC-141b that are compliant with the Brazilian legislation despite the fact of being substances that contribute to global warming; **(xi)** asmall IMU team of only four people to manage all the MLF projects; **(xii)** the initial adoption of a service contract that did not allow for the flexibility required to migrate end user from one contract to another; **(xiii)** geographical dispersion of end- user enterprises all over the country making it difficult to assist them.

As it can be observed: (i) the management of the Project was very satisfactory; (ii) the regulatory framework of the sector was updated guaranteeing the no importation of HCFC-141b as of January 2020, and the reduction of HCFC-22 importation in 2021, despite the fact that the Kigali Amendment has not been approved yet; (iii) 17 enterprises were converted out of a total of 24 (three of which have international capital), and 81 end-user enterprises were converted out of a total of 445; and (iv) it was deemed satisfactory the procurement of equipment to finalize Project BRA/12/G76 to carry out five RAC pilot projects in supermarkets. Three procurement processes were executed, two for supermarket projects and a third one that was redirected to seven technical schools with the purpose of training students on Outcome 4 related topics.

Therefore, the effectiveness of the project can be evaluated as very satisfactory, given the progress achieved and the fact that the deadline for the execution has been extended until the end of 2024, without affecting the funds and resources to attain the project’s outcomes. If the

current project completion date, which is 12/31/2021, were to be considered, it would be possible to evaluate the project as being moderately satisfactory for this mid-term assessment, which would then become a sort of final evaluation if there were no extension of the execution deadline until 2024. It is important to highlight that the outputs achieved to date have contributed to the attainment of Outcomes Goals and are an important contribution to the achievement of the General Objective for the Brazilian HPMP - Stage II (which also involves the contributions of UNIDO and GTZ).

In terms of efficiency, it was verified that the Project has a system in place for the permanent monitoring and evaluation of the implementation process with clear indicators, baseline, and goals to be reached in each of the Outcomes and Outputs expected by the end of the Project. MMA and IMU/UNDP responded in a timely manner and with adequate resources to the demands posed by the enterprises; and duly monitored the advances in the regulatory framework.

The four Outcomes and 31 outputs with their respective activities were technically appropriate to the sector needs, being produced, in general, on time, with some adjustments in the execution schedule which generated deadline extensions without affecting the costs, which were reasonable and aligned with the MLF guidelines and the Brazilian reality. So far, the implementation process and the strategy adopted have contributed to the achievement of the targets, outputs, outcome agreed upon in the Project Document, and the overall achievement of Project Brazilian HPMP - Stage II, under which BRA/16/G76 is inscribed.

The Outcomes Matrix and Resources have proven to be adequate. However, since 2020, and due to the Covid-19 pandemic outbreak, the Annual Operational Plan has presented modifications given the need to extend the execution period of the Outputs and adjust the disbursement schedule and the expected times to carry out the activities planned in most of the 27 subprojects.

It is important to highlight that the total approved budget was of US$ 17,020,000.00 and that three tranches have been disbursed by the MLF out of a total of four agreed upon with the Brazilian Government. By December 2020, a total of US$ 13,125,000.00 were disbursed in three tranches of (i) US$ 3,328,900.00 - Tranche1; (ii) US$ 2,627,704.00 - Tranche 2; and (iii) US$ 7,168,396.00 - Tranche 3; Tranche 4, which is still pending, would be of US$ 3,895,000.00.

Thus, 77.1% of the total approved budget has already been made available for project implementation. However, it should be noted that due to the conditions established to transfer the funds, not all the Tranches disbursed have been fully used yet. In the case of Tranche 1, 98.94% of the funds have been already executed; for the Tranche 2 83.26%, and for Tranche 3, 36.21%.

This means that about US$ 8,077,160.00 out of the US$ 13,125,000.00 have already been executed and/or committed. That results in US$ 8,942,840 that still need to be executed in the coming years: about US$ 5,047,840 corresponding to the balance of Tranches 1, 2 and 3; and US$ 3,895,000 corresponding to the balance of Tranche 4. In case of a substantive revision of the Brazilian HPMP – Stage II, the execution deadline could be extended until 2024, otherwise the project should be finalized by December 31, 2021.

The implementation arrangements promoted a close collaboration between IMU/UNDP, MMA and ABC for the monitoring and evaluation processes of the Project. Annual tripartite meetings were held in 2019 and 2020, and Progress Reports were prepared for these occasions. Minutes were kept reflecting the adjustments and recommendations agreed.

In compliance with MLF requirements, Progress Reports covering technical and financial aspects of the Project implementation were jointly elaborated with UNIDO and GIZ and presented for the ExCom meetings since 2017, becoming an important planning and monitoring instrument that informed the disbursement schedule and the achievement of the targets agreed. Financial reports followed UN accountability directives, broadly accepted by auditing systems of international organizations and funds.

Annual plans of activities and resources have been regularly updated for the presentation of reports to the MLF and Tripartite Meetings; although no Substantive Reviews of the Project have been carried out to date. Between 2017 and 2020, nine budget revisions were performed reflecting the adjustments in the allocated and disbursed funds.

Three tranches were disbursed from 2016 to 2020. By December 2020 this was the situation of funds approved vs executed by Project outcome: (i) Outcome 01: out of the US$ 1,594,155.00 approved, US$ 748,931.67 were executed; (ii) Outcome 02: out of the US$ 120,000.00 approved, US$ 66. 082.33 were executed; (iii) Outcome 03: out of the US$ 14,705,844.92 approved, US$ 6,697,153.64 were executed; (iv) Outcome 04: out of the US$ 600,000.00 approved, US$ 564,990.78 were executed.

These figures reflect the following percentages of executed budget out of the total budget approved by outcome:

Outcome 1: 46.0 % of the approved budget

Outcome 2: 55.0% of the approved budget

Outcome 3: US$ 45.5% of the approved budget

Outcome 4: US$ 94.1 % of the approved budget

The degree of efficiency attained throughout the implementation and the quality of the project management can be considered satisfactory in view of the significant efforts made by project collaborators throughout its execution. However, due to some factors beyond the control of the project, it was observed a reduction of the amounts disbursed in some years and delays in the execution schedule of project actions. On the other hand, there was a high degree of follow up and evaluation of the activities performed, and the outputs and outcomes achieved. The Project executed 64% of funds that were made available. During these five years, several of the expected outcomes and short-term objectives have been achieved with certain delay but within the foreseen costs, and human and financial resources.

In terms of efficiency, several external factors have impacted the attainment of the expected indicators, outputs and outcomes in different ways:

(a) factors that enhanced efficiency:

(i) permanent follow up and adjustment of action plans to encompass the pace of implementation up to the level of subprojects; (ii) monitoring and evaluation of Project implementation through indicators, targets and subprojects; (iii) periodic meetings of the main players: MMA, IMU/UNDP and ABC, and annual meetings held with the ExCom and ABC; (iv) financial and administrative teams; instruments, processes and execution being compliant with MLF and UNDP guidelines; (v) close collaboration with UNDP Panama Regional Office and international consultant; ABIQUIM and focal points in each of the subprojects; (vi) IMU/UNDP structure and operation being supported by MMA and IBAMA, in a collaborative synergy; (vii) the replacement of service contracts by the LTA model; (viii) technical and financial support offered to enterprises to achieve technological conversion.

(b) factors that reduced efficiency:

(i) service contract model lack of flexibility that prevented the receipt/transfer of end-users from one contract to another (ii) delay in the submission of documentation required to sign the contracts with end-users and some individual enterprises (iii) reduced IMU/UNDP staff to manage the project with the MLF; (iv) constraints in conducting technical visits and missions during the pandemic; (v) reduction in the number of SMEs originally listed to be converted;(vi) absence of tripartite meetings in 2017 and 2018.

All in all, it is possible to evaluate the Project as very satisfactory in view of the Outcomes achieved so far, the appropriate and efficient management, and its high relevance in the fulfillment of international and national commitments regarding ozone layer protection and global warming prevention.

Although it is not within the scope of this evaluation, it is possible to foresee further mid and long-term beneficial effects to be verified and monitored through annual ODS consumption reports presented at the ExCom meetings. It is deemed as necessary to follow up and speed up the ratification of the Kigali Amendment to the Montreal Protocol by the Brazilian government in order to guarantee greater mid and long-term Project Outcome effects; and the sustainability of technological conversion and HCFC substances substitution by national enterprises in the coming years.

5. RECOMMENDATIONS

Recommendation 1:

A substantive revision of the Project is suggested to be carried out in the next two months to adjust the implementation time and budget funds for an extended execution period until 2024, and to confirm the list of enterprises to be technologically converted until the conclusion of the Project.

Recommendation 2:

It is recommended to extend the execution period without harming the funds allocated and scheduled for disbursement to achieve the expected targets and indicators, allowing to make up for the delays caused by the two years of pandemic and the replacement of the contract model for a more suitable LTA type.

Recommendation 3:

It is suggested to insist with the National Congress and specific Commissions on the importance to ratify of the Kigali Amendment to the Montreal Protocol.

Recommendation 4:

It is recommended to hire more national consultants to support SHs, speed up the technological conversion of end-users, and update the list of the enterprises that still adhere to the Project.

Recommendation 5:

It is proposed the elaboration of two half-yearly progress reports considering the time cycles required for the conversion of the CHs, Individual enterprises and End Users.

Recommendation 6:

It is suggested to hire a consultant to sustain and update the information flow through the website, brochures, videos and seminars to improve the communication with enterprises, public officials, NGOs, business associations, and the general public.

Recommendation 7:

It is recommended the elaboration of a document (manual) containing the systematization of the procedures carried out in conversion projects of different kinds, good practices and lessons learned during the different phases of implementation.

Recommendation 8:

It is recommended to include in the substantive review a column in the section referring to "Assumptions", i.e., prerequisites to be obtained for the achievement of Outputs and Outcomes, and their corresponding risk assessment rating if obtained within the proposed timeframe.

6. LESSONS LEARNED

Lesson learned 1:

The Project design considered the previous experience with the Brazilian HPMP - Stage I which facilitated the initial stages of the Project in aspects related to management arrangements, monitoring systems, and focal points in enterprises and public agencies.

Lesson learned 2:

The Project is based on the premise that each enterprise may decide on the substance to be adopted to replace ODS (HCFC-141b) and the corresponding technological conversion adjustments. However, it was overseen the fact that the Brazilian legislation does not prohibit the use of some non-ODS but that generate global warming (high GWP). Hence, an alternative plan B should have been proposed in those cases where those substances were chosen.

Lesson learned 3:

The service contract model signed by UNDP and SHs involving end-users proved not to be suitable for its intended purpose. The introduction of long-term agreements (LTAs), after two years of implementation, facilitated this process giving greater agility and efficiency to end users' conversion processes.

Lesson learned 4:

The participation of an international consultant with expertise and a vast experience in international projects promoted an exchange of ideas about similar projects in the region and gave confidence to entrepreneurs.

Lesson learned 5:

The innovative initiatives (LTA, SH multipliers) undertaken in the Brazilian Project should be systematized in a formal document to be supported and presented by the MLF in the Excom meeting, and to be shared with other countries.

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ANNEX

Annex 1 – Outcome and Resources Matrix (Logical Framework)

Annex 2 - LTA Guidelines

Annex 3 - Methodology of Evaluation

Annex 4 - Evaluation Development Matrix

Annex 5 - Interview Script

Annex 6 - Financial and Budget Table

Annex 7 - Initial Planned Budget 2016/2021

Other Annexes Consulted

Annex 8: Interviewed list Annex 9: Enterprises and conversion list

Annex 10: End User Conversions

Annex 11: SC and EU Conversion Year

Annex 12: EU Conversion Contract by SH

Annex 13: Project Execution by Tranche

Annex 14: Equipment acquired

Annex 15: Enterprises Contracts Table