Consultancy for the Terminal Evaluation of the Project "Clean Energy Technologies for Rural Areas in Cuba (BIOENERGY)"

Project number: PIMS 4899

Final Report

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Contracting party

Financed by

Consultants

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Table of Contents

Index of graphic contents

Graphics

Tables

Illustrations

1. EXECUTIVE SUMMARY

1.1. PROJECT INFORMATION TABLE

1. This Terminal Evaluation (TE) covers the project implementation period, from May 2016[1] to May 2020. The main project data is summarized in Table 1.

Table 1 - Project Information Table

Project Title: Clean Energy Technologies for Rural Areas in Cuba (BIOENERGY)				
GEF Project ID:	5149		At endorsement (Million US$)	At completion (Million US$)
UNDP PIMS ID:	4899	**GEF financing:**	$2,737,524	$2,737,524
Country:	Cuba	**IA/EA own:**	$50,000	$50,000
Region:	Latin America & the Caribbean	**Government:**	$8,215,775	$12,148,170
Focal area:	Climate Change - Mitigation	**Others:**	$11,683,322	$11,683,272
Operative Programme	GEF Strategic Objective and Program: GEF-CCM 1: Promote the demonstration, deployment, and transfer of innovative low-carbon technologies	**Total co-financing:**	$19,949,097	$23,881,442
Executing Agency:	United Nations Development Programme (UNDP)	**Total Project Cost:**	$22,686,621	$26,618,966
Other partners involved:	Hatuey Indian Forage and Pasture Experimental Station (EEIH), of the Ministry of Higher Education (MHE)	**ProDoc Signature (date project began):**		05/16/2016
		(Operational) Closing Date:	Proposed: 05/16/2021	Actual: 05/14/2022

Source: Terms of Reference
Note: The GEF fund balance is fully committed

[1] Project implementation was affected by the mismatch between the GEF ECO approval date (May 4th, 2015) and the national signature date of the Project Document (which ended on May 16th, 2016, that is, the date that determines the start of the project from the legal point of view). Simultaneously, national legislation establishes the requirement for a process of signing the National Terms of Reference (ToR) for each international cooperation project, a process that was delayed. This process began on October 8th, 2016 and was concluded on January 4th, 2017.

1.2. PROJECT DESCRIPTION

2. The United Nations Development Programme (UNDP) / GEF (Global Environment Facility) Bioenergy project was designed to increase access to bioenergy technologies in rural areas of Cuba by promoting the use of biodiesel and biogas technologies by farmers.

3. Specifically, the Project sought to: (i) strengthen government policies in support of small-scale bioenergy technologies; (ii) address technological barriers that currently limit the extensive production and dissemination of cost-effective biodiesel and biodiesel plants in Cuba; and (iii) establish a detailed network of project designers, maintenance, repair and extension services for smallholders that increase local food production, generate new jobs and income, promote local resilience and restore degraded land. The development of the bioenergy market under the target beneficiary group means avoiding Greenhouse Gas (GHG) Emissions from fossil fuels in an amount of 207.1 ktons CO_2eq.

1.3. PURPOSE OF THE EVALUATION

4. The project's achievements were assessed against expected results, and lessons were identified to improve the sustainability of benefits while contributing to the overall performance of UNDP programming. The Final Report promotes accountability and transparency and assesses the replicability of project achievements.

1.4. EVALUATION RATINGS TABLE

5. Table 2 shows the project performance assessment ratings, compared with the expectations set out in the project logical framework and results framework, which provides performance and impact indicators for project execution, along with the relevant means of verification.

Table 2 - Project performance ratings

Evaluation Ratings Table		
Criteria	***Comments***	***Rating***
Monitoring & Evaluation (M&E): Highly Satisfactory (6), Satisfactory (5), Moderately Satisfactory (4), Moderately Unsatisfactory (3), Unsatisfactory (2), Highly Unsatisfactory (1)		
Overall quality of M&E	Execution of M&E tasks substantially improved over time, allowing for the anticipation of major delays	4
M&E design at the beginning of the project	The methodology, indicators, and the description of roles and responsibilities were only defined in broad terms at the beginning of the project, when it should have been very detailed to minimize delays in imports	3
M&E plan execution	M&E activities intensified over time, with check-up points on a monthly and even weekly basis, at all levels of project implementation	4
Implementation and Execution: Highly Satisfactory (6), Satisfactory (5), Moderately Satisfactory (4), Moderately Unsatisfactory (3), Unsatisfactory (2), Highly Unsatisfactory (1)		
Overall quality of implementation/ execution	Except for the contributions to policy design and regulations, the integration of expected products could not be completed, lacking demonstrative models for the effective access to bioenergy at the level of rural production units	3

Evaluation Ratings Table		
Criteria	***Comments***	***Rating***
Quality of UNDP implementation/ oversight	UNDP played an outstanding role in monitoring and facilitating the implementation of the project, constantly insisting on improving project management processes and finding solutions to the multiple challenges faced, going beyond its usual role in this type of projects	6
Implementation quality of Executing Agency	Although the Project Management Unit (PMU) demonstrated clear technical leadership and capacity to effectively link actors from various sectors, it took too much time to organize the logistical management of the project (which was greatly aggravated by the COVID-19 pandemic). As a consequence, the central result of the project was not achieved	2
Assessment of Outcomes: Highly Satisfactory (6), Satisfactory (5), Moderately Satisfactory (4), Moderately Unsatisfactory (3), Unsatisfactory (2), Highly Unsatisfactory (1)		
Overall quality of project results	The project's critical goals (biogas and biodiesel production) are still far from being achieved. The highly satisfactory achievement of the bioenergy policy and knowledge management targets partly offset an otherwise unsatisfactory the overall score	3
Relevance	Relevance remains very high for the development priorities of Cuba and its inhabitants, both socio-economic and related to climate change. The project responds well to the high-level geopolitical objectives of reducing dependence on fossil fuel imports and replacing imports of manufactured goods	6
Effectiveness	Project implementation presented significant deficiencies due to the materialization (and increase) of the risks inherent to the geopolitical nature of Cuba and of unforeseen additional risks. There is a high level of commitment and organization to complete the project's outstanding activities	3
Efficiency	The project was not efficient as a very significant amount of time and effort was invested in solving numerous problems (which arose from the realization of project's risks) as opposed to applying those resources to the technical development of the expected outputs	3
Sustainability: Likely (4), Moderately Likely (3), Moderately Unlikely (2), Unlikely (1)		
Overall likelihood of sustainability	A sustainability plan has been elaborated including 23 actions to be developed, identifying the responsible organization and participants for each action	3
Financial resources	Although a substantial source of funding has not yet been secured to facilitate the continuity of the project's actions, there is one national follow-on project and three pre-approved territorial projects. Project's partners are committing resources within their continuity contracts with EEIH	3
Socio-political sustainability	The sustainability plan of the project is based on 7 continuity contracts with the companies participating in the project, where their commitments are specified	3
Institutional framework and governance sustainability	EEIH and Cubanergy are committed to the development of bioenergy in Cuba, but do not have all the necessary know-how to implement engineering or technological development projects in a comprehensive manner. GESIME only plays a secondary role	3

Evaluation Ratings Table		
Criteria	***Comments***	***Rating***
Environmental sustainability	Moderate environmental risks are noted, particularly from the start-up and operation of projected biodigesters and biodiesel plants.	3

Source: Own elaboration following the ToR

1.5. CONCISE SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND LESSONS LEARNED

6. The main findings and conclusions are presented below for each of the criteria defined for the evaluation of the project: design, relevance, effectiveness, efficiency, sustainability and impact.

7. Project design was too ambitious given Cuba's geopolitical context: the complexities of both the Cuban context and the project's context were underestimated, as well as the project's high sensitivity to changes in macroeconomic conditions, leaving no space in the design for unforeseen events (which later materialized).

8. The assumptions, risks and mitigation measures were incompletely established. The risks posed by the development of component 2 (and part of component 3), given their vertical integration nature (across different actors) should have been foreseen. The multiple linkages required for the cultivation of Jatropha, as well as for the development of product prototypes, required more thorough risk assessments, as the risks were only partially identified.

9. One of the strengths of the Bioenergy project is the involvement of all stakeholders and actors that are relevant to the development of such a project. The degree of complementarity and collaboration between high-level actors (ministries and their departments), companies from different sectors, as well as municipalities and local producers has been important. Not only a "formal" commitment has emerged among participants, but also a willingness of the people and technicians involved to carry out the project despite the context difficulties and contingencies encountered during implementation.

10. The different allies recognize a very important role of the EEIH as a trusted partner, highlighting its articulating role and its ability to generate spaces for allies' participation in technical-strategic workshops. However, the choice of its leadership for the industrial components of Outcome 2 was not the most appropriate. EEIH is a scientific and technological excellence center specialized in agronomic areas, but not in issues related to product development or industrial innovations.

11. In terms of project implementation, during the first half of the project's life, no detailed management was undertaken of the complex logistics processes expected, which included hiring, procurement, imports, and budget execution. From the mid-term evaluation, and with the creation of the Project's Office at EEIH[2] systematic monitoring actions were implemented that allowed for corrections in the project implementation's course.

12. UNDP played an outstanding role in monitoring and facilitating the implementation of the project, constantly insisting on improving project management processes and finding solutions to the multiple challenges faced, going beyond their expected role in this type of project.

13. While the demonstrative effect of implementation of biodigesters and biodiesel plants has not yet been achieved, what has been made so far creates an important basis for future advocacy programs and government policies, as well as for the emergence of new projects extending the project's achievements to this date.

[2] The Project's Office was established as a support structure within the EEIH, and is distinct from the PMU.

14. Outcome 1 (about policy instruments) was far achieved, as the policy instruments and inputs developed by Bioenergy were not only approved by the government, but were also adopted and have been implemented by different ministries and business groups. Bioenergy has contributed with technical inputs for the elaboration of two key legal documents for the development of renewable energy (RE) sources and bioenergy in Cuba: *Decree-Law No. 345 On the Development of Renewable Sources and the Efficient Use of Energy* and *Resolution No. 123* of the Minister of Energy and Mines. As a result, companies are implementing RE introduction plans in their work programs. The most recognized product of Outcome 1 is the first *National Bioenergy Atlas*, which contains valuable information on national potential for bioenergy production and has become a valuable decision-making tool.

15. Products corresponding to Outcome 2 (about biogas and biodiesel production) have not been finalized and are at different development stages, depending on their complexity and relative capabilities of the responsible organizations for them. Outputs could not be finalized because of a combination of numerous factors, including, in order of impact: (i) Processes of procurement and importing inputs; (ii) Covid-19 pandemic; (iii) The increase in the euro-dollar exchange rate; (iv) Lack of detailed management of agricultural and industrial production logistics; (v) Devaluation of the Cuban currency; and (vi) Difficulty in accessing foreign exchange.

16. Outcome 3 (related to knowledge dissemination) has been achieved to a large extent, particularly in relation to the strengthening and projection of EEIH and Cubaenergy as centers of reference for knowledge and technology transfer related to bioenergy. A *Bioenergy Expert Center* was created at the EEIH and the *Technology Transfer Unit in Bioenergy* was formed between EEIH and Cubaenergy. However, these units do not have their own legal status and there is a lack of clarity about the division of responsibilities between them or with respect to their host institutions.

17. Regarding sustainability, the Project Management Unit (PMU), together with its partners and with the support of UNDP, began working in advance on a sustainability plan, which lists 6 goals and details 23 actions to be carried out. The plan specifies for each action the goals the action contributes to, the leading organization and other participant organizations. The project's sustainability plan is based on 7 cooperation continuity contracts that were signed by EEIH and the project's participating companies.

18. It is very difficult to complete the multiple remaining project's tasks by only persisting with the same practices employed so far. There is a need for focus and innovation, taking advantage of trends towards decentralization and the entry of new actors (Micro, Small and Medium-sized Enterprises - MSMEs) into the Cuban economy. Therefore, it is recommended to:

    a. *Develop a comprehensive sustainability strategy that addresses identified bottlenecks, including:* (i) Define clear, holistic objectives for the sustainability strategy, focusing on the most important factors; (ii) Identify the professional profiles that are necessary to achieve the strategy's objectives; (iii) Give a more important role to the Business Group for the Iron and Steel Industry (GESIME) in the new PMU; (iv) Define a few concrete integrative projects that lead to achieving the strategy's objectives; (v) Define a results-focused Monitoring and Evaluation (M&E) plan; and (vi) Identify financing sources or reallocation of additional resources apart from international cooperation.

    b. *Constitute business units at EEIH and Cubaenergy (with a clear "division of tasks") for the consolidation and scaling-up of the Know-how developed*, including: (i) Design a detailed business model and formally constitute the Business Unit "Specialized Bioenergy Services" in the EEIH *Expert Center* (including quantitative definitions and an operational plan); and (ii) Design a detailed business model and formally constitute the *Bioenergy Technology Transfer Unit* in Cubaenergy (with quantitative definitions and an operational plan).

c. *Develop a training plan to promote bioenergy innovation,* including*:* (i) Identify and train, in partnership with relevant actors (for example inCuba[3]), young people, women, professionals and entrepreneurial producers.

19. Lessons learned include: (i) Clearly define and limit actions to what needs to be demonstrated, without confusing demonstration with deployment or scaling-up of already implemented activities; (ii) Focus on a single type of technology and master its use; (iii) If the risks are significant and expected, the most relevant mitigation measure is the simplification of project design; (iv) Define *a priori* the criteria for selecting beneficiaries, considering the sustainability dimension; and (v) Ensure an implementation team sufficiently staffed, with all necessary and complementary skills, and with full-time dedication to the project.

[3] InCuba: Project led by the University of Havana in cooperation with the University of Berlin.

2. ACRONYMS AND ABBREVIATIONS[4]

BEU	Basic Economic Unit	**MINFAR**	Ministry of the Revolutionary Armed Forces
CITMA	Ministry of Science, Technology and Environment	**MININT**	Ministry of Internal Affairs
CONFORMAT	Matanzas Conformación Company	**M&E**	Monitoring and Evaluation
EEIH	Indio Hatuey Experimental Station	**MFP**	Ministry of Finance and Pricing
EMTA	Mechanical Steel Processing Company	**MSMEs**	Micro, Small and Medium-sized Enterprises
ENPA	National Agricultural Project Companies	**MTR**	Mid-term Review
TE	Terminal Evaluation	**MW**	Megawatt
GEF	Global Environment Facility	**MWh**	Megawatt-hours
GESIME	Business Group for the Iron and Steel Industry	**ONEI**	National Statistics and Information Office
GHG	Greenhouse Gas	**PB**	Project Board
INPUD	National Industry Company of House Hold Appliances Production	**PIR**	Project Implementation Report
MEP	Ministry of Economy and Planning	**PMU**	Project Management Unit
MINAG	Ministry of Agriculture	**POLIGOM**	Rubber Company
MINAL	Ministry of Food Industry	**PRODOC**	Project Document
MINCEX	Ministry of Foreign Trade and Investment	**RE**	Renewable Energy
MINDUS	Ministry of Industry	**RTA**	Regional Technical Advisor
MINEM	Ministry of Energy and Mines	**UNDP**	United Nations Development Program

[4] Many acronyms and abbreviations correspond to names in Spanish for easier recognition

3. INTRODUCTION

20. This report describes the findings of the TE of the "Clean Energy Technologies Project for Rural Areas in Cuba (BIOENERGY)", PIMS 4899. The consultancy started on April 14th, 2022. This TE was carried out by an evaluation team consisting of Team Leader César Yammal (international consultant) and Team Expert Dariel De León García (national consultant), between April and May 2022.

21. The project's objective was to increase access for small rural producers in Cuba to bioenergy technologies by promoting the use of biodiesel and biogas technologies. For this purpose, the project aimed to: (i) strengthening government policies in support of small-scale bioenergy technologies; (ii) address technological barriers that currently limit the extensive production and dissemination of cost-effective biodiesel and biodiesel plants in Cuba; and (iii) establish a detailed network of project designers, maintenance, repair and extension services for smallholders that increase local food production, generate new jobs and income, promote local resilience and restore degraded land.

22. The project was developed based on three components: (i) information and policy development; (ii) transfer and development of biodiesel and biogas technologies; and (iii) institutional strengthening, training and advocacy.

23. The project was results-oriented, linked to each of the components: (i) the formulation and recommendation of policy instruments to support small-scale bioenergy development, for government's approval; (ii) the transfer and assimilation of knowledge on the application of small-scale biodiesel and biogas systems; and (iii) the diffusion of bioenergy technologies through increased knowledge and demonstrations of biodiesel and biogas systems.

24. The United Nations Development Programme (UNDP) acted as the GEF agency for this project. The project was implemented by the Ministry of Higher Education (MHE), through the Indio Hatuey Experimental Station (EEIH), following the national implementation modality of UNDP.

25. This Evaluation was carried out in the context of mobility restrictions due to the pandemic caused by COVID-19. According to the guidelines established in the Terms of Reference (TOR), the work of the international consultant was developed remotely through videoconferences, complementary to his desk work and analysis, in coordination with the national evaluator who conducted field visits.

3.1. PURPOSE OF THE EVALUATION

26. The TE is one of the tools used by UNDP and GEF to assess the degree of success and effectiveness of the intervention. It is a mandatory requirement for all large and medium-sized GEF projects.

27. The purpose of the evaluation is to analyze the achievement of project results and to draw lessons that can improve the sustainability of project benefits, thus helping improve overall UNDP programming.

3.2. SCOPE AND METHODOLOGY

28. The evaluation was conducted along the lines of the *Guide for Final Evaluations of UNDP-supported and GEF-funded projects* (2012) and the *Guidance for conducting terminal evaluations of UNDP-supported, GEF-funded projects* (2020). These guidelines state that the evaluation must provide evidence-based information that is credible, reliable and useful, through a participatory and consultative approach that ensures close engagement with government counterparts, in particular with the GEF Operations Coordination Centre, the UNDP Country Office (CO), the project team, the GEF/UNDP regional technical adviser and all key stakeholders.

29. The methodology has been designed based on the project results framework, using the criteria of relevance, effectiveness, efficiency, sustainability and impact.

30. It also included value-added criteria and comparative advantages of UNDP involvement as a development partner in the project, and cross-cutting criteria such as gender equity.

31. The following techniques were used to assess the indicators associated with each of the evaluation criteria: documentary and bibliographic survey, interviews with stakeholders, face-to-face field visits, and surveys, which allowed to include the perspective of all types of actors involved in the project. Guides and questionnaires were developed for the implementation of each of the techniques. The overall methodological design ensures the reliability and validity of the results obtained.

32. The details of field activities' programming can be found in *Annex 7: Evaluation Mission Activity Schedule*. The designed questionnaires can be found in *Annex 6: Thematic Script for Interviews*, carried out in a virtual and face-to-face manner whenever possible. The analysis of the implementation of these questionnaires is available in *Annex 10: Survey Analysis*, as well as the raw data of the results in *Annex 11: Database of survey responses.* Finally, *Annex 9: Fieldwork*, collects audiovisual resources corresponding to field activities.

3.3. STRUCTURE OF THE EVALUATION REPORT

33. The evaluation report follows the general structure suggested in the TOR. Section 4 provides a description of the project and the strategy implemented for the context in which it was developed. Section 5 presents the findings regarding the design and formulation of the project, its implementation and the results achieved. Finally, section 6 summarizes conclusions, lessons learned and recommendations.

4. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

4.1. PROJECT START AND DURATION

34. The Project was approved by the GEF in May 2015 and signed by the Government and UNDP in May 2016. The National Project TOR was approved by the National Project Approval Committee in October 2016. The National TOR was signed in January 2017.

35. The effective implementation of the project began in May 2017, with an expected completion date of May 2020. A first exceptional extension to the implementation phase of the project was approved, extending it until January 14th, 2022. Subsequently, considering the effect of the COVID-19 pandemic as a major cause that led to additional delays in the implementation of the project, a second five-month extension was exceptionally approved, defining June 14th, 2022 as the closing date of the project. By the end of the project, its actual duration will have been just over six years.

36. The project had a Mid-term Review (MTR) in 2019. In addition, Project Implementation Reports (PIR) were regularly conducted annually.

4.2. PROBLEMS THAT THE PROJECT SEEKS TO ADDRESS

37. According to the Project Document (ProDoc), it was intended to provide solutions that mitigate the food and energy vulnerability, existing at the local level as well as at the national level. Much of the food and energy fuels is imported, which requires the availability of foreign exchange in a restrictive political and economic context. In addition, adverse environmental phenomena such as desertification, salinization and severe droughts, aggravated by global climate change, become evidently concomitant.

38. In response to these problems, the Government identified measures to preserve resources, promote food production, mitigate climate change impact and strengthen the resilience of local communities and farmers. These measures were part of a process of national transformation towards a more decentralized economy and administrative structure.

39. After 1990, the reduced availability of primary energy and materials caused a negative impact on agricultural systems, which were based on energy-intensive uses and mechanization, which led to a significant reduction in food production. Large land areas stopped being exploited, were abandoned and invaded by weeds.

40. The strategy identified by the Government to overcome these difficulties is to develop bioenergy or agro-energy, which reconciles food production with energy security, directing policy efforts towards local energy sources rather than maintaining dependence on imported energy.

41. In this sense, bioenergy combines food production and environmental conservation, opening opportunities and alternatives to fossil fuels, reducing the GHG emission footprint of agricultural activity. The agro-energy farm is based on local productive cycles, with care for the environment and improvement of socio-economic parameters.

42. In particular, the project identified barriers that limit the implementation of bioenergy technology development and transfer projects. Five types of barriers were addressed: (i) policy and regulatory, (ii) technological, (iii) informational, (iv) institutional and human capabilities, and (v) financial.

43. Political and regulatory barriers consisted in the absence of an articulated regulatory policy that promotes the innovative use of RE, especially those derived from biomass. Particularly noteworthy is the absence of instruments for the promotion of production, commercialization, operation and financing for rural energy generation. This has implications in the design of feasible business models for farmers.

44. Technological barriers identified limitations regarding: (i) access to modern biodigesters and ancillary equipment, lack of materials for their installation, and scarcity of applications for biogas; (ii) biodiesel production facilities, availability of high-quality non-food plants for the production of vegetable oil for biodiesel; and (iii) theoretical and practical knowledge on the integration of bioenergy technologies into production systems and rural communities.

45. Information barriers included: (i) scarcity of data in general, information capabilities and tools (especially ICTs) to enable government authorities to make policy decisions; (ii) scarcity of data, in particular on the small-scale production of biogas and biodiesel to build a baseline; and (iii) limited access to information available to both the farmers concerned and the institutional bodies and their human capacities to manage policies and projects of this nature.

46. Institutional and human capacity barriers included the lack of preparation of national and municipal institutions to promote and implement cost-effective bioenergy solutions, integrated into small farms. A structure for the promotion of bioenergy projects, project development and post-sales support is not available. The preparation and implementation of rural energy systems demand new roles and actors, specialized technicians, technology developers, suppliers of inputs and related services.

47. Financial barriers, which are present at all levels in Cuba, include those related to the lack of data and methodologies for conducting economic evaluations and analysis that allow the Government to quantify benefits and thus make efficient decisions to allocate resources for the financing and promotion of bio energies.

4.3. DEVELOPMENT AND IMMEDIATE OBJECTIVES OF THE PROJECT

48. The project aimed to increase access to bioenergy technologies in Cuba for the use of biogas and biodiesel by rural producers. This would be achieved by supporting the technology transfer process and contributing to the reduction of GHG generated by fossil fuels that are used specifically in electricity generation, transport and cooking. In addition, other potential GHG reductions in agro-energy farms were envisaged, due to the implementation of closed nutrient cycles, a more effective use of water, and carbon sequestration in lands reclaimed for agriculture.

49. To achieve this overall objective, the project focused on the following aspects:

    a. Strengthen the national technological base, including manufacturing capabilities, for the successful design and production of biogas and biodiesel facilities in compliance with national quality standards;

    b. Improve the institutional framework and human capacities to provide energy solutions to the beneficiary groups (small producers), and provide design of appropriate projects, their installation, operation and provision of post-sales services; and

    c. Generate accurate and relevant information on the sector, which increases the knowledge available on the use of bioenergy in rural farms in Cuba, providing a solid basis for decision-makers and other key players to mobilize investments for better and further development of the bioenergy market.

50. The project sought to achieve its objective through three main components: (i) Information and policy development (ii) Transfer and development of biodiesel and biogas technologies; and (iii) Institutional strengthening, training and promotion.

4.4. BENEFICIARIES AND MAIN STAKEHOLDERS

51. The main actors of the project are the EEIH and the Center for Information Management and Energy Development (Cubaenergy) as initial promoters of the project working together with UNDP. Together with high-level authorities from different ministries, the final profile of the project was defined.

52. Among the main beneficiaries and stakeholders are: (i) a group of industrial companies involved in the import of raw materials and the development of functional prototypes, the manufacturing of biodiesel plants and construction and installation of biodigesters; (ii) agricultural enterprises and local producers who provided collaboration and space to develop project activities related to cultivation of Jatropha, location of biodiesel plants and installation of biodigesters; and (iii) a set of local actors at the municipal level, government organizations, other local producers and community members in general.

53. The degree of collaboration between a wide range of institutions coming from high levels of government to local grass-roots organizations is significant. It is important to point out the commitment made by some institutions actively involved in the project.

54. The project's beneficiaries and stakeholders may also be considered to be all the government agencies involved in the project which, at the same time, collaborate and promote development conditions for bioenergy and gain new capabilities to support them.

55. The main actors for project implementation are: (i) the members of the Project Board (PB), integrated by the MES, the Ministry of Science, Technology and Environment (CITMA), the Ministry of Energy and Mines (MINEM), the Ministry of Foreign Trade and Investment (MINCEX), the Ministry of Agriculture (MINAG), the Ministry of Industry (MINDUS) and UNDP; (ii) the EEIH as national project coordinator and leader of working groups on Outcomes 2 and 3 and the Center for Information Management and Energy Development (Cubaenergy) as Coordinator of the working group for Outcome 1.

56. The activities were organized in functional working groups corresponding to each of the project's results. Table 3 the membership of each of the working groups.

Table 3 - Working Groups

Working Group	Institutional members
Outcome 1 (about policy instruments)	(i) CITMA, (ii) MINEM, (iii) MINCEX, (iv) ONEI, (v) MINAG, (vi) MINFAR, (vii) MININT, (viii) MINAL
Outcome 2 (about biogas and biodiesel production)	(i) CITMA, (ii) MINEM, (iii) MINCEX, (iv) MINAG, (v) Yaguajay and Manatí Municipal Administration Councils, (vi) Manatí and Yaguajay Local Operating Committees
Outcome 3 (related to knowledge dissemination)	(i) CITMA, (ii) MINEM, (iii) MINCEX, (iv) MINDUS

Source: Own elaboration

4.5. EXPECTED OUTCOMES

57. The development of project components involves the implementation of specific activities for the achievement of expected outputs. The strategies proposed for this are:

    a. Project objective: To increase access to bioenergy in Cuba by promoting the use of biodiesel and biogas technologies by farmers.

    b. Outcome 1: Policy instruments to support small-scale bioenergy development have been formulated and recommended for adoption.

    c. Outcome 2: The state of knowledge on the application of small-scale biodiesel and biogas systems has been transferred and assimilated.

    d. Outcome 3: Bioenergy technologies disseminated through increased knowledge and demonstrations of biodiesel and biogas systems.

58. In Outcome 1, the project anticipated the construction of a solid information-base on the potential and opportunities for bioenergy in rural areas in Cuba. In addition, it involves the provision of inputs and recommendations to decision makers based on analyzed data and realistic market scenarios for bioenergy technologies, with a focus on energy generation for self-consumption and/or local distribution.

59. In Outcome 2, the project expected improvements in the existing capacities in Cuba to produce technological systems of biodiesel and biogas, consolidating the production chain for biogas and biodiesel on a small scale, including inputs, development, implementation and use, innovation and quality.

60. With Outcome 3, the project sought to obtain (i) an institutional framework to accelerate the market introduction of biodiesel and biogas systems in Cuba; (ii) the strengthening of human capital for the development of bioenergy projects, including technical support and deployment activities for agricultural producers.

4.6. REFERENCE INDICATORS

61. The project sought to increase access to bioenergy technologies in Cuba for the use of biogas and biodiesel by rural producers, through the implementation of three components. To assess the results of the implementation of these components, a set of indicators and targets to be measured in each strategy was defined (Table 4)

62. Table 6 shows both a set of results and indicators as well as the established targets and the assessment of their achievement.

Table 4 - Project indicators

Strategies	Indicators
Project Objective: To increase access to bioenergy technology in Cuba by promoting the use of biodiesel and biogas	A. Products based on the transfer of technologies approved by the relevant authorities for commercial manufacturing.
	B. Extent to which technology transfer policies and mechanisms are adopted
	C. MWh/yr. produced using biogas and biodiesel attributable to the project

Strategies	Indicators
technologies by rural farmers.	D. Number of people directly and indirectly benefitted from RE due to project actions
	E. GHG emissions avoided (tons CO_2eq).
Outcome 1: Policy instruments supportive of small-scale bioenergy development have been formulated and recommended for approval.	1a) Information tools developed for bioenergy policy and strategy formulation
	1b) Draft small-scale bioenergy strategy (green paper) consulted with incumbent authorities.
	1c) Policy inputs and recommendations on the legal, institutional and regulatory framework for facilitating the implementation of a small-scale bioenergy strategy.
Outcome 2: State of the art knowledge on the application of small-scale biodiesel and biogas systems has been transferred and assimilated.	2a) National industry production capacity of small-scale (100, 200 and 400l/day) biodiesel plants (units produced per year).
	2b) Flexible geomembrane production (m^2/yr.)
	2c) Liters of biodiesel annually produced in demonstration pilots and available to use (l/yr.)
	2d) Cubic meters of biogas generated in demonstration pilots and available to use (m^3/yr.).
Outcome 3: Bioenergy technology diffused through increased knowledge and demonstration of biodiesel and biogas systems.	3a) Bioenergy expertise center established in EEIH.
	3b) Number of farmers (m/f) assisted on bioenergy
	3c) Number of advisory/consulting services provided by Cubaenergy to decision-makers on bioenergy

Source: Own elaboration

5. FINDINGS

5.1 PROJECT DESIGN

A. ANALYSIS OF THE RESULTS FRAMEWORK

63. The project, as well as its components, were clearly designed in general, although they were ambitious for the geopolitical reality of Cuba. The products generated in each component were also designed properly, clearly and accurately. Both the project objective and its components respond to the country's priorities.

64. The quality of the indicators designed for the Evaluation of the Project Results Framework is good. With a few exceptions, the scheme generally meets the "SMART" best practice criteria for the design of project outcome schemes.

65. Among the exceptions there is the project objective indicator *"C. MWh/years produced using biogas and biodiesel attributed to the project"*. It is specific, measurable and time-bound, but hardly affordable and irrelevant. The main effort of the project is focused on the development of two prototypes of biogas and biodiesel plants (and their inputs) for demonstration use on farms. Although it is possible to use the energy generated to produce electrical energy, this is not a project objective. On the other hand, if the intention was to measure the amount of energy generated by the project, the indicator "oil equivalent tonnes" would have been more appropriate.

66. The indicators *"2c) Liters of biodiesel produced annually in pilot demonstration and commissioning plants (l/year)"* and *"2d) Cubic meters of biogas generated in pilot demonstrations and available for use (m^3/year)"* are specific, measurable and time-bound and *a priori* appear to be achievable, but they are not fully relevant in the way they were defined. This is because the project focuses on the achievement of capacities for the national development of biogas and biodiesel plants and not on the production of certain volumes of energy products. While they are the natural consequence of project development, they should have been defined so as to reflect a certain production capacity to be achieved and not necessarily a level of production to be achieved. For example, they could have been defined as *"2c) Liters of biodiesel (annual production capacity) in pilot demonstration and commissioning plants (l/year)"* and *"2d) Cubic meters of biogas (annual production capacity) in pilot demonstrations and available for use (m^3/year)"*.

67. Another important element to consider is that the targets for these indicators were justified in the ProDoc based on basic assumptions, which later did not coincide with what was executed in the project. (i) Biogas production targets were set based on the planning of 5 biogas plants with a production dimension of 21.6 m^3/day. What was being developed in the project were two biogas plants of covered lagoon, one of 250 m^3 another of 1,500 m^3/day; (ii) Production targets were set for 3 biodiesel plants of 100, 200 and 400 l/day respectively. What was being developed in the project were two biodiesel plants of 400 l/day.

68. In practice, this adjustment, while not altering the achievability of the targets, represents a substantial difference in terms of the scale of production, which implies producers with farms much larger than those of small producers. This also implies the need to adjust the projected targets for indicators calculated based on the total production of biogas and biodiesel, such as avoided GHG emissions.

69. In the case of indicator *"D: 88 100 people directly and indirectly benefited from RE due to project actions"*, the resulting goals were set taking into account a future potential of beneficiaries after the completion of the project. Without effective functioning of biodiesel and biodigester plants it is difficult to assess the indicator properly.

70. The indicator *"E. Avoided GHG emissions (t CO_2eq)"* presents a target of *"6.7 kt CO_2eq (direct) and 199.4 CO_2eq (indirect) avoided emissions"*. The calculation of the target was very well grounded in the ProDoc, *"Annex D. Calculation of GHG benefits"*. The methodology of the *"Manual for Calculating GHG Benefits of GEF Projects"* was correctly followed for the calculation. In this sense, it is a very important contribution that the project takes into account the potential avoided GHG emissions. However, it is not recommended that indirect GEI emissions avoided are included as a target within the Project Results Framework, as this is not a time-bound and measurable indicator at the time of the evaluation at the end of the project. In addition, the methodology used has become outdated since GEF 5, and the definition of indirect emissions may lead to confusion between indirect emissions generated during the project and consequential or post-project emissions.

71. The other indicators defined in the Project Results Framework are adequate and allow proper M&E of the goals to be achieved. They are relevant to the country's development priorities and achievable within the project implementation period.

72. The relationship between the PB and the Project Management Team was structured in an articulated manner and in line with the capacities and responsibilities of each of them. The choice of its members was generally appropriate according to their capabilities. It should be noted that the choice of leadership of EEIH for the Working Group corresponding to Result 2, was not the most appropriate, since EEIH is a center of scientific and technological excellence in agronomic areas, but not specialized in product development or industrial innovations.

73. The analysis of the normative context was precise and relevant at the time of entry or start of the project.

74. The evaluation of the conditions of the development context of the project and the available resources was, in general, adequate, always taking into account the difficulties existing in the Cuban context. The knowledge and technical barriers identified in the project are reasonable and responded exactly, and at an *ex-post* analysis, to what has been verified in practice. The only exception has to do with information and institutional barriers to resource mobilization capacity. The project required an important capacity for vertical coordination and integration of different companies and actors involved and aligned with the project. Some of the delays identified in project implementation were due to such restrictions or barriers. The delays in the start-up of Jatropha cultivation, as well as in the development and validation of product prototypes, were due to the above-mentioned limitations.

75. The normative and regulatory barriers identified, such as the difficulties of articulation between the public sector and companies given the existing regulatory framework at the time, were correctly established.

76. A project-specific gender strategy or approach is not explicit in the design of the project embodied in the ProDoc. Only a baseline characterization study of the social, economic, environmental and gender aspects of biodiesel and biogas technologies was planned (Component 1, Output 1.1). There are no other specific actions, outputs, indicators or targets that guide the gender impact (and measurement) of project results. Indicators referring to persons trained and/or advised on bioenergy issues are disaggregated by gender, but are not expressed in a disaggregated manner. In the execution of the project there is a line of work oriented to gender issues, but it is not adequately explicit in the design. The topic has been treated generically in the ProDoc.

B. ASSUMPTIONS AND RISKS

77. External assumptions or factors (events, conditions or decisions) that are beyond the control of the project and are likely to occur in the short and medium term, influencing its implementation and long-term sustainability were only partially identified. These factors appear in the ProDoc expressed in the development of some components, but not in a systematic and precise manner.

78. The main risks to achieve the project's objectives identified at the design stage were: (i) Limited government support that could hinder the development of the market for small-scale bioenergy technologies in Cuba; (ii) Complex national processes for project approval and timely delivery of activities and contracts, including the purchase of goods and services; (iii) Low economic performance of proposed bioenergy solutions could impede sustainability and the development of local markets; (iv) Lack of working capital to produce bioenergy systems (biodigesters, biodiesel plants) in substantial quantities, could prevent a successful market transformation; v) Inadequate plant operation could jeopardize the efficient and cost-effective production of biogas and biodiesel; and (vi) Project development capabilities, maintenance and technical support services not available to end-users.

79. The assumptions, risks and mitigation measures were incompletely established. The risks posed by the development of component 2 (and part of component 3), given their vertical integration nature (across different actors) should have been foreseen. The multiple linkages required for the cultivation of Jatropha, as well as for the development of product prototypes required more thorough risk assessments, as the risks were only partially identified.

80. Regarding the economic context, the complexity of the project and its high sensitivity to changes in macroeconomic conditions were underestimated. While important mitigation measures were carried out during project implementation (which made it possible to overcome difficulties encountered), the delays had a substantive impact on the achievement of goals. Although the devaluation that occurred in January 2021 was steep, this occurred in the context of what should have been the final stage of the project, when most of the critical operations of purchasing inputs and tools from abroad should have been carried out. In some cases, such as purchases of parts for biodiesel plants, procurement failed because of small variations in the dollar's price. Such situations should have been foreseen, mainly because of the vertical integration characteristics of project activities.

81. External effects such as climate change were present throughout project implementation, but did not substantially affect project development. The emergence of the COVID-19 pandemic had effects on the final and critical stages of the evolution of the project, although only a part of the delays can be attributed to this factor.

C. LESSONS FROM OTHER RELEVANT PROJECTS INCORPORATED INTO PROJECT DESIGN

82. At the time of design, two projects provided relevant lessons: (i) *Carbon 2012*, financed by the Spanish cooperation and developed by UNDP and Cubaenergy; and (ii) the international project *Biomass as a renewable source of energy in rural areas of Cuba (BIOMAS-CUBA) Phase I*, with funds from the Swiss Agency for Cooperation and Development.

83. The *Carbon 2012* Project promoted climate change adaptation and mitigation, energy and environment, identifying opportunities for small Clean Development Mechanism projects. One of the studies focused on the potential for energy use of pig waste, which generated preliminary data in terms of feasibility studies for biogas generation.

84. Biomass began in 2009 with the integrated production of food and bioenergy in rural areas of the country, based on the agro-energy farm concept. In parallel to the Bioenergy project, Phase II of the Biomass Project (2018-2021) was implemented, while its Phase III is currently being implemented (2021-2023). These projects have been led by the EEIH.

85. Within the framework of Biomass, several productive models were developed, based on the concept of agro-energy farm, which integrates food and bioenergy production in rural areas of the country. Specifically, the following were developed: (i) small production farms equipped with anaerobic biodigesters; (ii) a medium-size pig farm using these biodigesters to treat effluents, distributing biogas to a rural community; (iii) private farms and a state farm that manage the Jatropha curcas crop to produce biodiesel, combined with short-cycle food crops and animal husbandry; (iv) a wood sawdust equipped with a biomass gasifier to generate electricity; and (v) a mixed farm equipped with various RE technologies, including a gasifier based on agro-forestry waste, biodigesters, wind water pumping, solar water heaters and Jatropha production. Phase II of the Project (2012-2016) added new energy uses, such as gasification of rice husk and rice stalk residues, use of biogas for household cooking and refrigeration, irrigation, electricity generation and the use of biodiesel in agricultural machinery.

86. The Biomass Project has been an important source of lessons learned for the design of the Bioenergy project and also for the work during its implementation and planning review. The degree of complementarity and use of experiences is remarkable. This relationship has allowed to overcome barriers of: (i) previous knowledge for the construction of the baseline; (ii) human capacity, to enhance the knowledge of the EEIH in bioenergy issues; (iii) technical and financial, by facilitating access to components and supplies in stock, as well as providing financing for the purchase of components that could not be purchased due to changes in the exchange rate and procurement conditions.

D. PLANNED STAKEHOLDER PARTICIPATION

87. One of the strengths of the Bioenergy project is the involvement of all stakeholders and actors that are relevant to the development of such a project. The degree of complementarity and collaboration between high-level actors (ministries and their departments), companies from different sectors, as well as municipalities and local producers has been important. Not only a "formal" commitment has emerged among participants, but also a willingness of the people and technicians involved to carry out the project despite the context difficulties and contingencies encountered during implementation. This was evidenced by the stakeholders' degree of commitment and dedication to overcome difficulties arising from the COVID-19 pandemic: financial and technical difficulties that delayed the implementation of the project.

E. REPLICATION EFFECT

88. The most important catalytic effect of the project is the promotion of a new economic sector of bioenergy, particularly biodiesel and biogas. On the one hand, it broadened the vision and possibilities of product development and sales by industrial companies dedicated to the manufacture of inputs for biodiesel and biogas plants and their applications. On the other hand, the context of economic reforms at the national level promoting MSMEs adds to the policy and regulatory reforms aimed at the promotion of bioenergy. This is a key input for the creation of a base of technicians and small businesses dedicated to the design, construction, manufacture, management and provision of services and maintenance for biodiesel and biogas plants.

89. While the demonstrative effect of the implementation of biodigesters and biodiesel plants has not yet been achieved, what has been achieved so far creates an important basis for future advocacy programs and government policies, as well as for the emergence of new projects extending the project's achievements to date.

F. UNDP COMPARATIVE ADVANTAGE

90. The comparative advantages of UNDP's participation in the project are of two types; (i) because of its nature as an international agency for financing and promoting development projects; and (ii) because of its specific experience in bioenergy issues in Cuba.

91. UNDP's national and international recognition, has been a major advantage particularly in the Cuban context of economic restrictions. UNDP provides objectivity and transparency in recruitment, procurement and disbursement procedures. In addition, in its collaborative work with different ministries, government areas and institutions, it enhances the development of management capacities.

92. Since 2005, UNDP has been working at the level of small communities on energy-related issues through the GEF Small Grants Programme. The projects funded by this Programme included early initiatives in Cuba to promote the use of tubular biodigesters. The Small Grants Programme also provided initial support to Jatropha curcas plantations in Guantanamo, specifically to extract their oil and promote the recovery of degraded lands.

G. LINKAGES BETWEEN THE PROJECT AND OTHER INTERVENTIONS WITHIN THE SECTOR

93. The Bioenergy project took advantage of connections with and experience from other projects in the sector such as Biomass Cuba and Agroenergy.

94. There are interesting learning opportunities from Bioenergy, particularly since it places much emphasis on the training of municipal actors in the intervention sites to manage the different links of the local biogas and biodiesel chains.

95. Strong linkages were created between the Bioenergy project and the RE management of MINEM. It is evident that the project's actions are in synergy with the efforts to implement the RE sources policy in Cuba.

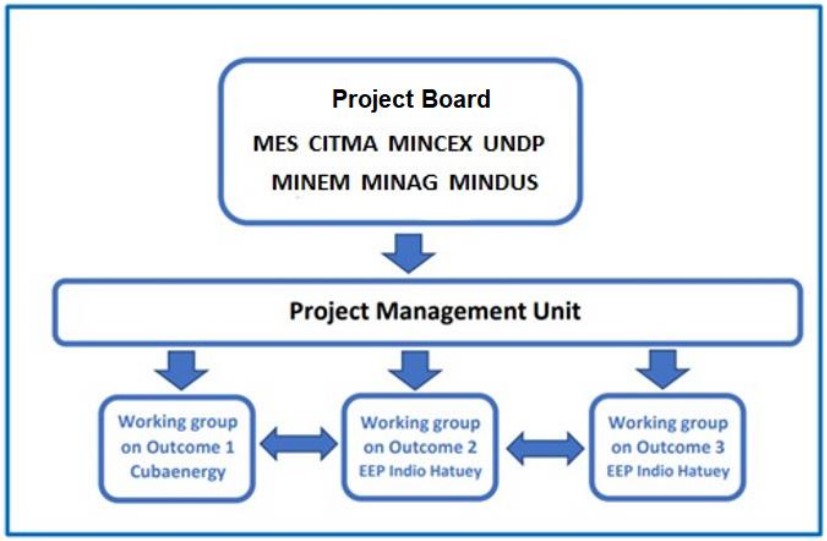
H. MANAGEMENT ARRANGEMENTS

96. The project was implemented under the UNDP National Implementation Modality. This modality helps develop ownership within the host country and helps create conditions for sustainability.

97. The MINCEX is the national authority in charge of coordinating international cooperation and its implementation in Cuba. The designated Implementing Partner of the project was the EEIH, which belongs to the MES. EEIH was responsible for the timely delivery of inputs and outputs and the coordination of all other responsible parties, including other ministries, relevant entities, and local government authorities.

98. The implementation of the project was carried out under the general guidance of a PB, formed specifically for this purpose. Its members were MINCEX, MES, CITMA, MINEM, MINAG, MINDUS and UNDP. The PB provided the political and technical-strategic vision of the Project. See Illustration 1:

Illustration 1- Project Organizational Chart



Source: Own elaboration based the Mid-term Report

5.2 PROJECT IMPLEMENTATION

A. ADAPTIVE MANAGEMENT (CHANGES IN PROJECT DESIGN AND PROJECT OUTPUTS DURING IMPLEMENTATION)

99. The MTR exercise made important contributions to adaptive management and to finetune implementation priorities. As a result of the MTR a Project's Office was created at EEIH. This office helped improve and accelerate project management practices. The MTR identified several recommendations for improvement, many of which were adopted by the PMU.

100. Although there are several aspects that were not achieved during project execution (due both to internal and external causes to the project), the PMU has demonstrated capacity to manage a complex and novel project for Cuba. The PMU also adapted well to the COVID-19 pandemic, maintaining operations going, combining in-person and on-line activities.

101. Adaptive changes were made in order to meet the mitigation goals committed during project design. Since project implementation in the Municipality of Yaguajay had serious limitations, it was decided to move out its biodiesel plant and biodigestor components to other municipalities with existing capacities to successfully implement those technologies. Meanwhile, the mitigation goal for Yaguajay is being achieved through the afforestation of Jatropha curcas.

102. Anticipating that the technology deliverables were not going to be finalized by the project's end, the PMU worked out an exit strategy with key partners to assure the completion of deliverables. This strategy actually is a project continuation plan, to which stakeholders are fully committed.

B. ACTUAL STAKEHOLDER PARTICIPATION AND PARTNERSHIP ARRANGEMENTS

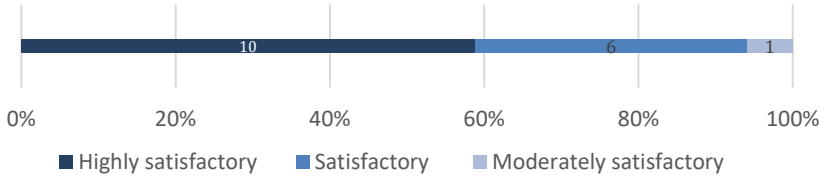
103. The governance of the project worked very well through the active participation of partners, both in the PB and in the working groups, which allowed for balancing perspectives and approaches to decision-making.

104. It is important to highlight the participation of various governmental partners through high level representatives. The partners found in this project a good point of convergence for their own interests as leaders and actors of public policies related to RE sources and the environment.

105. This project has been considered relevant by all partners, some of them assessing it as a high-impact and highly complex project. The main partners signed cooperation or partnership agreements with EEIH. The agreements adopted by large industries (POLIGOM, EMTA[5], Varona Mechanical Company, CONFORMAT and INPUD) aim to produce prototypes or necessary parts for the biogas and/or biodiesel chains. This will impact on national capacity building for import substitution, which is reaffirmed in the signed continuity contracts to support the exit strategy.

106. The different allies recognize a very important role of the EEIH as a trusted partner, highlighting its articulating role and its capacity to generate participatory spaces through technical-strategic workshops. Graphic 1 shows a high degree of satisfaction from project partners.

Graphic 1- Satisfaction with coordination and complementarities among participating institutions and companies during project development



Source: Own elaboration based on surveys carried out to participating institutions and companies. N= Institutions=10; Companies=7

107. In the elaboration of the *National Bioenergy Atlas*, there was cooperation between necessary participants, even when they were not key project actors. This results shows a commitment to forge alliances and showcases EEIH and Cubaenergy's leadership.

C. FEEDBACK FROM M&E ACTIVITIES USED FOR ADAPTATIVE MANAGEMENT

108. The information documented by the PMU allowed the verification of compliance and traceability of actions, in particular the M&E of the project during the execution period.

109. The first M&E activities, in particular the visits to industries and intervention sites, were instrumental in understanding the evolution of the project on the ground. Feedback was used to improve implementation.

110. M&E activities were particularly relevant to make adaptive management decisions, especially regarding implementation difficulties in Yaguajay. The decision to move out the technological components (mentioned above under Adaptive Management) was well understood and accepted by the parties involved.

[5] Belonging to the Superior Organization of Business Management of GESIME, at MINDUS.

D. PROJECT CO-FINANCING

111. Table 5 shows the evaluation of project financing. At the finalization of this report, the level of implementation of the total budget is 117.3%, while the financial execution of the GEF-UNDP budget is still 13% short. Remaining GEF funds are already committed.

Table 5 - Project co-financing

Co-financing (type/source)	Own financing from GEF/ UNDP (USD)		Government (Municipal governments, EEIH and Cubaenergy) (USD)		Beneficiary enterprises and partners (USD)		Donor programs (USD)		Total (USD)	
Type of co-financing	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Cash	2,737,524	2,737,524	2,134,900	4,485,326		-	-	-	4,872,424	7,222,850
In-kind support	-	-	-	3,107,466	6,130,875	4,605,378	11,683,322	11,683,272	17,814,197	19,396,116
Totals	**2,737,524**	**2,737,524**	**2,134,900**	**7,592,792**	**6,130,875**	**4,605,378**	**11,683,322**	**11,683,272**	**22,686,621**	**26,618,966**

Source: Own elaboration based on the ProDoc, collaboration agreements with key partners and latest financial, annual and quarterly reports

112. The table shows the existence of additional contributions to those planned in a first instance. In particular, actual co-financing by the Government was three times higher than planned, and most of it was channeled as cash contributions. The money delivered in kind was mainly in the form of facilities and equipment required for the production of biogas and biodiesel. The EEIH was the unit of the government that made greater contributions, while the Integral Energy Directorate of the MINAG, the FIIAPP (EU-Cuba experience exchange program), Cubaenergy and the Municipality of Yaguajay made minor contributions.

113. The co-financing of companies was lower than planned, and was entirely in kind, mainly in the form of facilities, equipment, materials, salaries and services. The Varona Mechanical Company and POLIGOM stand out as major contributors to the project. Finally, other donor programs made a significant contribution in kind.

E. MONITORING & EVALUATION: DESIGN AT ENTRY AND EXECUTION

114. UNDP and GEF have a set of procedures with tools for M&E the progress of projects and their results, their impact and the corresponding means of verification. In the present project, instruments such as: Workshop and Initial Report; Annual Project Report; PIR; Technical Reports; Final Project Report; TE and Final Project Report; Project Audits; Periodic Thematic Reports; Project Publications; and Field Visit Reports by UNDP (Country Office representative); and other visits organized by the PMU.

115. During the first half of project's life, no detailed planning of the expected complex logistics of contracting, purchasing, importing and budget execution processes was carried out. From the mid-term evaluation, and

with the creation of the Project Office in EEIH[6], systematic monitoring actions were executed that allowed correcting project implementation.

116. The quarantine decreed by the national government as a contingency action for COVID-19 required a readjustment of the M&E scheme that involved, for example, changes in the rhythms of work of the entities involved in the project. However, the PMU was able to implement much of the activities planned at the different intervention sites.

117. Reports and evidence obtained through M&E were of great value and effectiveness for the project. These reports contributed to the good governance of the project, especially of the PB. The most important strategic partners were involved. The planned agenda for the committees was generally fulfilled. Basic progress and financial reporting requirements were achieved.

F. UNDP AND IMPLEMENTING PARTNER EXECUTION, AND OPERATIONAL ISSUES

118. UNDP played an outstanding role in monitoring and facilitating the implementation of the project. This agency has contributed to the improvement of project management processes and found solutions to multiple challenges.

119. UNDP provided leadership to the project from its origin. It has been an important support throughout the project, both in design, planning and implementation, with constant follow-up. The project has directly contributed to the "inclusive and sustainable growth" priority of the *Country Programme Document* for Cuba. UNDP also facilitated project financing and import procedures.

120. MES, MINEM, MINDUS' entities, MINAG, Cubaenergy, ONEI and the municipal governments of Yaguajay and Manatí have been relevant and qualified partners for the project execution. However, there were differences in their effectiveness depending on their relative capabilities and incentives.

121. The staff, which counted with several years of experience, provided a high-level technical response in tasks related to the conformation of biogas and biodiesel local chains.

122. To achieve the objective of developing the biogas production chain in Cuba, it is necessary to strengthen the business vision of input suppliers. It is necessary that these companies consolidate and improve their technological capabilities and incorporate the lessons learned from the Bioenergy project.

123. As an opportunity for improvement, it is identified the need to enhance the work of *the Technology Transfer Unit* in the structuring of biogas and biodiesel chains, to be based in municipalities with adequate energy potential.

[6] The Project Office was established as a support structure within the EEIH, distinct from the PMU.

5.3 PROJECT RESULTS

A. OVERALL PROJECT RESULTS

124. The general and specific results of the project, along with their evaluations, ratings and comments can be found in Table 6

Table 6 - Evaluation of the Project Results Framework

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
Project Objective: To increase access to bioenergy technology in Cuba by promoting the use of biodiesel and biogas technologies by rural farmers					
A. Products based on the technology transfers that are approved by the relevant authorities for commercial manufacturing	A. No products (0)	A. Four products (4). Biogas plant, biodigestor membrane, diverse equipment that use biogas, components for the use of biodiesel generation residues.	The goal was not reached. Main products were not finalized, although key components for the biodigestors were completed.	The project achieved technical development and validation of prototypes, oriented to their commercial production Technical development was achieved in all cases. Production and testing of prototypes was achieved in some products All the equipment and inputs necessary for the domestic manufacture of these products were purchased and received from abroad. The exceptions are: a) missing components of the biodiesel production plant which, due to financial difficulties (increase of euro-USD exchange rate), were took over by the Biomass Project; b) components of industrial equipment to geomembranes fabrication (cooling towers), which the supplier has compromised to deliver before the project closure	MU

[7] References: Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
				Three agitators, two biogas torches for biodigesters, CO_2 filter, hydrogen sulphide filter for biogas cleaning, household industrial kitchens and refrigerator, are validated and in process of installation and/or production	
B. Extent to which policies and mechanisms are adopted for technology transfer	D. No policies and mechanisms adopted (0)	B. Four policies/ mechanisms adopted (4)	The goal was exceeded. Various practices, mechanisms and policies were adopted, and collaborated with the development and transfer of bioenergy technologies	Main practices and mechanisms adopted: - *National Bioenergy Atlas* (2018, and 2021 update in edition process) - Between 2018 and 2019, the development of the proposed strategy to promote biodiesel in Cuba was supported - Contributions were made to two legal documents for the development of RE sources and bioenergy in Cuba: *Decree-Law No. 345* and *Resolution No. 123* of the MINEM (2019) - Cost sheets for various bioenergy intermediate/end products, and price proposals	HS
C. MWh/yr. produced using biogas and biodiesel attributable to project	C. Zero (0)	C. 1,540.1 MWH/yr	The goal was not reached. There are no biodiesel plants nor biodigestors in operation yet	The project did not provide for the installation of electricity generators from biodiesel or biogas.	U
D. Number of people directly and indirectly	D. Zero (0)	D. 88,100 people	The goal was not reached. 1,447 people were formally trained	The expected goal depends on the active operation of the biodigesters and the biodiesel plants for demonstration to agricultural	MU

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
benefitted from RE due to project action				producers, which has not been achieved so far	
E. GHG emissions avoided (tons CO_2eq)	E. No (0) GHG emission avoided	E. 6.7 ktons CO_2eq (direct) and 199.4 CO_2eq (indirect) avoided emissions	The goal was not reached. Total direct GHG emissions avoided at the end of the project does not reach the expected target. The project target depends on biodigesters and biodiesel plants in operation, which has not been achieved so far. It is estimated that the fully operational project may exceed the direct emissions target (7.13 kt CO_2eq) To date, only the carbon emissions captured by the Jatropha crop, derived from 153 ha (56 ha in Manatí and 97 ha in Yaguajay), can be quantified. According to LABIOFAM studies, each has been cultivated with Jatropha captures emissions per 2.3 t CO_2/year per hectare. Assuming a 10-year shelf life of the plantations, this would potentially involve 500 tn CO2eq caught at the end of the project	The project planned the assessment of carbon fixation in Jatropha plantations, and avoided emissions from the production and use of biogas and biodiesel, by the end of 2020 and 2021. These assessments were affected by import delays that have deferred the planting schedule, so the first measurements will be made in 2023	MU
Outcome 1: Policy instruments supportive of small-scale bioenergy development have been formulated and recommended for approval					
1a) Information tools developed for bioenergy policy and strategy formulation	1a) No tools existing focused on bioenergy	1a) Information tools focused on bioenergy developed at three levels (information gathering, processing and compilation)	The goal was exceeded. The project has elaborated information tools focused on the development of bioenergy at three levels (information capture, processing and compilation)	The "Evaluation report of opportunities and limitations for the development of bioenergy by small and medium agricultural producers" (2019), constitutes a first tool or methodology applied to the collection and analysis of information. With project support, ONEI developed a set of *Improvements to the*	HS

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
				Territorial Statistical Information System (2019). This has been reflected in the *Survey of Renewable Energy Sources*, implemented in 5 pilot municipalities, and to be extended at the national level. The *National Bioenergy Atlas* (in two editions; 2018 and 2021) contains valuable information on national potential for bioenergy production and has become a valuable decision-making tool.	
1b) Draft small-scale bioenergy strategy (green paper) consulted with incumbent authorities	1b) No draft bioenergy strategy (0)	1b) Draft strategy compiled and consulted with incumbent authorities (1)	The goal is considered achieved to some extent	Although the Draft Bioenergy Strategy (Green Paper) was not developed, a set of relevant activities, reports, recommendations, regulations and instruments have been produced	MS
1c) Policy inputs and recommendations on the legal, institutional and regulatory framework for facilitating the implementation of a small-scale bioenergy strategy	1c) No policy inputs and recommendations (0)	1c) Policy inputs and recommendations formulated and presented to incumbent authorities	The goal was reached. Inputs and policy recommendations were formulated and submitted to relevant authorities	The project has generated sufficient inputs and recommendations. These include: 1) The 52 proposed solutions to 45 barriers to biogas development (also applicable to bioenergy); 2) The Bioenergy Opportunities and Limitations Report, and the recommendations derived therefrom; 3) Recommendations for the formulation of programs and policies for the development, maintenance and sustainability of energy efficiency; 4) The methodological instructions of the *Renewable Energy Sources* Survey (ONEI); 5) The technological recommendations contained in books	HS

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
				and manuals on Jatropha cultivation, as well as the production and use of biodiesel; 6) Laboratory procedures manuals, requirements and standards for certifying and ensuring the quality of Jatropha curcas seeds; 7) The Technical Instruction for experimental work in biodiesel plant laboratories; 8) The proposed standard for the use of biodiesel blends - diesel in agricultural equipment; 9) The cost sheets of various bioenergy intermediate and end products, as well as the price proposal, to be delivered by MINAG to the Ministry of Finance and Pricing (MFP), in order to adopt the relevant resolutions	
Outcome 2: State of the art knowledge on the application of small-scale biodiesel and biogas systems has been transferred and assimilated.					
2a) Production capacity for small-scale (100, 200 and 400l/day) biodiesel plants of national industry (units produced per year)	2a) No production capacity (0 per year)	2a) Production capacity for small-scale biodiesel plants (100, 200 and 400 l/day) of 10 units per year	The goal was not reached. The complete availability of all imported components, necessary for the manufacturing of the first two biodiesel plants by the Cuban Steel BEU, has not been achieved so far	The missing components were expected to arrive in Cuba shortly after the close of the project It is expected that the Cuban Steel BEU will achieved production capacity, although the target of 10 small biodiesel plants per year is unlikely.[8]	U
2b) Flexible geomembrane production (m^2/yr)	2b) No geomembrane production (0)	2b) Production capacity for flexible geomembrane	The goal was not reached. The missing elements to start production are already on their way to Cuba	Assembly is completed for most of the components of the manufacturing system, while the missing elements correspond to the cooling tower.	MU

[8] Given the increasing import related difficulties and the lack of foreign currency in Cuba, it is expected that manufacturing of biodiesel plants will be done on a case by case basis, once the corresponding funding is secured beforehand (as opposed to serial production)

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
		material of 68,000 m^2/yr		It is estimated that the maximum production capacity will be 3,500 m^2/ month. Once all imported inputs needed for production are available, it follows that the annual production capacity of flexible geomembrane would be 42,000 m^2/year, short of the target of 68,000 m^2/year	
2c) Litres of biodiesel annually produced in demonstration pilots and put to use (l/yr)	2c) No production (0l/yr)	2c) 127,500 l/yr	The goal was not reached. The two biodiesel pilot plants were not manufactured	Considering that the nominal capacity of the two biodiesel plants under construction is 400 lt/day, with an operating regime of five days a week, the estimated maximum total annual capacity would be 192,000 l/year, making it very likely to achieve the target (allowing for some down time)	U
2d) Cubic meters of biogas generated in demonstration pilots and put to use (m^3/yr).	2d) No production in demonstration pilots (0 m^3/yr)	2d) 39,400 m^3/yr biogas produced	The goal was not reached. The two pilot biodigesters are not built	Once the two biodigesters are launched, with nominal capacities of 250 m^3 and 1,000 m^3 of biogas/day, they would generate a maximum of 456,250 $m^3$of biogas/year The ProDoc had calculated the target assuming the development of 5 biodigesters that generate each 21.6 m^3/day of biogas. The biogas plants to be launched are more than ten times larger in capacity	U
Outcome 3: Bioenergy technology disseminated through increased knowledge and demonstration of biodiesel and biogas systems					

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
3a) Bioenergy expertise center established in EEIH	3a) Good track record and individual competences on bioenergy within EEIH	3a) Formal bioenergy expertise center habilitated within EEIH	The goal was exceeded. The *Bioenergy Expert Center* was established at the EEIH in 2020	The Expert Center provides: knowledge; technological, market and management information; analysis of opportunities, technological alternatives, transfer and provision of technology services; training and advice to industrial enterprises, agricultural producers, researchers, teachers and decision-makers in bioenergy	HS
3b) Number of farmers (m/f) assisted on bioenergy	3b) No (0) farmers assisted	3b) 120 farmers assisted (trained, advised and equipped with facilities for the production and use of biogas and biodiesel)	The goal was reached. Formal training has been provided to 422 municipal actors involved in productive agricultural activity and producers, in the bioenergy generation and use. 38.2% of the total trained are women	The training also included decision makers and officials from MINAG, MINEM and MFP businesses groups. These addressed issues such as the use of agricultural waste for electricity and heat generation, as well as the costs and prices of bioenergy This training process has been affected by COVID-19 pandemic, so several workshops have been postponed	S
3c) Number of advisory/consulting services provided by Cubaenergy to decision-makers on bioenergy	3c) On average 3 services on bioenergy provided per year	3c) 8 services on bioenergy provided per year	The goal was exceeded. Twelve technical services on bioenergy are provided annually to decision makers, covering: a) Several training sessions focused on topics such as biogas, biodiesel, gasification and biomass combustion, aimed at national decision-makers and specialists, and focused on the MINAG Business Groups; b) Publication of the *National Bioenergy Atlas*; c) Information on opportunities and constraints for the development of	Another complementary activity is the development of the *Renewable Energy Sources Survey* and training for all ONEI provincial directorates for its national extension (first half of 2022). Also worth noting is the Geocuba Guantánamo Company's work to develop and validate a tool based on Geographic Information Systems, which complements the Territorial and National Statistical System	HS

Indicators	Baseline	Target (End of Project)	Level at 05/15/2022	Final comments on evaluation	Rating [7]
			bioenergy in Cuba; d) Publication of the *Technical Bulletin on Technology Transfer in Bioenergy for Decision-makers*; and e) Advisory services in the formulation of programs for the development and maintenance of RE sources in MINAG business groups		
Project Management					
4a) Annual progress monitoring reports delivered	4a) No annual progress reports	4b) four (4) annual progress reports delivered	The goal was met	PIR 2017, 2018, 2019, 2020, 2021 were delivered	S
4b) MTR and TE implemented	4b) No evaluations	4b) MTR and TE evaluations executed and reports approved	The goal was met	The MTR was implemented and its reports were approved. The TE is being implemented	S

Source: Own elaboration

B. RELEVANCE - Rating: (6) Highly Satisfactory

125. The relevance of Bioenergy has been very high for the development priorities of Cuba and its inhabitants, both socio-economic and related to climate change. Bioenergy is a key factor towards the country's high-level geopolitical objectives of reducing dependence on fossil fuel imports, and replacing imports of manufactured goods.

126. When the project began, Cuba was already developing climate change policies. Bioenergy accompanied the development of these policies, bringing many valuable inputs for their elaboration. Bioenergy continues to be a project fully aligned with national policies. It promotes the achievement of the commitments declared in the *First Determined National Contribution of the Republic of Cuba*, through its contribution to the reduction of GHG emissions in the pig farming sector. In addition, project results were recognized with a National Prize of the Cuban Academy of Sciences in 2020, for the generation of bioenergy through thermochemical means, which would be integrated into local generation systems.

127. Cuba's legislative and regulatory framework, related to environmental care, has evolved favorably starting with *Decree-Law 345* of 2019 (to which Bioenergy contributed with four articles) up until the most recent *Law on the System of Natural Resources and the Environment* of May 2022. Bioenergy is very relevant in other important areas besides climate change. The project contributed to the *Food Sovereignty and Nutritional Education Plan* of the MINAG (2020) and the *Policy for Promotion of Territorial Development* of the Ministry of Economy and Planning (2020). In recent years, decentralization has been promoted in Cuba, so municipalities (one of the intervention levels of Bioenergy) are acquiring greater prominence. In addition, *Decree-Law 46* was approved in August 2021, regulating the creation of MSMEs in Cuba, which will enable these new economic actors to exploit and take advantage of the opportunities generated by Bioenergy.

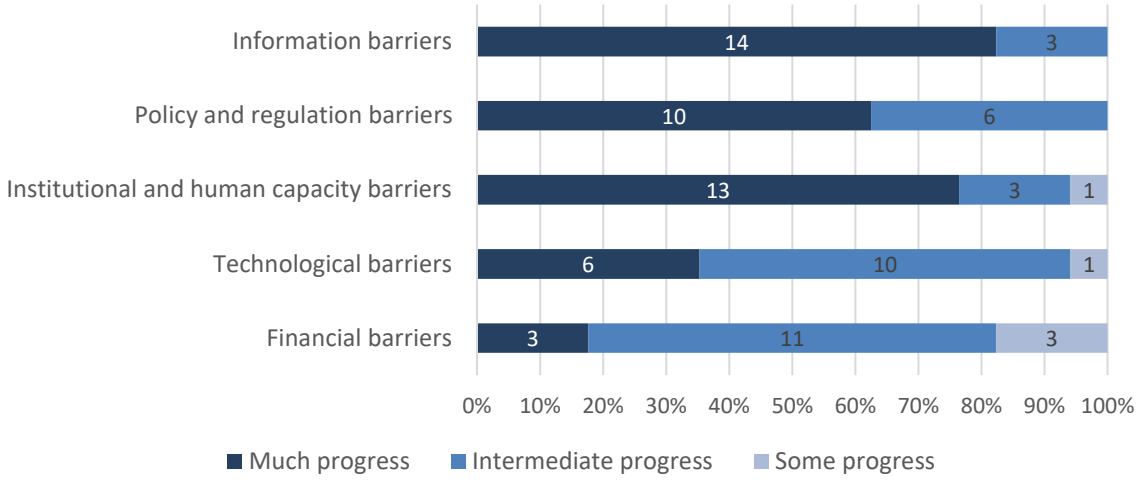
C. EFFECTIVENESS – Rating: (3) Moderately Unsatisfactory

128. Project implementation presented significant gaps, despite the high level of commitment of the PMU and its partners. This happened as the result of the materialization (and increase) of the inherent risks to the geopolitical nature of Cuba and to unforeseen additional risks, such as the depreciation of the dollar against the euro and the COVID-19 pandemic. Even so, the project has created and improved important capacities for the development of bioenergy in Cuba, which is a long-term process initiated by the project.

129. Bioenergy has established a proper base for the achievement of results that will lead to the goal (not yet achieved) of *increasing access to bioenergy in Cuba by promoting the use of biodiesel and biogas technologies by farmers*. This base is constituted by the innovative and effective articulation among the different types of actors involved in the project: ministries, municipalities, agricultural production units, and industrial enterprises.

130. Bioenergy has been helping to overcome barriers to bioenergy development in Cuba, as identified in the ProDoc. In particular, the greatest progress was related to overcoming barriers of: (i) information; (ii) policies and regulations; and (iii) institutions and human capacities. The least progress was related to technological and financial barriers, in line with the lack of completion of planned technological products. Based on the results of a survey applied to representatives of 10 partner institutions and 7 companies participating in the project, Graphic 2 shows Bioenergy achievements from the partners' perspective (see Annex 10 for more details on the survey).

Graphic 2- Progress in overcoming barriers to the development of bioenergy in Cuba



Source: Own elaboration based on surveys carried out to participating institutions and companies. N= Institutions=10; Companies=7

131. The effectiveness degree achieved for each of the three Bioenergy's expected outcomes is discussed below: (i) Policy instruments to support small-scale bioenergy development have been formulated and recommended for approval; (ii) The state of knowledge on the application of small-scale biodiesel and biogas systems has been transferred and assimilated; and (iii) Bioenergy technologies were disseminated through increased knowledge and demonstrations of biodiesel and biogas systems.

Outcome 1: Policy instruments to support small-scale bioenergy development have been formulated and recommended for approval

132. This result was far exceeded, since the policy instruments and inputs developed by Bioenergy were not only approved by the government, but were adopted and have been implemented by the different ministries and business groups. Bioenergy contributed technical inputs for the preparation of two key legal documents (approved at the end of 2019) for the development of RE sources and bioenergy in Cuba: *Decree-Law No. 345 On the Development of Renewable Sources and the Efficient Use of Energy*, approved by the State Council of the Republic of Cuba, and *Resolution No. 123* of the MINEM. As a result, companies are implementing RE introduction plans in their work programs.

133. The most important product of Outcome 1 is the first *National Bioenergy Atlas*, published in 2018 and which 2021 update is currently in process. The Atlas contains valuable information on national potential for bioenergy production and has become a valuable decision-making tool. Cuba has been a pioneer country in this type of initiative within the Caribbean, since at present there are no other Caribbean countries that have a similar mapping. The biannual edition of the Atlas of Bioenergy (until 2030) is planned to be institutionalized.

134. In order to collect information on the production and use of bioenergy at the national level, the ONEI has developed (in collaboration with the project) a set of *Improvements to the Territorial Statistical Information System* (2019). This has been reflected in the *Survey of Renewable Energy Sources*. Improvements to the information system included: (i) definition of new indicators suitable for measuring the bioenergy sector; (ii) development of an information collection tool (Form T14-00); (iii) validation of the instrument in five pilot municipalities (2019); and (iv) training of all ONEI provincial directorates for the application of the methodology to all municipalities in the country (164 municipalities). ONEI and Geocuba Guantánamo continue developing and evaluating a Geographical Information System-based computer tool to complement the Territorial Statistical System. Future Atlas updates will source information from these ONEI tools.

135. Although the *Draft Small-Scale Bioenergy Strategy* (Green Paper) planned in the ProDoc was not elaborated, the project produced a series of relevant documents and inputs that could be compiled into a Green Paper, such as contributions to the elaboration of the of biodiesel promotion strategy in Cuba, in collaboration with the Labiofam Business Group, of the MINAG, and the Biomass Project (2018-2019).

136. From a policy perspective, the Project made several, important policy recommendations:
    a) 52 proposed solutions to 45 barriers to biogas development in Cuba, which are also generally applicable to bioenergy;
    b) Report on *Opportunities and Limitations for Bioenergy* and the recommendations derived therefrom;
    c) Recommendations for the formulation of programs and policies for the development, maintenance and sustainability of RE sources and energy efficiency, including bioenergy, both for Matanzas Province and for MINAG's Business Groups (Livestock, Agricultural, Agroforestry and Labiofam);
    d) Methodological instructions for using form T14-00, *Renewable Energy Sources Survey*, belonging to the ONEI Territorial Information System;
    e) Technological recommendations for the agronomic management of the Jatropha curcas, reflected in the *Manual of Jatropha curcas: Cuban and International Agronomic Experiences*;
    f) Technological and quality assurance recommendations, provided in the book *Biodiesel: Production and Use of Biodiesel*;
    g) Procedures, requirements and standards to ensure the quality of seeds, which exist in the manuals: *Jatropha curcas Seed Analysis and Certification System*, and *Seed Analysis: Generalities and Procedures*, as well as the standard operating procedures for all seeds laboratory equipment procured;
    h) Technical instructions for experimental work in biodiesel plant laboratories; and
    i) Proposed standards for the use of biodiesel-diesel blends in agricultural equipment, to be developed on the basis of bench test results and tractor tests, expected to be completed by the end of 2022.

137. In addition, and with the participation of MINAG and its business groups, a first version of cost sheets of various bioenergy intermediate and end products was developed. These products include Jatropha curcas seed, seedling, fruit, oil, biodiesel, glycerol, soap and soap flake, obtained from the plant. The price proposal was also elaborated, and it will be delivered by MINAG to the Ministry of Economy and Planning, to adopt the relevant resolutions. During the Closing Workshop of the Project (May 2022) the cost sheets and price proposals for biogas and bio-fertilizer resulting from anaerobic digestion were developed, as well as various products and co-products associated with agricultural and forestry biomass.

Outcome 2: The state of knowledge on the application of small-scale biodiesel and biogas systems has been transferred and assimilated

138. The products corresponding to Outcome 2 have not been finalized and they are in different stages of development, despite the high degree of commitment of those involved in Bioenergy and the evidence of several efforts in order to accomplish expected results. Progress depended on product complexity and the relative capabilities of the organizations responsible for them. Despite the difficulties, Bioenergy contributed to the development of capacities related to Jatropha´s cultivation, along with those related to industrial development of biodiesel plants and biodigesters. The initiated process for industrial capacity development is very important to achieve Cuba's import substitution goal in general, and in the field of bioenergy equipment in particular. The processes underway will take time to be completed, beyond project closure.

139. The products could not be completed due to a combination of several factors. Most of them are common to all Outcome 2 outputs. According to their relative impact on project implementation, the obstacles faced were:

    a) *Processes for purchasing and importing inputs,* given the commercial blockade that has affected Cuba for decades. The options of authorized suppliers to sell to Cuba are limited and have been decreasing over time, making it increasingly difficult to identify suitable suppliers and in sufficient numbers to carry out successful tenders (which had to be declared deserted several times). The blockade has also affected the project's payment processes, given the decrease in options for paying banks. In addition, the Cuban import companies were not familiar with the type of specific (and unusual) imports of Bioenergy. This learning curve had to be transited twice due to the change of the importing company in the middle of the project.
    b) *Covid-19 pandemic,* which further aggravated the difficulties of the project's input imports by increasing logistical complexity, extending transit times and making the final value of inputs more expensive because of increased freight costs.
    c) *The increase in the euro-dollar exchange rate,* which has reduced the financial capacity of the project, since the GEF grant is in dollars and the contracts are denominated in euros.
    d) *Lack of detailed management of the project's logistics* during the first half of the project, which was going to be critical due to the already known and expected geopolitical difficulties inherent to Cuba.
    e) *Devaluation of the Cuban currency,* from 1 to 24 Cuban pesos to the dollar, reducing the purchasing power of local contracts.
    f) *Difficulty in accessing foreign currency,* which makes it impossible for participating institutions to increase their effective counterpart, because they cannot use Cuban pesos to pay for imports.

140. The combination of obstacles reduced the actual amount of the GEF grant received by USD 62,000, leaving inputs to be purchased, despite the fact that there was a foreign exchange co-finance from the Biomas Project, also led by EEIH and financed by the Swiss Agency for Development and Cooperation.

141. For the purpose of the analysis, the products of Outcome 2 are divided into the following categories, which distinguish among the production of inputs for biodiesel elaboration, and the manufacture of the necessary equipment for the biodiesel or biogas production:

    a. Production of Jatropha curcas seeds and space adaptation for biodiesel plants;
    b. Biodiesel production; and
    c. Biogas production.

Production of Jatropha curcas seeds and space adaptation for biodiesel plants

142. Nurseries and farms for Jatropha seeds production were created in the municipalities of Manatí and Yaguajay, with an extension of 2 ha each, and equipped with irrigation systems under development. Of the 250 ha committed in total, 153 ha of Jatropha were implanted (61% of the committed number): 56 ha in Manatí by the BEU Integral Agropecuaria Martí, and 97 ha (very recent plantation) in Yaguajay by the company Agronomy. While there were many delays, work was re-taken and substantial progress is expected towards the end of 2022. Table 7 shows the relative progress of the plantations and their support facilities in each municipality.

Table 7 - Progress in the development of Jatropha Curcas (Jc) plantations at the end of the evaluation

Municipality	Hectares targeted	Hectares planted	Nursery units	Progress in the construction of the seed certification laboratory	Adaptation of space for the biodiesel plant	Biogas engineering project	Estimated date for the completion of activities
Manatí	100 ha	56 ha	- 5,650 bags of seed - 6,350 seedlings	85%	50%	Integral engineering project completed in January 2021	April 2023
Yaguajay	100 ha	97 ha	- 8,580 bags of seed - 495 seedling	100%	To be relocated to the Municipality of Calixto García	Decision not to make biodigester due to lack of engineering project	September 2022 (limited to cultivation of Jatropha)

Source: Own elaboration based on reports by BEU Integral Agropecuaria Manatí and Agronomy of Yaguajay

143. The common reasons for delays in both municipalities were related to: (i) natural events (drought and floods); (ii) shortages of diesel to work the land; (iii) shortage of building materials for the construction of seed laboratories; and (iv) delays in the preparation of the engineering projects by the corresponding National Agricultural Project Companies (ENPA). Manatí municipality is the process of completing all scheduled tasks, while Yaguajay municipality will complete the part corresponding to the production of seeds of Jatropha, planting 150 ha. The differences in performance were mainly due to the level of incentives and commitment of the beneficiary agricultural companies in each municipality: while Agricultural Manatí has a local focus and the contributions of Bioenergy are very aligned with their needs, Agronomy of Yaguajay is a large exporting company, for which the project was not critical.

Biodiesel production

144. The EMTA is waiting to receive missing components to begin manufacturing the two prototypes (it has most of the necessary inputs stored on hold, still unprocessed).

145. Progress has been made in laboratory evaluations of blends of diesel and biodiesel produced in Cuba from Jatropha curcas (provided by the Biomass-Cuba project). Initial positive results were obtained in engine test evaluations, showing significant potential for reducing GHG. The final determination of optimal blends for agricultural use is still pending.

Biogas production

146. In 2018, the project team completed the basic engineering projects corresponding to the two covered lagoon biodigesters, planned to be constructed in the pig production centers of Manatí and Carbó (Yaguajay). The projects were delivered to the MINAG's ENPAs in the provinces of Las Tunas and Sancti Spíritus, respectively.

147. Manatí's integral engineering project was delivered by the corresponding ENPA in January 2021, although its construction did not yet start, due to delays in imported inputs and a shortage of construction materials at the national level. Currently, not all the tools and inputs are available to carry out the construction and installation of the biodigester in Manatí, so a project proposal is being formulated in order to obtain international financing.

148. As the ENPA of Yaguajay did not deliver the engineering project, its inputs and components were reassigned to a similar biodigester. This biodigester is currently being built by Biomass-Cuba in the municipality of Martí, in order to meet project mitigation targets.

149. Table 8 shows the progress achieved in industrial Bioenergy product development. With the exception of the two biodiesel plants to be built by EMTA, all other industrial products correspond to biogas use and production. Completion dates for each product are difficult to estimate. While the companies concerned tend to be optimistic, not all imported inputs have yet been received and it is probably that unexpected delays will take place. It can be estimated that the completion of all products will take, at least, until March 2023. The most critical products to start producing and using biogas are synthetic geomembrane and biogas filters.

Table 8 - Progress in the development of industrial products

Company	Products	Development status	Estimated date of completion
Varona	Three agitation systems for lagoon biodigesters	Two prototypes were assembled, validated in the factory and transported for testing to a pre-existing covered lagoon in Martí. Final destinations are Manatí, Martí (to an additional lagoon under construction) and Mariel	October 2022
	Two torches for burning unused biogas for the lagoon biodigesters	Two prototypes assembled and validated in the factory. Final destinations are Manatí and Martí	October 2022
	A 500-litre milk cooling tank	Manufactured. The required electricity generator has already arrived in Indio Hatuey. It must be adapted and installed	November 2022
POLIGOM	11,000 m^2 of synthetic geomembrane	Assembly completed for most of the components of the manufacturing system, while the missing elements corresponding to the cooling tower are already on their way to Cuba	January 2023
EMTA	Two plants of Biodiesel	Waiting to receive missing components to start manufacturing the two prototypes	March 2023
CONFORMAT	Filters for biogas purification	Third prototype under evaluation	February 2023
INPUD	1 and 2-burner stoves, domestic and industrial	Domestic stoves with 1 burner in test phase, and industrial stoves (1 or 2 burners) in production and marketing phase	August 2022
	Refrigerator	Five refrigerators in process of assembly, for subsequent validation in field tests	November 2022
	Other household equipment: rice cook, water heater and lighting lamp	Lamp design finished, being able to be manufactured if additional financing is provided. Remaining equipment: in design phase	March 2023

Source: Own elaboration

Note: Dates are consulting team's estimates based on dates reported by participating companies

Outcome 3: Bioenergy technologies were disseminated through increased knowledge and demonstrations of biodiesel and biogas systems

150. This result has been achieved to a large extent, particularly in relation to the strengthening and projection of the EEIH and Cubaenergy as centers of reference for knowledge and the transfer of bioenergy-related technologies. While numerous outreach publications were produced and training conducted, these were affected by the pandemic and the lack of completion of biogas and biodiesel facilities.

151. With the support of the Business Incubator of the University of Havana, a *Bioenergy Expert Center* was created at EEIH (2020) to provide knowledge and transfer of bioenergy technologies (design, installation and commissioning) to producers and agricultural-livestock enterprises. The *Technology Transfer Unit in Bioenergy* was also formed between EEIH and Cubaenergy. However, these units do not have their own legal status nor clear divisions of responsibilities between them, or with respect to their main institutions. They do not have an independent internet presence either.

152. As a result of the project, Cubaenergy increased its offer of technical services on bioenergy to institutional and business decision-makers, which now includes:

    a. biogas updates for national decision makers and specialists;
    b. updates on biodiesel for national decision makers and specialists;
    c. information about opportunities and constraints for bioenergy development in Cuba;
    d. updates on biogas, biodiesel, gasification and biomass combustion for decision-makers and specialists in the MINAG's business groups;
    e. specific training for decision makers and specialists in biogas, biodiesel and gasification/ combustion of agricultural and forestry waste;
    f. publication of the *National Bioenergy Atlas*, a tool to support decision-making;
    g. the *Technical Bulletin on Technology Transfer in Bioenergy for Decision Makers*, by the project's *Technology Transfer Unit* in Cubaenergy; and
    h. advice in program formulation for the development and maintenance of RE sources in MINAG's business groups.

153. Finally, 422 (161 women) municipal agricultural workers were trained in the production and use of biogas and biodiesel, as well as in bioenergy in general. The training also included decision makers and officials from MINAG's business groups and other sector related organizations, such as MINEM and the Ministry of Economy and Planning. Training also included the use of agricultural waste for electricity and heat generation, as well as the costs of and prices for bioenergy products.

D. EFFICIENCY – Rating: (3) Moderately Unsatisfactory

154. Overall, the project could not be efficient, since a very significant amount of time and effort was invested in solving problems arising from the materialization of project risks. Time and efforts could have instead been used in the technical development and implementation of the expected products. Efficiency improved with the creation of the Project Office as a result of the MTR. The Office has also generated new projects with potential for funding.

155. The project was efficient in obtaining results when they were closely related to EEIH and Cubaenergy's core expertise: research, training and technical contributions for policy development. On the other hand, the lower efficiency was related to the development of technological products, where the Cuban experience is scarce.

E. NATIONAL OWNERSHIP

156. Since its origin, the project has had a high level of institutional and business ownership, ranging from the national to the municipal level. EEIH leveraged, through multiple alliances, its positioning as a recognized *think tank*, consulted by national authorities.

157. Starting with bioenergy, the project contributed to the development of local and national environmental priorities. It also supported national and local key actors (in the two intervention municipalities) in the implementation of those priorities.

F. GENDER APPROACH, EMPOWERMENT OF WOMEN AND CROSS-CUTTING PROBLEMS

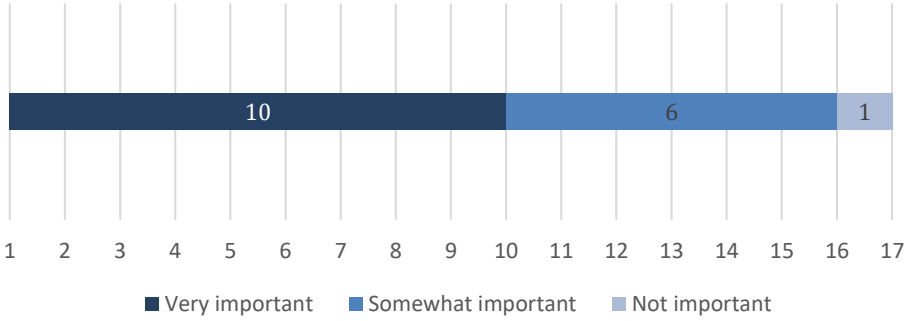
158. The project has a gender coordinator, and awareness-raising activities (talks, seminars) on gender equity were carried out. Despite this, the project did not respond to a gender diagnosis nor to any action plan with specific objectives. The project was limited to counting the participation of women in its activities, and no spaces for women's empowerment were created.

159. If the implementation of the pending tasks through the exit strategy of the project is carried out, there is a high potential to positively influence the resolution of cross-cutting problems such as social inequities and human development.

G. SUSTAINABILITY – Rating: (3) Moderately Likely

160. Regarding sustainability, the Project Management Unit (PMU), together with its partners and with the support of UNDP, began working in advance on a sustainability plan, which lists 6 goals and 23 actions to be carried out. The plan specifies how each action contributes to the goals, the leading organization and other participant organizations. The project's sustainability plan is based on 7 cooperation continuity contracts that were signed by EEIH and the project's participating companies. This is very appropriate, as the partners consider that the risks to sustainability are still important (Graphic 3).

Graphic 3- Importance of the risks affecting the sustainability of the Bioenergy Project's results and their continuity



Source: Own elaboration based on surveys carried out to participating institutions and companies. N= Institutions=10; Companies=7

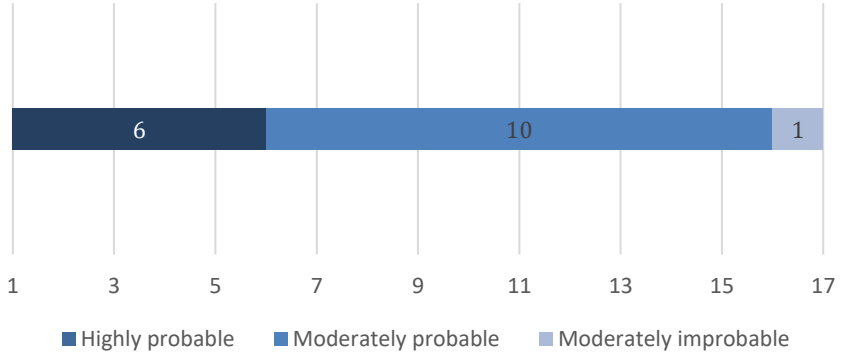
161. Although the overall risks of the project remain, the risk of obtaining the imported inputs has been minimized, since almost all of the outstanding inputs have already been acquired and received.

Financial risks

162. The efforts put in the continuous resolution of obstacles of various kinds (especially related to imports) "distracted" the PMU from ensuring a substantial source of financing that would facilitate the continuity of the project's actions. However, there would be some continuity at the local level with the Ecological Transition Program to Support the Development of Sustainable Municipalities in Cuba (European Union's Multiannual Indicative Program 2021-2027). In addition, EEIH has received approval for a project proposed to the *National Program for Integral and Sustainable Energy Development* for 5.2 million Cuban pesos (approximately USD 200,000).

163. The project's partners, who are committing resources in their continuity contracts with Bioenergy, are optimistic about obtaining the financial resources necessary for the sustainability of the project (Graphic 1Graphic 4).

Graphic 4- Probability of obtaining timely financing for project sustainability



Source: Own elaboration based on surveys carried out to participating institutions and companies. N= Institutions=10; Companies=7

Socio-political/economic risks:

164. The project's sustainability plan is based on seven cooperation contracts that are being signed by EEIH and the companies participating in the project: (i) Varona Mechanical Company; (ii) POLIGOM; (iii) INPUD; (iv) CONFORMAT; (v) EMTA; (vi) Agricultural of Manatí; and (vii) Agricultural Company of Yaguajay. These contracts detail the obligations of each party in a very specific way.

Institutional framework and governance risks:

165. The EEIH and Cubaenergy are committed to the development of bioenergy in Cuba, but they do not have the necessary *know-how* for the implementation of engineering or technological development projects in a comprehensive manner. Although GESIME is included in the reformulation of PMU roles beyond the closure of the project, its role is limited to monitoring the implementation of commitments by industrial companies.

Environmental risks:

166. Moderate environmental risks are noted, especially from the launch and operation of projected biodigesters and biodiesel plants. The environmental and social safeguards tools reduce these risks (the latest, 2022 version is appended to the Project's Sustainability Strategy).

167. However, it is important to continue evaluating and optimizing the design of these safeguards tools to improve compliance with applicable environmental regulations and standards. In particular, it should clarify the institutional regulatory framework applicable to this type of activity, which leads to environmental and social licenses, especially in the areas of water and waste management, occupational health and safety.

H. IMPACT

168. The project is already having significant impacts on the design and implementation of public policies. Bioenergy is used as a reference or best practice for other territorial development projects in Cuba and its publications are widely used, even as "textbooks".

169. Following the implementation of *Decree-Law 345*, business groups are presenting plans for the introduction of RE in their operations, with specific actions to be approved by the MINEM.

6. MAIN FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

6.1. MAIN FINDINGS AND CONCLUSIONS

170. The main findings and conclusions are presented for each of the criteria defined for the project evaluation: design, relevance, effectiveness, efficiency, sustainability and impact.

171. Project design was too ambitious given Cuba's geopolitical context: the complexities of both the Cuban context and the project's context were underestimated, as well as the project's high sensitivity to changes in macroeconomic conditions, leaving no space in the design for unforeseen events (which later materialized).

172. The assumptions, risks and mitigation measures were incompletely established. The risks posed by the development of component 2 (and part of component 3), given their vertical integration nature (across different actors) should have been foreseen. The multiple linkages required for the cultivation of Jatropha, as well as for the development of product prototypes required more thorough risk assessments, as the risks were only partially identified.

173. One of the strengths of the Bioenergy project is the involvement of all stakeholders and actors that are relevant to the development of such a project. The degree of complementarity and collaboration between high-level actors (ministries and their departments), companies from different sectors, as well as municipalities and local producers has been important. Not only a "formal" commitment has emerged among participants, but also a willingness of the people and technicians involved to carry out the project despite the context difficulties and contingencies encountered during implementation.

174. The different allies recognize a very important role of the EEIH as a trusted partner, highlighting its articulating role and its ability to generate spaces for allies' participation in technical-strategic workshops. However, the choice of its leadership for the industrial components of Outcome 2 was not the most appropriate. EEIH is a scientific and technological excellence center specialized in agronomic areas, but not in issues related to product development or industrial innovations.

175. In terms of project implementation, during the first half of the project's life, no detailed management was undertaken regarding the complex logistics processes expected: hiring, procurement, imports, and budget execution. From the mid-term evaluation, and with the creation of the Project's Office at EEIH[9]systematic monitoring actions were implemented that allowed to correct the project implementation's course.

176. UNDP played an outstanding role in monitoring and facilitating the implementation of the project, constantly insisting on improving project management processes and finding solutions to the multiple challenges faced, going beyond their expected role in this type of project.

177. While the demonstrative effect of the implementation of biodigesters and biodiesel plants has not yet been achieved, what has been achieved so far creates an important basis for future advocacy programs and government policies, as well as for the emergence of new projects extending the project's achievements to date.

178. Outcome 1 (about policy instruments) was far achieved, as the policy instruments and inputs developed by Bioenergy were not only approved by the government, but were also adopted and have been implemented by different ministries and business groups. Bioenergy has contributed technical inputs for the elaboration of two key legal documents for the development of renewable energy (RE) sources and bioenergy in Cuba: *Decree-Law No. 345 On the Development of Renewable Sources and the Efficient Use of Energy* and *Resolution No. 123* of the Minister of Energy and Mines. As a result, companies are implementing RE introduction plans

[9] The Project's Office was established as a support structure within the EEIH, and is distinct from the PMU.

in their work programs. The most recognized product of Outcome 1 is the first *National Bioenergy Atlas*, which contains valuable information on national potential for bioenergy production and has become a valuable decision-making tool.

179. Products corresponding to Outcome 2 (about biogas and biodiesel production) have not been finalized and are at different stages of development, depending on their complexity and the relative capabilities of the organizations responsible for them. Outputs could not be finalized because of a combination of numerous factors, including, in order of impact: (i) Processes of procurement and importing inputs; (ii) Covid-19 pandemic; (iii) The increase in the euro-dollar exchange rate; (iv) Lack of detailed management of agricultural and industrial production logistics; (v) Devaluation of the Cuban currency; and (vi) Difficulty in accessing foreign exchange.

180. Outcome 3 (related to knowledge dissemination) has been achieved to a large extent, particularly in relation to the strengthening and projection of EEIH and Cubaenergy as centers of reference for knowledge and technology transfer related to bioenergy. A *Bioenergy Expert Center* was created at the EEIH and the *Technology Transfer Unit in Bioenergy* was formed between EEIH and Cubaenergy. However, these units do not have their own legal status and there is a lack of clarity about the division of responsibilities between them or with respect to their host institutions.

181. Regarding sustainability, the PMU, together with its partners and with the support of UNDP, began working in advance on a sustainability plan, which lists 6 goals and details 23 actions to be carried out. The plan specifies for each action the goals the action contributes to, the leading organization and other participant organizations. The project's sustainability plan is based on 7 cooperation continuity contracts that were signed by EEIH and the project's participating companies.

6.2. RECOMMENDATIONS

182. Table 9 provides recommendations that explore different ways to take advantage of the opportunities (and problems) revealed by Bioenergy. It is very difficult to complete the multiple remaining project's tasks by only persisting with the same practices employed so far. There is a need for focus and innovation, taking advantage of trends towards decentralization and the entry of new actors (Micro, Small and Medium-sized Enterprises - MSMEs) into the Cuban economy.

Table 9 - Recommendations of the Terminal Evaluation

REC	Recommendation of the Terminal Evaluation	Responsible Entity/ies	Time frame
A	***Category 1: Develop a comprehensive sustainability strategy that addresses identified bottlenecks***		
A.1	*Define clear, holistic objectives for the sustainability strategy, focusing on the most important implementation factors*. The sustainability strategy should go beyond a list of outstanding activities to be carried out and focus on achieving concrete final results. A holistic objective could be "to complete the demonstration of the generation and use of biogas and biodiesel (from technologies integrated in Cuba) in the Municipality of Manatí". This objective is feasible to be achieved given the municipality actors' attitude and the high alignment of their incentives with the objectives of Bioenergy. This requires concentrating efforts in this municipality and minimizing future efforts in Yaguajay	EEIH, Cubaenergy and GESIME	Before project closure
A.2	*Identify the professional profiles needed to achieve the objectives of the sustainability strategy*, and then define the integration of the "new" PMU. For example, to achieve the holistic	EEIH, Cubaenergy	Before project

REC	Recommendation of the Terminal Evaluation	Responsible Entity/ies	Time frame
	objective defined above for Manatí (recommendation A.1) staff with engineering, product development and marketing profiles will be needed. The proposed intervention in Manatí would include activities such as earthworks for the biodigester, the installation of the biodigester stirring system, and the installation of household appliances in the area surrounding the biodigester.	and GESIME	closure
A.3	*Give a more important role to GESIME in the new PMU*, including, but not limited to monitoring the implementation of industrial companies' commitments. Their responsibility should include monitoring the commissioning of prototypes, and providing feedback to industries on their operation, including repairs or retrofitting if necessary (those are prototypes and therefore it is expected that they may fail or do not function properly)	EEIH, Cubaenergy and GESIME	Before project closure
A.4	*Define a few concrete integrative projects that lead to achieving the strategy's objectives.* One of the projects would be to complete implementation of the biogas engineering work of Manatí, including the necessary pipes and filters for the different points of use and the installation of the corresponding appliances. Another project would be the installation, production and use of biodiesel (including monitoring) in Calixto García. Prioritize technological projects over agronomic or research projects, since technological projects are more comprehensive, have the greatest risk and have a higher potential social impact. Do not scatter efforts on many small tasks	UMP and GESIME in collaboration with UNDP	Until July 31st, 2022
A.5	*Define a results-focused Monitoring and Evaluation (M&E) plan*, identifying indicators related to the production and use of biogas and biodiesel. The indicators to be monitored should include those related to the quality, production and efficiency of Jatropha seeds and all the production costs, so that prices can be adjusted in the future. Continue to involve UNDP in the activities' development and their monitoring. Conduct an external evaluation by mid-2024, to be conducted by bioenergy experts who verify and certify the results of bioenergy production and use	UMP in collaboration with UNDP	Until July 31st, 2022
A.6	*Identify additional financing sources apart from international cooperation funding*, such as the generation of foreign exchange through the provision of consulting services to foreign clients by the *Bioenergy Expert Center*, Cubaenergy or the Bioenergy *Technology Transfer Unit*	EEIH, Cubaenergy and GESIME	Until December 31st, 2022
B	***Category 2: Constitute business units at EEIH and Cubaenergy (with a clear "division of tasks") for the consolidation and scaling-up of the Know-how developed***		
B.1	*Design a detailed business model and formally constitute the Business Unit "Specialized Bioenergy Services" in the EEIH Expert Center*. The business model should *include quantitative definitions and an operational plan*, and it should build on the model developed with inCuba, including a strategy to incorporate staff. A minimum staff should be exclusively dedicated to this business unit. The model must also include foreign income sources to solve the bottleneck of lack of foreign exchange	EEIH, Cubaenergy and GESIME	Until December 31st, 2022
B.2	*Design a detailed business model and formally constitute the Bioenergy Technology Transfer Unit in Cubaenergy (with quantitative definitions and an operational plan).* This model should include a strategy to incorporate staff, with a minimum staff exclusively dedicated to this business unit. The model must also include foreign income sources to solve the bottleneck of lack of foreign exchange	Cubaenergy EEIH and GESIME	Until December 31st, 2022

REC	Recommendation of the Terminal Evaluation	Responsible Entity/ies	Time frame
C	***Category 3: Develop a training plan to promote bioenergy innovation***		
C.1	*Identify and train, in partnership with relevant actors (for example inCuba), young people, women, professionals and entrepreneurial producers* (particularly in Bioenergy intervention areas) that can combine emerging opportunities in bioenergy with the possibility of creating MSMEs to take advantage of such opportunities	PMU	Until December 31st, 2022

Source: Own elaboration

6.3. LESSONS LEARNED

183. At the project design stage, *clearly define and limit actions to what needs to be demonstrated*. Do not confuse demonstration with the deployment or scaling of already implemented activities. In the case of Bioenergy, the cultivation of Jatropha curcas did not need to be demonstrated, because it had been done previously. It was necessary to demonstrate the technical-economic feasibility of biodiesel production using plants manufactured in Cuba. In this sense, it would have been enough to attach the biodiesel plant to an active crop of Jatropha, which is what finally happened with the replacement of Yaguajay by Calixto García.

184. The field of RE is very broad, with a diversity of available technologies and different specificities. Therefore, it is very important to *focus on a single type of technology and master its use.* Otherwise, efforts could disperse and the demonstration could be not conclusive. In this sense, Bioenergy would have been much more effective by choosing a single RE option to demonstrate: biogas or biodiesel.

185. It is important to fully identify the assumptions, risks and mitigation measures in project design. If the risks are significant and expected (as it happens in Cuba, and to a large extent in island countries in cyclone zones) *the most relevant mitigation measure is the simplification of the project design* or the reduction of the project's ambition level.

186. *Define a priori the criteria for selecting beneficiaries, considering the sustainability dimension:* is the proposed benefit relevant to the beneficiary's priorities? Does the proposed benefit solve a "pain" recognized by the beneficiary? Although the municipality of Yaguajay met project criteria at the local government level, the key participant was the Agronomy Company, whose priority proved not to be local development.

187. *Ensure an implementation team sufficiently staffed, with all necessary and complementary skills and full-time dedication to the project.* If the country does not have some of the necessary skills, consider specialized external technical input. Bioenergy would have benefited from a detailed initial consultancy, combining the early definition of technical specifications with the logistics for the selection of suppliers and imports.

7. ANNEXES

Annex 1- Consultancy's Terms of Reference

Annex 2- MTR Consultant's Agreement Form

Annex 3- Initial Report

Annex 4- Evaluation Matrix

Annex 5- Co-financing Template

Annex 6- Thematic Interview Script

Annex 7- Evaluation Mission Activity Schedule

Annex 8- Closing Workshop Program

Annex 9- Fieldwork

Annex 10- Survey Analysis

Annex 11- Database Survey Response

Annex 12- Presentation of Terminal Evaluation Draft

Annex 13- Tracking Tool

Annex 14- Audit Trail

Consultancy for the Final Evaluation of the Project "Clean Energy Technologies for the Areas rural in Cuba (BIOENERGY)"

No. of Project: PIMS 4899

Annexes

October 17th, 2022

Contractor

Financed by

Contractors

Carlos Cesar Yammal

Dariel del Leon Garcia

Table of Contents

Board of Illustrations

Boards

Annex 1 – Terms of Reference of the Consultancy

TERMS OF REFERENCE FOR THE FINAL EVALUATION

UNDP/GEF Project

"Energy Technologies for Rural Areas in Cuba (BIOENERGY)" (PIMS 4899)

project Title:	**Technologies energy clean for the areas rural in Cuba (BIOENERGY)**			
GEF project ID:	5149		*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP PIMS-ID:	4899	GEF financing:	$2,737,524	$2,737,524
Country:	Cuba	AI/AE own:	$50,000	$50,000
Region:	Latin America & the Caribbean	Government:	$8,215,775	$6,113,168
Focal Area:	Climate Change -Mitigation	other:	$11,683,322	$11,683,332
FA Objectives, (OP/SP):	GEF Strategic Objective and Program: GEF-MCC 1: Promote the demonstration, deployment, and transfer of innovative low-Coal technologies	Total co-financing:	$19,949,107	$17,846,500
executing Agency:	Program of nations united for the Development(UNDP)	Total project Cost:	$22,686,631	$20,584,024
Other Partners involved:	Station Experimental of grasses and fodder "Indian Hatuey" (EEPFIH), of Ministry of Education Higher (MONTH)	ProDoc Signature (date projects began):		05/16/2016
		(Operational) Closing Date:	proposed: 05/16/2021	Current: 05/14/2022

1. INTRODUCTION

Of agreement with the procedures and policies of GEF and UNDP for the monitoring and evaluationof the Projects, everybody the Projects of length and medium term of UNDP sponsored by theGEF must undergo to an evaluation final (EF) when I finished the Project. These terms of reference set the points to work in the evaluation final of Project **"Technologies energy clean for the areas rural in Cuba (BIOENERGY)"** (PIMS 4899) implemented through the Station Experimental of grasses and fodder "Indian Hatuey" (EEPFIH), of Ministryof Education Higher (MONTH). East Project started in May of 2016 and have 5 years ofimplementation (the phase of execution of Project I know extended until the 14 of January of 2022).The RU must follow the guide presented in the document **Guidance for carrying out evaluationsend of UNDP projects financed by the GEF.** (http://web.undp.org/evaluation/guideline/documents/GEF/TE_GuidanceforUNDP-supportedGEF-financedProjects.pdf)

2. BACKGROUND OF PROJECT AND CONTEXT

The UNDP/GEF Bioenergy project was conceived with the aim of increasing access to technologies of bioenergy in rural areas from Cuba a leave of the promotion of use of technologies of biodiesel and biogas by part of the farmers.

Specifically, the Project search: (i) strengthen policies government in support for a small-scale bioenergy technologies; (ii) address technological barriers that currently limit the wide production and dissemination of effective biodigesters and biodiesel plants in costs in Cuba; and (iii) establish a detailed net of designers of Projects, maintenance, repair and services of extension for the little ones producers that increase the production local of foods, generate new jobs and income, promotethe resilience local and recover land degraded. The developing of market of bioenergy basstarget beneficiary group means avoiding greenhouse gas emissions from fossil fuels in an amount of 207.1 tons CO_2 eq.

The Project will pursue its objective through the following components:

I Information and development of policies;

II Transfer and development of biodiesel and biogas technologies; and

III Strengthening institutional, training and promotion.

These activities will contribute to Output 1.5.1 of the UNDP Strategic Plan: “Solutions taken to achieve universal access to clean, affordable and sustainable energy”. The same weather, contribute to the Result 3 of Document of Program of Country (COD): "The institutions, the sectors productive AND of services, the governments territorial AND the communities they improve the protection AND the use rational of the means natural AND the ecosystems,resilience to climate change and comprehensive disaster risk reduction management", specifically to Product 3.3 “Increased energy efficiency and promoted the development of renewable energy sources that contribute to mitigating climate change by ensuring an economic development Y Social inclusive".

The activities of Project they started in May of 2016 and the date planned of ending it was May of 2020. I know approved a first extension exceptional the phase of execution of Projectin virtue of its which extended its phase of execution until the 14 of January of 2022. Subsequently, considering the effect of the covid 19 what cause of strength elderly that genderadditional delays in the implementation of the project, it was approved on exceptional grounds, a second extension request for 5 months, which was agreed on June 14, 2022 as the project closing date. The total cost of the project is US $22,686,631. This is finances through a donation of GEF of US $ 2,737,524 and US $ 19,949,107 of co-financing, US $ 8,215,775 of the Government of Cuba[1].

[1] Regarding the national co-financing declared by the national institutions, the variation in the official exchange rate declared by the Central Bank of Cuba by virtue of the Ordering Task, in force in the country as of January 1, 2021. Until December 2020 the official exchange rate in the country was 1 USD equivalent a 1 cup (in these terms I know agreed the co-financing national to the Project. A leave of January of 2021 1 USD is equivalent to 24 CUP. National co-financing reported from January 2021 onwards I know must calculate on base of is rate of official change.

The Committee Executive of Project (CDN) provides decisions based in consensus, in particularly when the project coordinator requires guidance and has final authority onaffairs that require revision and approval official, included plans of worked annual, budget and hiring key code. The CDN search actively and have in bill the contributions oftechnical advisory committee that meets annually, with periodic consultations as needed during all the year. The CDN is integrated by representatives of the institutions key code involved in the Project, who they take the main decisions concerning to the implementation of Project.

UNDP is acting as the GEF agency for this project. The project is executed by Ministry of Higher Education (MES), through the Experimental Station of Pastos and fodder "Indian Hatuey" (EEPFIH), Following the modality of implementation national (NIM) ofUNDP.

The world is currently facing the Covid-19 pandemic, which is affecting people in everywhere and impacting local and global economic activity and transportation systems, what's more of cause interruptions without precedents in the life daily that affect the opportunities for the interaction human that offers the knitting Social. For to guarantee the wellness and the security of UNDP staff and contractors, as well as to ensure that no harm is done to partners, communities and interlocutors, the implementation of this Final Evaluation exercise it will be carried out virtually, as described in "approach and evaluation method" of the presents terms of Reference.

Since March 2020, the Government of Cuba has adopted very strict measures aimed atprevent the spread of the pandemic Covid-19: closing of borders and modality of worked of telecommunication, among others, to ensure social isolation). Until March 7, 2022 a total of 1,073,951 cases were reported in the country, of which 1,063,000 were recovered and 8501 deaths for this illness.[2]

The main effects of the Covid-19 in the developing of Project are the following:

- Slowdown of process of import of the equipment necessary for thefacility of the solutions biogas technology and biodiesel.
- Suspension of activities techniques initially planned for develop them offace-to-face manner.

3. OBJECTIVES OF THE EVALUATION FINAL

The Final Evaluation Report will evaluate the achievements of the project in relation to the results expected, and will state the lessons that allow improving the sustainability of the benefits to while contributing to the overall performance of UNDP programming. The report promotes accountability and transparency and evaluates the replicability of the achievements of the Project.

4. APPROACH and METHOD OF EVALUATION

With the weather I know he has developed an approach and a method[3] general for realize

[2] Ministry of Health Public. Republic of Cuba. https://salud.msp.gob.cu/

[3] For additional information on methods, see Handbook on Planning, Monitoring and Evaluating forDevelopment Results , Chapter 7, pg. 163

evaluationsendings of Projects financed by the GEF supported by the UNDP. I know wait that the evaluatorframe the evaluation effort using the criteria of relevance, effectiveness, efficiency, sustainability and impact, as defined and explained in the UNDP Guide to Conducting terminal evaluations of GEF-funded projects supported by UNDP. A set of questions covering each of these criteria has been drafted and is included with East TOR. (Watch Annex D) I know wait that the evaluator amend, complete and present its matrix what part of the initial evaluation report, and the will include what exhibit to the final report.

The evaluation must provide evidence-based information that is credible, reliable and Useful. The evaluator is expected to follow a participatory and consultative approach that ensures narrow collaboration with the counterpart's government, in particular the point focal GEF Operational Team, UNDP Country Office, Project Team, Technical Advisor of GEF, of UNDP in the region and the parts interested key code. The elderly part of the informationwill be obtained remotely, as well as interviews with territorial actors. The interviews are they will carry a cape with the following organizations and individuals what minimum:

- Pasture and Forage Experimental Station "Indio Hatuey" (EEPFIH), which belongs to the Ministry of Education Upper (MONTH)
- Center of Management of the Information and Development of the Energy (CUBAENERGY)
- Address of Energy of the Ministry of the Agriculture
- Address of Energy renewable from Ministry of Energy and mines
- Address of Developing Industrial of Cluster Business of the Industry sideroMechanics
- Government Local of municipality Yaguajay and actors key code of is location involvedin the project
- Government Local of Manatee municipality and actors key code of is location involvedin the project
- Project FR local, coordinated from the University from Sancti spirits
- Project BIOMES Cuba, coordinated from the EEPFIH

The evaluation team will review all relevant sources of information, such as the Document of Project, the Reports Progress (PIR) of Project, the reviews budget, the Mid-term review, project files, legal and strategic documents nationals, and any other material that the team considers useful for this. The evaluation is makes based in evidences. In the Annex B. of these Terms of Reference it includes a readyof documents that the project team will provide the equipment for your review.

The specific design and methodology of the PE shall leave of the consultations between the team evaluator and the parts mentioned previously on it that it is appropriate for the evaluation, evaluation objectives and questions, given budget, time and data constraints. The equipment evaluator must, without embargo, use methodologies with approach of gender and toolsthat ensure gender equality and the empowerment of women, as well as other aspectstransverse incorporated in the report of the EF.

The approach methodological final must include a cluster of interviews, visit of countryside if it is possible,by part of the national evaluator and data that they will be used in the evaluation and must be clearly set out in the Initial Assessment Report and be fully discussed and agreed Come in UNDP, the parts interested and the team evaluator.

Since the eleven of March of 2020 the Organization International of the Health declared the covid-19 what global pandemic when the new coronavirus spread rapidly around the world. Starting of that moment the movements within of country were limited, by it that unfortunately, the consultant will not be able to visit the demonstration sites of the project. By Therefore, it was

determined that the final evaluation will be carried out virtually. In addition, the team evaluator should develop a methodology that takes this into account, including the use of methods alternative for conduct interviews remote via phone and on-line (WhatsApp*, JitsiMeet, Microsoft team, zoom,* etc.), analysis of data, and surveys Y questionnaires of evaluation. The methodology of interview a use must be detailed in the report initial ofevaluation.

What the EF will be virtual, I know must to have in consideration the availability of the parts interested in interviewing. In addition, your internet accessibility from home shouldbe had in bill for be guaranteed at the hour of realize the interviews. These limitationsmust be reflected in the report end of evaluation.

The international consultant can work remotely with the national evaluator, who could carry out some field visits if the epidemiological situation allows it. None of people involved in the evaluation must be put in danger by the Covid-19.

Taking into account that the terminal evaluation will be carried out under virtual modality, in the design methodologically, an extensive period was foreseen for documentary revisions. This makes it easier for the evaluation team has sufficient time to understand the progress in achieving the objectives results; conduct virtual meetings and interviews with stakeholders and have national consultants who conduct face-to-face interviews and visit the areas of intervention, if the epidemiological situation allows it, where the results of the project are verified, in theto the extent permitted by national regulations to deal with the pandemic. The methodologies and approaches used in the evaluation final, so What the limitations facedduring the process, I know will detail in the initial and final reports.

The report final must describe what's more the approach complete of the evaluation final, leaving surethe assumptions made, challenges faced, strengths and weaknesses of the methods used during the evaluation.

5. SCOPE DETAILED OF THE EVALUATION

The TEA will evaluate the performance of Project according to the expectations established in the FrameworkLogical (watch Annex A). The evaluation I know will perform of agreement with the criteria designated in the Guidefor Final Evaluations of GEF/UNDP projects (http://web.undp.org/evaluation/guideline/documents/GEF/TE_GuidanceforUNDP-supportedGEF-financedProjects.pdfinsert hyperlink *).*

The findings section of the Report will cover the topics listed below (see Annex C withthe index of Report). The asterisk "(*)" indicates the criteria that require a rating.

Findings

i. Design/Formulation of Project
   - Priorities nationals
   - Theory of change
   - Equity of gender and empowerment of the women
   - Safeguards environmental and social
   - Analysis of Framework of Results: logic of Project, indicators
   - assumptions and risks
   - lessons of others Projects relevant (eg of the same area focal) incorporatedto the design of the project
   - Stake of actors planned

- Link of the project with others interventions within of same sector
- arrangements management

ii. Implementation of Project

- Driving adaptive (changes to the design of Project and Departures during the implementation)
- Stake real of actors and management of the alliances
- Financing and co-financing
- monitoring and evaluation: design initial (*), implementation (*), and evaluation general ofI (*)
- Agency of implementation (UNDP) (*) and Agency of execution (*), Supervision and execution (*)
- Driving of risks, including standards social and environmental

iii. Results of Project

- Evaluation of the achievement of the results according to the indicators, reporting the level ofprogress for each indicator of outcome and objective, to the moment of the TEA andpointing out achievements endings
- Relevance (*), Effectiveness (*), Efficiency (*) and result final of Project (*)
- Sustainability: financial (*), socio-political (*), framework institutional and governance(*), environmental (*), general (*)
- Appropriation national
- Equity of gender and empowerment of the women
- Issues transverse (poverty, governance, mitigation and adaptation to the climate change, prevention disaster and recovery, human rights humans, ability of developing, cooperation south-south, management of knowledge, volunteering, etc., according to be relevant)
- Additionality of the GEF
- Role catalyst / Effect replicator
- Progress towards the achievement of impacts

Main finds, Conclusions, recommendations and lessons learned

- The EF will include a summary of main findings. The findings must be based in the analysis of the data.
- The section of conclusions I know will write in function of the findings. Shall be approaches encompasses and balanced, right backed by evidence and connected with the findings of form logic. Shall be pointed out the strengths, weaknesses and results, answer the evaluation questions and approach the ID of solutions at the problems important relative to the beneficiaries, theUNDP and the GEF, including the topics relative a the equity of gender and the empowerment of the woman.
- The recommendations must be concrete, practical, feasible and objective, aimed at the users linked to the evaluation. They must be supported by evidence and related with the findings and the conclusions.
- The Report, what's more, will include the lessons learned of exercise of evaluation, including good and bad practices in the attention of the topics relative to the relevance,execution (methods programmatic and of evaluation used, alliances, etc.), that are applicable to other UNDP and GEF initiatives. Whenever possible, the team evaluator should include examples of good practice in the design and implementation ofProjects.

The Report will include the Table Ratings following:

Monitoring & Assessment (I)	Rating[4]
I design at entry	
I Plan Implementation	
Overall Quality of I	
Implementation & Execution	**Rating**
Quality of UNDP implementation/oversight	
Quality of implementing partners Execution	
Overall quality of implementation/execution	
Assessment of outcomes	**Rating**
relevance	
effectiveness	
Efficiency	
Overall project outcome Rating	
Sustainability	**Rating**
Finance resources	
Socio-political/economic	
institutional framework and governance	

[4] outcomes, effectiveness, Efficiency, I, I&E execution, relevance are rated on a 6 point rating scale: 6 = Highly Satisfactory (HS), 5 = Satisfactory (S), 4 = Moderately Satisfactory (MS), 3 = Moderately unsatisfactory (MU), two = unsatisfactory (OR), 1 = highly unsatisfactory (HU). Sustainability es rated on a4 point scale: 4 = Likely (L), 3 = moderately Likely (ML), two = moderately Unlikely (MU), 1 = Unlikely (OR)

Environment	
Overall Likelihood of Sustainability	

6. TIME OF THE EVALUATION

The total duration of the EF will be 34 days within the period from March to May 2022, and will not will exceed three months from the hiring of the consultants. The tentative term of the EF is theNext. These dates are indicative. These times could be adjusted according to the situation of the pandemic Covid-19:

DATES	EXERCISE
17 of March	Selection of Equipment Evaluator*
22 of March	Signature of contract Come in EEPFIH and evaluators
24 and 25 of March (2 days)	Preparation of the evaluation (delivery of documentation)
28 of March – fifteen of April (6days)	Revision of documents and preparation of Report Initial of the PE**
14 – fifteen of April (1 day)	Ending and validation of report initial of the EF
18 – 26 of April (8 days)	Online information exchange (teleconference, mail survey andothers alternatives) with parts interested, beneficiaries and others actors key code
26 of April	Presentation on-line of the first conclusions
April 27 – May 5 (12days)	Elaboration of eraser of Report final
twenty of May (5 days)	Incorporation of tracks of audit a leave of comments about the eraserof report
May 31 (1 week after receiving the management response - Management Response-)	Date planned of ending complete of the EF

** The contract I know will sign of agreement to the normative national having in bill that the ProjectI know implements low Modality National (NIM).*

*** The options for the exchange of information in line and the topics continue must be includedin the report Initial. Must introduce oneself so much in English like in Spanish.*

7. DELIVERABLES

#	Deliverable	Description	Weather	Responsibilities
1	Report of Start	The evaluation team prepare and present Report Initial to the UNDP and To the address of project, in which clarify goals and methods of the EvaluationFinal.	within 2 subsequent weeksto the exchange of initial information (delivery documentation) *(fifteen of April, 2022)*	The evaluation team sends theReport of home to UNDP/Cuba and the Unit for Driving of Project
two	Presentation	Findings initials	At the end of exchange of information and online interviews *(26 of April, 2022)*	The team introduces UNDP/Cuba and the Unit for Driving of Project
3	Draft Report Final	Eraser complete *(according totemplate in Annex C)* with annexes	within 3 weeks afterfinished the exchange of information and interviews on-line *(5 of May, 2022)*	Team sends draft to UNDP/Cuba and the Unit for Driving of Project. Also reviewed by Technical Advisor and Point Focal of GEF in Cuba
5	Final Report in English and Spanish +Audit Trail	Reviewed final report and Audit Trail, in which details how the comments were received and answered in the Report *(Watch Annexh)*	Within a week of receivedthe comments to eraser (*31 of May, 2022)*	The team sends both documents a UNDP/Cuba andManagement Unit of the Project

The Final Report of the EF must introduce oneself in version in language English and Spanish. I know will considerfilled when I know have compliment the expectations of the evaluation and its quality comply with the standards either requirements UNDP / GEF.

The quality of everybody the reports of the Evaluation will be evaluated by the Independent Office ofUNDP Evaluation (IEO). Details of the quality assessment are found in Section6 of the

Guide of Evaluation of the UNDP[5].

8. ARRANGEMENTS OF IMPLEMENTATION

The Office of Country of UNDP, together with the Unit of Management of Project, will assume theresponsibility of the coordination and the logistical arrangements of the TE.

The Project Management Unit will hire the consultants and will also be responsible for provide everybody the documents relevant, program interviews and, a weather, provide the contract payments.

The EF Team will meet virtually with UNDP Cuba at the beginning and end of the process. I know they will organize conference calls with the Adviser Technical Regional a position of Project in the Center UNDP Regional. Other meetings can be arranged if one of the parties considers it necessary.

9. COMPOSITION OF EQUIPMENT EVALUATOR

The equipment of evaluation will be compound by 1 evaluator international and 1 national evaluator.The consultants must have previous experience in the evaluation of similar projects. The experience with Projects financed by the GEF it is an advantage. The evaluators selected they should not have to participated in the preparation and / either implementation of project and should have no conflict of interest with activities related to the project.

Leader of equipment (consultant international)

a. Degree of Master either Doctor in engineering, sciences energy, agronomic, ofclimate change either some other countryside near;
b. Knowledge of UNDP and the GEF;
c. Experience previous with methodologies of tracing and evaluation based in results;
d. Knowledge technicians in the area focal of Mitigation of Climate change;
e. Ability communicative in the Languages Spanish and English;
f. Show understanding in issues related a gender and mitigation of climate change;
g. Experience working in Cuba or with others countries of the region;
h. Experience applying indicators SMART and reconstruction either validation ofscenarios of line base;
i. Show skills analytics;
j. Experience with the implementation of evaluations via remote will be considered an advantage.

Expert of equipment (consultant national)

k. Degree of Master either Doctor in sciences energy, agronomic, of change climate either some other countryside near;
l. Work experience with management of environmental information, climate change,energetic, policies related to public these topics or other affine field;
m. Experience of worked in topics energetic me change climate and planningby the less 5 years;
n. Show knowledge of the policies public, frames regulatory andinstitutional in

the sector environmental, climate change and energetic;

o. To show familiarity with the Convention International of Change Climate and othersagreements environmental multilateral related;
p. Experience of worked with UNDP and the GEF will be considered as advantage;
q. Experience applying indicators SMART and reconstruction either validation ofscenarios of line base;
r. Ability communicative in idiom Spanish;
s. Show skills analytics;
t. Experience with the implementation of evaluations via remote will be consideredan advantage.

10. ETHICS OF EVALUATOR

The equipment evaluator will observe the plus tall standards ethical, and the evaluators shall signa code of conduct. The evaluation will be carried out following the principles indicated in the 'ethical Guidelines for Evaluation'. The evaluators shall safeguard the Rights and confidentiality of the providers of the information, interviewed and counterparts, for ensure compliance with legal codes and other relevant aspects. In addition, they must ensure the security of the information collected before and after the evaluation, as well as the anonymity and confidentiality of information sources whenever required. The information and data raised during the evaluation, only must be used to this end and No forothers uses without the authorization express of UNDP and partners.

11. SCHEME OF PAYMENT

The evaluators will be contracted with project funds. The payment scheme will be next:

- 50% of the total upon satisfactory delivery of the draft Evaluation Report to UNDP Cuba.
- 50% of total at the delivery and acceptance of Report and its approval by part of AdviserUNDP Regional Technician (upon signing the Approval form – Annex G), and upon delivery of audit trail filled (Annex H).

Criteria for the issue of payment of 50% final:

- The Final report it includes everybody the requirements specified in these ToR.
- The Report final this written clearly, organized of form logic and it is specific to this project (i.e. the text has not been copied and pasted from other reports)
- The Audit Trail includes answers and justifications for each comment.

The quality of the final report will be assessed by UNDP/Cuba and UNDP/Regional. If does not meet the standards or requirements, the evaluation team will be asked to review it or write it out how many times necessary, before to perform the payment final

12. ANNEXES

a. ToR Annex A: project Logical/Results Framework
b. ToR Annex B: project Information Package to be reviewed by TEA team

c. ToR Annex C: content of the TE report
d. ToR Annex D: Assessment Criteria Matrix template
e. ToR Annex AND: UNEG Code of Conduct for Evaluators
f. ToR Annex F: TEA Rating Scales
g. ToR Annex G: TEA report Clearance Form
h. ToR Annex H: TEA audit trail

Annex 2 - MTR Consultant Agreement Form

The evaluators/consultants:

1. Must introduce an information complete and fair in its evaluation of the strengths and weaknesses,such way that the decisions either Actions taken to cape I know find well founded.

2. They must disclose the full set of conclusions together with information on their limitations andmake it available to all those affected by the evaluation who have the express right to receive the results.

3. They must protect the anonymity and confidentiality of individual informants. Shall to offer the maximum weather of notification, limit the demands of weather and respect the law of thepeople not to get involved. Evaluators should respect the right of individuals to grant information of way confidential, and must make sure of that the information sensitive No can betraced back to its origin. Evaluators are not required to evaluate individual persons but must hold the Balance between evaluation of the functions management and this principle general.

4. Sometimes when conducting assessments they will uncover evidence of crimes. It must be reported discreetly about such cases to the appropriate investigative body. The evaluators must consult with other relevant supervisory entities when there is even the slightest doubt as to whether these topics they should be releases and of what they should communicate.

5. They must be sensitive to the beliefs, uses and customs and act with integrity and honesty in their relations with all the parts interested. In the line of the Statement Universal of Rights Humans of the nations United, the evaluators must be sensitive towards the topics of discrimination and gender equality. They must avoid offending the dignity and self-esteem of those people who establish a Contact during the evaluation. knowing that exists the possibilityof that the evaluation affect negatively a the interests of some parts interested, the Evaluators should conduct the evaluation and communicate the purpose of the evaluation and its results in a way that respect clearly the dignity and the self-esteem of those involved.

6. They are responsible for their performance and (the) product(s) they generate. They are responsible for a clear, precise and balanced written or oral presentation, as well as the limitations, conclusions and recommendations of study.

7. They must apply sound accounting procedures and be prudent in the use of resources of the evaluation

Agreement for abide the Code of Conduct for Evaluators of the system of the UN:

Name of the consultants: Carlos Cease Yammal and Dariel del León Garcia

Name of the Organization consultant (when be necessary): _____

He claimed that I have received and it is understood and that I will abide the Code of Conduct for Evaluators of thenations United.

Signed in _ Cordoba, Argentina (Place) a 05/13/2022 (date)

Signature: Carlos Cease Yammal

Signed in _ Havana, Cuba (Place) a 05/13/2022 (date)

Signature: Dariel of Lion Garcia

Annex 3 – Initial Report

Objectives

The Consultancy for the Final Evaluation of the *"CleanEnergy Technologies Project for the Rural Areas in Cuba (BIOENERGÍA)",* PIMS 4899, aims to evaluate the achievements of the project in relationship with the results expected, and enunciate the lessons that allow to improve the sustainability benefits, while contributing to the overall performance of the United Nations Program united for him Developing (UNDP).

The Project a evaluate I search increase the access a technologies of bioenergy by part of little ones producers rural in Cuba through the promotion of use of technologies of biodiesel and biogas. Forit, the project I know oriented a:

(i) Strengthen government policies in support of small-scale bioenergy technologies scale;

(ii) Treat barriers technological that currently limit the wide production and dissemination of biodigesters and plants of biodiesel effective in costs in Cuba; and

(iii) Establish a detailed network of project designers, maintenance, and repair and extension services for small farmers to increase production local food supply, generate new jobs and income, promote local resilience and recover degraded lands.

The development of the bioenergy market under the target beneficiary group supposes avoiding emissions of gases of effect greenhouse from of fuels fossils in an amount of 207.1 ktons CO_2 eq.

Work Plan

In is section I know describe the activities made by the evaluator, detailing the description of each activity, methodology to be implemented and expected results of each of the activities.

Illustration *1* shows the proposed work scheme for its subsequent description in detail:

Ilustración 1 - Esquema de Fases

Source: Own elaboration in base a the Terms of Reference (ToR) of the consultancy

Stage 1: Plan of Worked

1. **Revision documentary film**

In first instance I know made a revision documentary film of the sources of information relevant forthe consultancy. The main documents reviewed were:

Documents provided by the Experiment Station of grasses and fodder "Indian Hatuey" (EEIH), of the Ministry of Education Higher (MONTH):

- documents relative to the Result Io
  - Atlas national of bioenergy 2018
  - Atlas national of bioenergy 2021
  - documents of contribution a policies public
- documents relative to the Result II
- documents relating to Outcome III
- Trainings of actors
- documents relative to the Center Expert in bioenergy Indian Hatuey
- documents of divulgation
- documents relative to experience with the incubator of business "Incubate"
- documents of the Unit transfer of Technology in Cubaenergy

- Documents of the Unit of Transfer of Technology of Center academic MunicipalYaguajay
- Mid-term evaluation carried out by Gilberto Hernández Pérez, Enrique Riegelhaupt andManuel Alexander Sources
- documents relative to the co-financing, budget and calculation of emissions

Documents provided by the UNDP

- plans Operative Annuals (POAs) corresponding a the years 2017, 2018, 2019, 2020 and 2021
- Document of Program for Cuba 2020-2024
- Rapporteurship Workshop Home Bioenergy 2016
- reports of implementation of Project (PIR) correspondent a 2017, 2018, 2019, 2020 and2021
- PIF
- UNDP Plan of initiation
- Document of Project of the UNDP
- Results of the evaluation Social and environmental UNDP
- Report of insertion of Project
- Reports of progress
- reports of audit
- tracking Tools (Mitigation Change Climate)
- Reports of missions of supervision
- Reports of prepared follow-up by the Project
- Guides financial and of management used by the equipment of Project
- guidelines, manuals and systems operative of the project
- Document (s) of Program of country / countries of UNDP
- minutes of meetings techniques
- maps of Location of site of Project
- Update on the condition of compliance of the measures adopted in response to the recommendations of the Revision of Medium Finished.

2. Elaboration of a Matrix of Evaluation

A leave of study of background, I know large the matrix of evaluation provided in the ToR, arriving to a structure of 14 dimensions: design of Project, relevance, effectiveness, efficiency, sustainability, impact and results, COVID-19, Come in others, that I know established according as defined and explained in the *UNDP Guide for carrying out final evaluations of projectsfinanced by the bottom world for the Environment (GEF) supported by the UNDP.*

The matrix contains the questions to be answered by the consulting team together with the sources of information and the corresponding methodologies to obtain the respective answers. Bliss matrix is attached to this report under the Name "Annex 1 – Matrix Evaluation".

3. ID of actors key code

In this activity, the main actors of the project were identified, to be approached either through through visits, interviews and/or focus groups. Based on the evaluation matrix, the guidelines for the developing of the interviews and Focus Group. A continuation, the *Table 1* Table 1sample the main actors identified:

Table 1- Main actors

Ministry of Education Higher (MONTH)
Address of Relations international
Station Experimental of grasses Y fodder Indian Hatuey (EEIH)
Ministry of Science, Technology and Medium Ambient (CITMA)
Address of Relations international
Center of Management of the Information Y Developing of the Energy (Cubaenergy)
Ministry of Energy and mines (MINEM)
Address of Energy renewable
Ministry of Agriculture (MINAG)
Address of Energy Integral
Business Agricultural Obdulio Morales of Yaguajay
Unit Business of Base (UEB) Agricultural sea cow
Cluster Business Rancher
Cluster Business Agricultural
Cluster Business Forest
Cluster Business Tabacuba

Cluster Business labiofam
Ministry of the Forces Armed revolutionary (MINFAR)
Cluster Business geocuba Guantanamo
Business Agricultural of the FAR
Ministry of Inside (MININT)
Business Agricultural of MININT
Ministry of Trade Exterior and the Investment foreign (MINCEX)
Ministry of the Industry Food (MINAL)
Cluster Business of the Industry food
Office National of Statistics and Information (ONEI)
ONEI National
Offices municipal guane, Yaguajay, cabiguan, sea cow and Baracoa
Ministry of Industries (MINDUS)
Address of Developing of Cluster Business of the Industry sidero Mechanics (GESIME)
Business Mechanics Male
Business Format killings
Unit Economic basic (UEB) Cuban of Steel
Business of the Rubber

Business Industry National producer of Utensils Domestic (INPUD)
producers rural
producers rural of municipality sea cow (Province The prickly pears)
producers rural of municipality Yaguajay (Province Sancti Spirits)

Source: Own elaboration

From the initial Project evaluation meeting, the following actors were identified in order to have a more complete perspective on the future projection of theProject:

- Incubator of Companies of the University of The Havana;
- Bank of Agricultural Development;
- Consumimport (Importer of Project); and
- Visit to the location of Calixto Garcia.

4. Definitions methodological

The methodology to be implemented will be framed in the evaluation criteria proposed by the Guide agreed between UNDP and the GEF to carry out final evaluations of financed projectsby the GEF supported by UNDP. The evaluation will minimally cover the criteria of relevance, effectiveness, efficiency, sustainability and impact, adding other dimensions such as equity of gender, problematic transverse, appropriation national of the results of Project, Come in others. Additionally, I know incorporate dimensions that pick up questions about of design of Project, thepandemic of COVID-19 and What keen a the execution of Project. In the *Table 2*is detail the criteriaproposed for him UNDP and that will be considered during evaluation:

Table 2- UNDP Evaluation Criteria

Criteria of Evaluation of UNDP
1. Relevance (*)
The measure in that the objectives of an intervention of developing are consistent with the requirements of the beneficiaries, the needs of country, the priorities global and the policies of the partners and donors.
2. Effectiveness (*)

The extent to which the objectives of the development intervention were achieved, or are expected to be achieved, taking into account bill their relative importance. Note: Also I know uses What a measure added of (either judgment on) the merit either the worth of an exercise, it isi.e. the extent to which an intervention has achieved, or is expected to achieve, its main objectives relevant of way efficient and sustainable and with an impact positive in the developing institutional. Related term: effectiveness.
3. Efficiency (*)
A measure of What economically the resources/inputs (money, experience, weather, etc.) I know convert in results. I know apply plus Commonly to the link of entrance exit in the string causal of anintervention.
4. Result general of Project (*)
The calculation of the qualification general of the results of Project I know will base in the ratings of relevance, effectiveness and efficiency, of which the relevance and effectiveness are critical.
5. Sustainability (*): financial, socio-political, framework institutional and governance, environmental, probability general sustainability
The sustainability it is the continuation either probable continuation of the effects positive of a Project after that it has come to an end, and its potential for expansion and/or reproduction. The projects supported by the UNDP and GEF funded projects are intended to be environmentally sustainable, institutional, financial, political, cultural and Social. The probability of sustainability of the results of Project in terms of each one of the risks mustbe discussed individually and assign grades separated. All the dimensions risky of the sustainability are critics. Note: The equipment of the evaluation final also can to have in bill risks additional that they can to affectthe sustainability.
6. Appropriation national
Relevance of Project for the agendas environmental and of developing national, the commitment of country receiver and the agreements regional and international, as appropriate.
7. Fairness of gender and empowerment of the women

The gender equality assessment should be present throughout the final evaluation report, but a dedicated section covering the areas outlined below is required. The final report should assess the project's gender outcomes, which are defined as project outputs or outcomes that contribute (positively or negatively) to gender equality and women's empowerment. Gender outcomes of a GEF-funded project would include planned outcomes as part of the project's gender action plan and results framework, as well as any other unplanned gender outcomes produced by project activities.

Gender equality refers to the equal rights, responsibilities and opportunities of women and men, girls and boys. Equality does not mean that women and men will be equal, but rather that the rights, responsibilities and opportunities of women and men will not depend on whether they are born male or female. It implies that the interests, needs and priorities of both women and men are taken into consideration, recognizing the diversity of different groups of women and men. Gender equality is not a "women's issue", but concerns and must involve both men and women. Equality between women and men, girls and boys is seen as both a human rights issue and a precondition and indicator of people-centered sustainable development. It is also an essential component for the realization of all human rights.

8. Issues transverse (poverty, governance, mitigation and adaptation to the change climate, prevention of disasters and Recovery, Rights humans, ability of developing, cooperation south-south, management of knowledge, volunteering, etc., as may be relevant)

GEF-funded projects supported by UNDP are key elements in the planning of the UNDP country. As such, the objectives and results of the project must align with the strategies of the organization. UNDP country planning, the SDGs, as well as with the global environmental benefits required by the GEF, as described in the global environmental conventions. Final evaluation reports must therefore assess how successfully projects are integrating other UNDP priorities, which include but are not limited to: poverty alleviation, improved governance, mitigation and adaptation to change climate, prevention and Recovery of disasters, Rights humans and developing of capabilities, cooperation South-South, management of knowledge, volunteering, etc., according to appropriate, and What the Projectsincorporated the commitment UNDP with the based approaches in rights in its design.

9. Additionality of GEF

The GEF Evaluation Policy states that the final evaluation will assess the additionality of the GEF, defined What the result additional (so much environmental What of other Type) that I know can associate directlywith the GEF supported project.

10. Role catalyst/ Effect replicator

Replication can be considered when lessons and experiences are replicated in different areas geographic locations, and also when lessons and experiences are replicated within the same area, but financed by others sources. The examples of approaches of replication include: ● Transfer of knowledge (it is tell, diffusion of lessons a through of documents of results ofProjects, workshops of training, exchange of information, a forum national and regional, etc.); ● Extension of Projects demonstratives; ● Developing of capabilities and training of people and institutions for enlarge the achievements of Project in the country or in other regions; ● Use of people, institutions either Business trained in the Project for replicate the results ofProject in other regions.
11. Progress towards the achievement of impacts
The final evaluation team should assess and report on progress towards long-term impact described in the theory of change of Project and the measure in that the impact a length term I know can attribute to the Project.
12. Progress towards the objective and the results expected
GEF-funded and UNDP-supported projects are expected to achieve results planned to the closing of Project. The report of the evaluation final must assess individually the achievement of theresults against indicators reporting on the level of progress for each goal and performance indicator result in the moment of the evaluation and scoring the achievements endings.

(*) The final evaluation report must include an evaluation of the results measured by aspects more wide. Several of these items require of use of system of classification of GEF, plus there of analysisdescriptive. Classified Items are marked with asterisk.

Source: *United Nations Development Program (2020). Guidance for driving terminalevaluations of UNDP-supported, GEF-financed projects*

5. Elaboration of an outline of Final Report

In this activity, the outline of the final evaluation document of the project was elaborated. The sketchtentative of same it is the next:

i. cover
   - Consultancy for the Final Evaluation of the Project "Clean Energy Technologies for Rural Areas in Cuba (BIOENERGY)"
   - Project Number: PIMS 4899
   - March 17 to May 31, 2022
   - Cuba
   - Contractor: UNDP
   - Funded by: GEF
   - Contractor: Carlos César Yammal and Dariel de León García

ii. Acknowledgments
iii. Table of Contents
iv. acronyms Y abbreviations

1. Summary Executive (3-4 pages)
   - Project information table
   - Brief description of the project
   - rating table
   - Concise summary of findings, conclusions and lessons learned
   - Summary table of recommendations
2. Introduction (2-3 pages)
   - Purpose and objective of the Final Evaluation
   - Approach
   - Methodology
   - Data collection and analysis
   - Ethics
   - Limitations to the evaluation
   - Structure of the Final Evaluation report
3. Description of Project (3-5 pages)
   - Start and duration of the project, including milestones
   - Development context: environmental, socio-economic, institutional and policy factors relevant to the objective and scope of the project
   - Problems that the project sought to address: threats and barriers that it faced
   - Immediate and development objectives of the project
   - Expected Results
   - Main stakeholders: summary list
   - Theory of Change
4. recommendations

   4.1 Design/Formulation of Projects

   - Analysis of the Results Framework: project logic and strategy, indicators
   - Assumptions and Risks
   - Lessons from other relevant projects (eg same focal area) incorporated into project design
   - Planned stakeholder engagement
   - Links between the project and other interventions within the sector

   4.1 Implementation of Project
   - Adaptive management (changes to project design and project deliverables during implementation)
   - Real stakeholder engagement and partnership agreements
   - Financing and co-financing of projects
   - Monitoring and evaluation: design at the beginning (*), implementation (*) and general evaluation of M&E (*)
   - Implementation/supervision (*) of the UNDP and execution of the Implementing Partner (*), general implementation/execution of the project (*), coordination and operational issues

   4.2 Results of Project
   - Progress towards the objective and the expected results (*)
   - Relevance (*)
   - Efficacy (*)
   - Efficiency (*)
   - Overall result (*)
   - national ownership
   - Gender equality and empowerment of women

- Other cross-cutting themes
- Social and Environmental Standards
- Sustainability: financial (*), socioeconomic (*), institutional framework and governance (*), environmental (*) and general probability (*)
- GEF Additionality
- Catalyst Role/Replicator Effect
- Progress towards achieving impacts

5. main findings, Conclusions, recommendations and Lessons learned
   - Findings main
   - Conclusions
   - recommendations
   - lessons learned
6. Annexes
   - Terms reference of the Evaluation Final (excluding the annexes of the ToR)
   - itinerary of the mission of the Evaluation Final
   - Ready of people interviewed
   - Ready of documents reviewed
   - Summary of the visits of countryside
   - Matrix of questions of evaluation (criteria of evaluation with questions key code,indicators, sources of data and methodology)
   - Questionnaire used and abstract of results
   - Paintings of co-financing (if No are included in the body of report)
   - scales of qualification of the Evaluation Final
   - Form of Agreement of Consultant of Evaluation signed
   - Form of Code of Conduct of Cluster of Evaluation of the nations united (GENU) signed
   - Form of authorization of report of the Evaluation Final signed
   - Annex in a separate file: Final Evaluation audit itinerary (TE Audit track)
   - Annex in a separate file: basic indicators or monitoring tools of GEF/Fund for the countries less advanced (FPMA)/Fund Special forthe Climate change (FECC), according to correspond

6. **Elaboration of Initial Report**

Here I know elaborated the Plan of Work, where I describe the activities made and elaborated with its methodology and the products expected. The same, this structured in 4 stages:

1. Plan of Worked
2. initial findings
3. Eraser of Report Final
4. Report Final

Consequently I know will deliver four products that will contain the results relevant of the activities of each stage.

A time delivered East Plan of Worked, I know will fix a meeting with the authorities for that they approvethe plan initial and give returns and comments from gets better.

Stage two: Initial Findings

1. Initial meetings with authorities

The initial meeting with the project authorities will be held in a hybrid modality: the consultant national Dariel of Lion Garcia will be Present of way face-to-face and the consultant international Cease Yammal will attend of way virtual through of the platform of videoconferences *JitsiMeet* , and in its flaw I know will use *Google Meet* . Likewise, I know will use the app WhatsApp like a resource necessary in case of need speed up the coordination of process. The objective of the meetingwill be to know the specific expectations of the counterpart regarding the study and present to itthat activities I know they will carry out to perform the evaluation.

2. Elaboration of guidelines for visits, interviews and focus groups

In order to address the Hybrid Evaluation Mission, this activity will be aimed at preparing the guidelines of the instruments of harvest of information: visits, interviews and Focus Group.

Scripts will elaborated that they will work as scheme counselor of the themes and important points to deal with during the development of each of the activities. Three scripts will be developed, one for each type of actor involved:

a) representatives of Ministries;
b) representatives of companies; and
c) producers rural

It will be important to emphasize that during the development of these activities it will be used as resource additional of harvest of information the use of the recording of testimonials and the implementation of surveys.

For the realization of visits, interviews and Focus Group I know will have in bill the opinion of the key actor's code.

3. Design of surveys

In order to systematize the collection of information, surveys will be developed and designed to each of the three groups of actors identified. The surveys will be applied online through the Google Forms platform) to representatives of ministries and companies, while that in the case of the producers that No tell with access to Internet I know will apply in paper by partof local consultant (particularly during the visits to the municipalities).

The main objective of the surveys is to collect information of a quantitative nature and qualitative, in achieving the objectives and indicators mentioned in the evaluation matrix. The surveys they will be designed of Way that be of easy comprehension and response.

Table
specifies the data collection instruments to be applied to *each* actor key code identified.

Table 3- Fieldwork Methodology

Actors	Instrument of Harvest of Information			
	Visit	Interview	Cluster Focal	Poll
Ministry of Education Higher (MONTH)				
Address of Relations international		✓		✓
Station Experimental of Indian Pastures and Forages Hatuey	✓		✓	
Ministry of Science, Technology and Media Ambient (CITMA)				
Address of Relations international		✓		✓
Cubaenergy		✓		
Ministry of Energy Ymines (MINEM)				
Address of Energy renewable		✓		✓
Ministry of Agriculture (MINAG)				
Address of Energy Integral		✓		✓
Agricultural Company Obdulio Morales of Yaguajay	✓			
UEB Agricultural sea cow	✓			

Cluster Business Rancher				✓
Cluster Business Agricultural				✓
Cluster Business Forest				✓
Cluster Business Tabacuba				✓
Cluster Business labiofam				✓
Ministry of the ForcesArmed revolutionary (MINFAR)				✓
Cluster Business geocuba Guantanamo				✓
Business Agricultural of the FAR				✓
Ministry of Inside (MININT)				✓
Business Agricultural of MININT				✓
Ministry of TradeForeign and Investment foreign (MINCEX)		✓		✓
Ministry of the IndustryFood (MINAL)				✓
Cluster Business of the Industry food				✓
National Office of Statistics and Information (ONEI)				
ONEI National		✓		

Guane Municipal Offices,Yaguajay, Cabaiguan, Manateeand Baracoa				✓
Ministry of Industries (MINDUS)				✓
Developing GESIME		✓		
Business Mechanics Male	✓			✓
Company Format killings				✓
UEB Cuban of Steel	✓			✓
Business of the Rubber	✓			✓
Business INPUD	✓			✓
producers rural				✓
rural producers of sea cow	✓		✓	✓
rural producers of Yaguajay	✓		✓	✓
Actors additional				
business incubator the University of The Havana		✓		
Bank of promotion Agricultural		✓		
Consumimport		✓		
Calixtus Garcia	✓			

Source: Own elaboration

4. Mission of Evaluation hybrid

In is exercise I know will proceed an implement the instruments of harvest of information proposed with previous confirmation of the actors' key code, according to the diary prepared by the Unit ofManagement of Project (See Annex 2- Schedule of Activities of Mission Evaluation).

Due to public knowledge issues involving the COVID-19 pandemic, the entire of the Evaluation Mission will be developed in a hybrid way, that is, activities of modality face-to-face and virtual, always having in bill safety of the people attendees.

The activities face-to-face I know will develop in the framework of the protocols established by the National Government and will be led by the national consultant Dariel de León Garcia, who will connectinternational consultant César Yammal via the internet. The local consultant will develop his activity underthe orientation consultant methodology international.

5. Elaboration of a presentation Power Point

Finally, I know will elaborate a presentation in Format Power Point in where I know will indicate themain findings found during the recollection of information.

Stage 3: Eraser of Report Final

1. Description of approach complete of the Evaluation Final

A description of the complete approach used in the development of the Final Evaluation will be elaborated, having been dyed in an approach participatory and advisory for to guarantee a narrow collaborationwith the counterparts governmental.

2. ID of findings and lessons learned

In this activity, the main findings will be identified and the lessons learned will be pointed out. Infunction of sayings finds, I know they will write the conclusions plus relevant. The same they will be posed in a comprehensive and balanced way, supported by evidence and connected with the findings logically.

Regarding the lessons learned, good practices related to the topics will be identified. Relevant.

3. Elaboration of recommendations of improvements and lines of action future

Within the framework of the final evaluation, recommendations for improvements will be made and then proceed with proposals on future lines of action. The recommendations will be concrete, practical, feasible and objective, aimed at users linked to the evaluation. They will be supported by evidence and related to the findings and the conclusions.

Likewise, the strengths, weaknesses and results will be pointed out, which will allow the identification of solutions to problems relating to the beneficiaries.

4. Elaboration of Eraser of Report Final

The document "Draft of the Final Report" will be prepared to be delivered to UNDP-Cuba already Project Management Unit. It will contain a description of the project, approach and methodology used for the evaluation, the main findings, the lessons learned and the recommendations of gets better. Saying contents will remain subject a revision for the later elaborationof Report Final ending.

Stage 4: Report Final

1. Revision of eraser of Report Final and incorporation of comments

What part of is exercise, I know will review the third deliverable "Eraser of Report Final" and will be incorporated the comments and fixes made by counterpart.

2. **Elaboration of Report Final and Audit Trail**

I know will elaborate a document of evaluation final of Project, saying document will be compound bythe final report and the audit itinerary (or Audit Trail). In the itinerary, it will be explicitly indicated how the comments received were addressed in the revised Final Evaluation Report, as observe in the *Table 4.* East itinerary of audit will be delivered in set with the Final Report.

Table 4 - Model of itinerary of audit

Institution/ Organization	Number of comment	Number of paragraph/ Location of the comment	Comment/ feedbackof the draft of report of the Evaluation Final	Response of the team of the final evaluation and Actions taken

Source: Terms of Reference for the Evaluation Final of Project UNDP/GEF *"Technologies clean energy for the areas rural in Cuba (BIOENERGY)"* (PIMS 4899): Annex H - Audit Trail

Once the final report in Spanish is approved, it will be translated into English, in accordance with the terms of the contract, giving with it completion to consultancy.

Products to Deliver

In the *Table 5* I know show the products to deliver and the date's delivery planned.

Table 5 - Products a Deliver

Product	Description	Date of delivery
Deliverable 1: Report of Start	Document that contain: - Scheme of Worked	14 of April of 2022
Deliverable 2: Presentation	Presentation on-line that contain: - Summary of worked of countryside - Findings initials	26 of April of 2022
Deliverable 3:Draftof Final report	Document that contain: - lessons learned, recommendations of gets better Y lines of future action - Contents of Report Final - Annexes	5 of May of 2022
Deliverable 4: Report Final and Audit Trail	Document that contain: - Report Final in Spanish - Report Final in English - Audit Trail - Annexes	31 of May of 2022

Source: Own elaboration in base a the Terms of Reference

3. Mission of Evaluation hybrid

In is exercise I know will proceed an implement the instruments of harvest of information proposed with previous confirmation of the actors' key code, according to the diary prepared by the Unit ofManagement of Project (See Annex 2- Schedule of Activities of Mission Evaluation).

Due to public knowledge issues involving the COVID-19 pandemic, the entire of the Evaluation Mission will be developed in a hybrid way, that is, activities of modality face-to-face and virtual, always having in bill safety of the people attendees.

The activities face-to-face I know will develop in the framework of the protocols established by the National Government and will be led by the national consultant Dariel de León Garcia, who will connectinternational consultant César Yammal via the internet. The local consultant will develop his activity underthe

orientation consultant methodology international.

4. Elaboration of a presentation Power Point

Finally, I know will elaborate a presentation in Format Power Point in where I know will indicate themain findings found during the recollection of information.

Annex 4 – Matrix of Evaluation

Below is *Table 4*with the Evaluation Matrix.

Table 4- Evaluation Matrix

Questions of Evaluation	Indicators	Sources	Methodology
1. Design of Project			
- It is Right the issue that tackles the Project? - Are the assumptions correct? Project? If No it are, what impactin the execution of Project?	- Level of consistency between the issue and theresult forecast of the project. - Validation of each one of the assumptions key code,such and how is established in the Prodoc.	- Document of Project - All the reports of execution of Projects (PIR) - Report of progress - Reports of audit - All the reports of tracing prepared bythe Project - Report of evaluation intermediate andrecommendations - plans operative annual - reviews budget - groups of interest involved	- Revision Documentary film - Interviews - visits
2. Relevance			

- How do you support the project with the main objectives of the focal area of the GEF and with the priorities environmental anddevelopment at the national, provincial and municipal?	- There is a tangible contribution of the project to the main objectives of focal area of GEFand local environmental policies, national development programs and provincial environmental strategies and municipal	- National environmental policies, local programsof development, provincial environmental strategies and municipal	- Revision Documentary film - Interviews - visits
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
-How does the project contribute to the production priorities and strategies and environmental management of small producers involved in the Project?	- Exists a contribution tangible of Project atthe productive strategies of the small producers participating in the project, in organic waste management terms pollutants as well as benefits arising from the implementation, production and utilization of jatropha curcas and their derivatives.	- Reports of performance of Project. - Groups of interest involved.	- Revision Documentary film - Interviews - visits
-How does the project contribute to the development of link of the string providers ofspecialized supplies and technology biodigesters and biodiesel?	- There is a tangible contribution to the Project by development of productive links suppliers of necessary inputs and technologiesfor the sustainability of related projectsa biogas and production of biodiesel.	- Reports of performance of Project. - Groups of interest involved.	- Revision Documentary film - Interviews - visits

-The Project provides lessons and experiences relevant to others Projects Similar in the future?	- There are lessons and experiences derived from the development of the project that provides information key to how to design, execute, evaluate and monitor Projects Similar to run in thefuture	- All the reports of execution of Projects (PIR) - Report of progress - Reports of audit - All the reports of tracing prepared bythe Project - Report of evaluation intermediate andrecommendations - groups of interest involved	- Revision Documentary film - Interviews - visits
3. Effectiveness			
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
- What is the behavior and what are advances in qualitative terms of the indicators of Objective of the Project?	- Compliance of the indicators goal to the final of project, according to its ML.	- Document of Project - Reports of performance of Project	- Revision Documentary film - Interviews - visits
-Did the project be effective in its goal of increasing access to little ones producers a technologies ofbioenergy?	- Compliance of the indicators goal of Project, according to its ML.	- Document of Project - Reports of performance of Project	- Revision Documentary film - Interviews - visits
-I know led a cape the activities in each Component of Project of agreementwith its design and the scope expected in its execution?	- The Results Indicators are achieved expected in each component, according tothe Matrix of Logic frame (MML) of Project.	- Document of Project - Plan Annual Operation - Reports of performance of Project	- Revision Documentary film - Interviews - visits

4. Efficiency			
-The developing of Project I know he has givenwithin of the deadlines planned? - If there was some delay Which were the Causes?	-Level of compliance with the development of activities programmed by Component of agreement at the deadlines established in the design ofProject	- Document of Project of UNDP - All the reports of execution of Projects (PIR) - Report of progress - Reports of audit - All the reports of tracing prepared bythe Project - Report of evaluation intermediate andrecommendations	- Revision Documentary film - Interviews - visits
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
		- plans operative annual - reviews budget	
-I know they have used efficiently themeans financial?	-Difference Come in the budget planned and executed. - Co-financing planned vs. real. - Results-Related Costs achieved compared to the costs ofProjects Similar of others organizations.	- Reports financial of Project - Reports of analysis of execution budget and adjustments made by the Project Team with the CO of UNDP - Plan annual operating - Cluster of Project - UNDP CO - groups of interest involved	- Revision Documentary film - Interviews - visits

-It is adequate the management financial ofProject?	-Difference Come in the budget planned and executed. -Co-financing planned vs. real. - Costs related to results achieved compared to the costs ofProjects Similar of others organizations.	- Reports financial of Project - Reports of analysis of execution budgetary and adjustments made by the Project Team with the CO of UNDP - Plan annual operating - Cluster of Project - UNDP CO - groups of interest involved	- Revision Documentary film - Interviews - visits
-Does the Project have an M&E System, that uses for complete, document and secure the activities of their Components and Results?	- System available and updated.	- Document Elaborated by the equipment of Project	- Revision Documentary film
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
-Have the scheduled tasks been fulfilled? In the plans Operative Annuals (POA) of project in each of its components, so that they point to the expected results at the end of the Project?	-Number of scheduled activities / fulfilled according to him POA in the period evaluated.	- Document of Project of UNDP - All the reports of execution of Projects (PIR) - Report of progress - Reports of audit - All the reports of tracing prepared bythe Project - Report of evaluation intermediate andrecommendations - plans operative annual - reviews budget	- Revision Documentary film - Interviews - visits

Have the activities been documented? Scheduled in each Component forto ease the tracing?	-Activities scheduled by Component / yearof execution of Project.	- Plan annual operating - Reports of performance of Project	- Revision Documentary film - Interviews - visits
-National stakeholders continue to play an active rolein project decision making supports efficient implementation and effective of Project?	-Level of stake of the groups of interestin the taking of decisions.	- Document of Project - Plan Annual Operation - Reports of performance of Project - Minutes of Committee of Address - parts interested involved	- Revision Documentary film - Interviews - visits
5. Sustainability			
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
-What are the main challenges could affect the sustainability of results of the project? They have tackled during the management of Project? - What potential measures could contribute to the sustainability of results achieved by the Project?	- Financial, institutional, socioeconomic and / either environmental that couldbe challenges for the Project.	-Document of Project - Cluster of Project - UNDP CO - parts interested involved	- Revision Documentary film - Interviews - visits
-It is enough the level of property of the stakeholders to enable continuation of the benefits of Project?	- Institutional and private actors includeproject objectives in their frameworks planning.	- Planning frameworks, strategies, programmers, manuals, procedures and partsrelevant stakeholders	- Interview - Poll

6. impact and results			
-Has the project succeeded in promoting developing and transfer of technologiesof biogas and biodiesel for small producers rural in Cuba?	-Number of biogas plant projects andbiodiesel developed, implemented and thatis it so in proper functioning	- Reports of performance of Project	- Revision Documentary film - Interviews - visits
-Has the project managed to contribute to the establishment of public policies that contribute to the transfer and diffusion of biogas technologies and biodiesel?	-Policies public and regulations established that promote the development of the sector of technologies FR, in special in matter of biogasand biodiesel	- Reports of performance of Project - regulations and regulations relevant	- Revision Documentary film - Interviews
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
-What social, environmental and economic local I know they have identifiedarising from the implementation of Project?	-There are social, environmental and cheap local in the sites of interventionof the project that identify positive impacts of Project	- Reports of performance of Project	- Revision Documentary film - Interviews - visits
7. Covid-19			
-To what extent was the project affected in its technical implementation and operative due at the pandemic Covid-19?	-Activities No developed by Componentduring the term of the pandemic Covid-19.	- Document of Project - Plan Annual Operation - Reports of performance of Project - Minutes of Committee of Address - parts interested involved	- Revision Documentary film - Interviews - visits

-What adaptive management measures andresilience were adopted on the occasion of the Covid-19 pandemic? What was the effectiveness of these measures?	-Adaptive management and resilience measurestaken during the pandemic period Covid-19.	- Document of Project - Plan Annual Operation - Reports of performance of Project - Minutes of Committee of Address - parts interested involved	- Revision Documentary film - Interviews - visits
-What direct and indirect contributions arise from the project to the situation arisen in Cuba by the pandemic Covid-19?	- Direct and indirect contributions derived of Project to the situation of pandemic Covid-19in Cuba	- Document of Project - Plan Annual Operation - Reports of performance of Project - Minutes of Committee of Address - parts interested involved	- Revision Documentary film - Interviews - visits
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
8. Appropriation National			
-How supports the Project the priorities environment and development at the national?	-There is a tangible contribution of the Project to the Plan of Condition for the Confrontation to the ChangeClimate (Life Task), the Environmental Strategy National. Development Policy Perspective of Renewable Sources of Energy and Energy Efficiency and Plan Developing Economic and Social to the 2030.	- Plan of Condition for the Confrontation to the ChangeClimate - Strategy National of Medium Ambient - Policy for Development Perspective of Renewable Energy Sources and Efficiency energetic - Plan of Developing Economic and Social to the 2030.	- Revision Documentary film - Interviews

-How incorporates the Project the agendaslocal, regional and global environmentaland development in achieving their objectives?	-Incorporation of agendas local, regional and global environmental and development achievement of the objectives of the project	- Plan of Condition for the Confrontation to the ChangeClimate - Strategy National of Medium Ambient - Policy for Development Perspective of Renewable Energy Sources and Efficiency energetic - Plan of Developing Economic and Social to the 2030.	- Revision Documentary film - Interviews
9. Approach of Gender and empowerment of the Women			
What positive changes has the UNDP in terms of equity of genrein the generated products? Occurredany unexpected effects?	- Number of women and men participantsof Project - Stake of women - Quantity of women in positions of leadership	- Beneficiary companies - Actors: Executors, Financial, commissioner and Implementers - Actors allies - NGOs linked	- Revision Documentary film - Interviews - visits - Poll
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
10. Issues Transverse			
-To what extent has the approach of Rights and human developmentin the interventions carried out? Which were their effects positive?	- Identification of rights policies and developing human that I know they had in bill inthe Project - Alignment of Project with SDG, PND andpolicies sectoral	- Actors: Executors, Financial, commissioner andImplementers - Allied actors - NGOs linked	- Revision Documentary film - Interviews

-In terms of promotion of equity In what level were held in bill theneeds of excluded sectors and the vulnerable groups? What were the effects positive?	-Level of incorporation and systematization of resulting local socio-economic benefits of the execution of the project - Alignment of Project with SDG, PND and policies sectoral	- Actors: Executors, Financial, commissioner andImplementers - Allied actors - NGOs linked	- Revision Documentary film - Interviews - Poll
-Were supplies provided for the development of the project for the sector of theindustry?	- Identification of elements that contribute to project development: successful experiences that they contribute to the design and planning of policies	- Actors: Executors, Financial, commissioner andImplementers - Allied actors - NGOs linked	- Revision Documentary film - Interviews - Poll
11. Additionality of GEF			
-What results additional (environmentalas of another type) can be associated directly with the supported project by the GEF?	- Results derivatives of the financing ofGEF	- documents relative to the co-financing, budget and calculation of emissions	- Revision Documentary film - Interviews
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
12. Role Catalyst/Effect replicator			

-Have the results of the tests been replicated? Experiences and contributions methodological of Project in others areas geographical of country?	- Results and methodological contributions replicated of the experiences of Project in others areas geographical from the country	- documents of the Unit of Transfer of Technology in Cubaenergy - documents of the Unit of Transfer of Technology of the Municipal University Center Yaguajay	- Revision Documentary film - Interviews - visits
- Have the results of the tests been replicated? Experiences of the project in the same areas but financed by others sources?	- Replicated results of the experiences of the project in the same geographical areas with others sources of financing	- documents of the Unit of Transfer of Technology in Cubaenergy - documents of the Unit of Transfer of Technology of the Municipal University Center Yaguajay	- Revision Documentary film - Interviews - visits
13. Worth Aggregate			
What strategic contribution has the UNDP What partner of development? Which he hasbeen its contribution to the expected effects inparticular?	- Degree and value of UNDP involvement inthe Project	- Actors: Executors, Financial, commissioner andImplementers - Actors allies	- Interviews
14. Advantage Comparatives			
Questions of Evaluation	**Indicators**	**Sources**	**Methodology**
-Which are the advantage comparatives of UNDP that has granted as a partner of developing? They have been these maximized?	-ID of advantage and means providedby the UNDP -Degree of use of the advantages comparatives of UNDP	-Actors: Executors, Financial, commissioner andImplementers - Actors allies	- Interviews

Annex 5 – Co-financing Template

Table 5 is presented below *REF _Ref116637493 \h * MERGEFORMAT* with the data on Co-financing.

Table 5- Co-financing Template

Co-financing sources	Contractor's name	Type of financing	Investment	USD amount
Beneficiaries	EEPF-IH, installations, equipment, cup	in kind	investment mobilized	2,845,600.00
Beneficiaries	EEPF-IH, Idem, USD	in kind	investment mobilized	199,600.00
Beneficiaries	EEPF-IH, project national support for Development of Technologies energy clean for the Areas rural in Cuba, 2017-2020, cup	Grant	recurring expenditures	2,067,808.00
Beneficiaries	EEPF-IH, project FONCI Alternatives technology for the development of the bioenergy in Cuba, 2019-2023, cup	Grant	recurring expenditures	2,397,100.00
Beneficiaries	Cubaenergy, installations, cup	in kind	investment mobilized	50,000.00
Donor agency	EEPF-IH, project SDC/ Biomes-Cuba, equipment, installations, training, USD	in kind	investment mobilized	10,197,763.00
Donor agency	EEPF-IH, Project EU-Oikos/Agroenergy, Idem USD	in kind	investment mobilized	1,485,509.00
Recipient Country Government	Comprehensive Management of Energy, Ministry of Agriculture, diesel for jatropha 5 000 L,CUP	Public investment	recurring expenditures	5,208.03
Donor agency	FIIAPP, Program exchange of EU-Cuba experiences for promotion of renewable sources of energy and efficiency energy in Cuba. Financing of two workshops, USD	Grant	recurring expenditures	20,418.00
Donor agency	EEPF-IH, Project EU-Oikos/Agroenergy, Idem USD	in kind	investment mobilized	1,485,509.00
	Comprehensive Management of			

Recipient Country Government	Energy, Ministry of Agriculture, diesel for jatropha 5 000 L,CUP	Public investment	recurring expenditures	5,208.03
Donor agency	FIIAPP, Program exchange of EU-Cuba experiences for promotion of renewable sources of energy and efficiency energy in Cuba. Financing of two workshops, USD	Grant	recurring expenditures	20,418.00
Beneficiaries	Company Industry National producer of household utensils (INPUD), installations and equipment industrial, cup	in kind	investment mobilized	181,396.83
Beneficiaries	Empr. national industry, producer of Household Utensils (INPUD), expenses materials in manufacturing of pieces and remodeling of laboratory, cup	in kind	recurring expenditures	1,289.33
Beneficiaries	Empr. Industry bornproducer of Household Utensils (INPUD), salaries p/ remodeling and of technicians associates to the Project, cup	loan	recurring expenditures	5,192.25
Beneficiaries	rubber company, technical projects of engineering 2016-2021, 411 675.32 CUP + 33 338.73	loan	recurring expenditures	445,014.00
Beneficiaries	CUC			
Beneficiaries	Business of the Rubber, installations and equipmentindustrial, cup	in kind	investment mobilized	1,340,011.00
Beneficiaries	Business of the Rubber,hiring of mounting of equipment acquired, cup	loan	recurring expenditures	112,471.48
	Empr. national			

Beneficiaries	industry, producer of Household Utensils (INPUD), expenses materials in manufacturing of pieces and remodeling of laboratory, cup	in kind	recurring expenditures	1,289.33
Beneficiaries	Empr. Industry bornproducer of Household Utensils (INPUD), salaries p/ remodeling and of technicians associates to the Project, cup	loan	recurring expeditures	5,192.25
Beneficiaries	rubber company, technical projects of engineering 2016-2021, 411 675.32 CUP + 33 338.73	loan	recurring expenditures	445,014.00
Beneficiaries	CUC			
Beneficiaries	Business of the Rubber, installations and equipmentindustrial, cup	in kind	investment mobilized	1,340,011.00
Beneficiaries	Business of the Rubber,hiring of mounting of equipment acquired, cup	loan	recurring expenditures	112,471.48
Beneficiaries	Mechanical Company Varona, materials p/ prototypes manufactured, 6 365.75 cup + 65.82 CUC	loan	recurring expenditures	267.96
Beneficiaries	Mechanical Company Varona, Facilitiesof paileria of steel stainless, cup	in kind	investment mobilized	378,677.00
Beneficiaries	Mechanical Company Varona, equipment industrial used,	in kind	investment mobilized	2,082,103.00
Beneficiaries	Agricultural UEB Manatee, salaries of agricultural workers, operators of tractor and builders, materialsof construction, gas and			

	payment ofdocuments p/ remodeling of	loan	recurring expenditures	22,207.34
Beneficiaries	Cuban Steel UEB, installations and equipment industrial, cup	in kind	investment mobilized	28,824.00
Beneficiaries	Business Agricultural Obdulio Morales, Yaguajay, salaries, fuels, land preparation, maintenance and tractor Repair, documentation of projects and materials of building for remodeling of	loan	recurring expenditures	7,923.46
Beneficiaries	laboratory of seeds, payment of construction services , cup			
Beneficiaries	Government of Yaguajay With-tribute of 1% to the Developing Local, cup	loan	recurring expenditures	7,058.33
Total co-financing				23,881,442.01

Annex 6 – Script Thematic for Interviews

Thematic Script of Ministries' representors

Categories coming from of the matrix of evaluation:

1. Design of Project (D)
2. Relevance (R)
3. Effectiveness (EFE)
4. Efficiency (IFE)
5. Sustainability (S)
6. Impact and results (I)
7. Covid-19 (C)
8. Appropriation National (AP)
9. Approach of Gender and empowerment of the Women (G)
10. issues Transverse (T)
11. additionality of GEF (AD)
12. Role Catalyst/Effect replicator (RC)
13. Worth Aggregate (GOES)
14. Advantage Comparatives (VC)

Questions about the design and execution of the project (in general for the participating companies, inthe components that is participated)

(D) It is correct the ID of problems that he has done in the project?
(A combination of problems of food vulnerability, energy vulnerability and degradation of soils)

(D) Are adequate the proposed solutions to the problems identified?
(Deployment, dissemination and investment in bioenergy technology at the national level, which allows promoting local food production systems to generate energy inputs, sell energy to others end users)

(D) It is coherent the ID of issue with the results planned in the Project?
(D) The success of Project supposed a set of conditions basic Are correct the assumptions that it established in the Project? If they are not, how did they impact on the execution of Project?
(The project assumes that it can collaborate to overcome barriers and limitations in terms of 1) Lack of specific regulation in the promotion and commercialization of bioenergy and its inputs at the level of small producers; 2) Difficulties in accessing supplies for the construction of bio digestersand biodiesel plants; 3) Ignorance of the potential benefit of the development and production of bioenergy by small producers; 4) Insufficient technological capabilities for the developing of bioenergies, so much of professionals technicians experts in developing, facility and management, bidders of equipment and supplies, advisers in matter of integration of production agronomic and energy; 5) Insufficient ability institutional for manage bioenergies ….Come in others…)

(GOES) What input strategic he has done the UNDP what partner of developing? Which has

been its input to the expected effects of Project?

(VC) which are the comparative advantages of UNDP that he has granted what partner of developing?

They have been these maximized?

(R) Is the project aligned with national environmental and development priorities, provincial and municipal?

Questions about the results obtained: achievements and difficulties, factors that influenced, roles ofthe different actors, etc. Take into account results of the three components (for institutions) and in everybody the components that they have participated (companies)

(EFE) Was the project able to be effective in its objective of increasing the access of smallproducers to technologies of bioenergy?

(R) Does the project contribute to the productive and environmental management priorities and strategies of thelittle ones producers involved in the project?

(EFE) Which are the main difficulties found in the developing of Project?

Precisely focus in:

- Limited training/skills in the theme
- Resources (not only financial, but also time, personnel, modificationsregulations, of processes, etc.)
- Management operational/administrative of Project
- Sustainability of the Actions implemented

(EFE) What factors (internal and external) explain the level of achievement or the lack of achievement ofresults?

Questions referred a the management and execution of Project

(EFE) Were the activities carried out in each Project Component according to their design? And the reaching expected in its execution?

(EFE) What is the behavior and what are the advances in qualitative terms of the indicators of Goal of the project?

(IFE) The developing of Project I know he has given within of the deadlines planned? If there was some delay

Which were the Causes?

(EFI)Is it adequate the management financial of Project?

(R) Does the project provide relevant lessons and experiences for other similar projects in thefuture? What learned lessons can be derived of the execution of the project?

Questions on the sustainability of the results of Project

(S)Which were the main capabilities developed/strengthened by the parts involved?

Were existing capacities strengthened or new capacities developed? *Consider not only capabilities in terms of equipment, techniques, but also institutional, resource humans, innovation, transfers technological, etc.).*

(S) What are the main challenges that could affect the sustainability of the results of the project (financial, institutional, socioeconomic, and environmental)? Have they been

addressed during themanagement of the project?

(S) It is enough the level of involvement of the parts interested for allow the continuationof the Benefits of Project? What difficulties either tensions will evidence?

(AND) The parts interested continue playing a paper active in the taking of decisions of project that supports the implementation efficient and effective of the project?

(S) What potentials measures could contribute to the sustainability of the results achieved bythe Project?

Questions on the results and impacts derivatives of Project

(I) Has the project succeeded in promoting the development and transfer of biogas and biodiesel technologiesfor little ones rural producers in Cuba?

(I) He has accomplished the Project contribute to the establishment of policies public that contribute to the transfer and diffusion of technologies in matter of biogas and biodiesel?

(I) What improvements social, environmental and economic local I know they have identified derivatives of theimplementation of Project? *(Since the vision of each actor)*

Questions on appropriation of Project a level national and local

(AP) How incorporates the Project the agendas local, regional and global environmental and ofdevelopment in achievement his objectives?

Questions on the impact of the pandemic covid 19 in the developing of Project

(C) In what measure the Project I know he saw affected in its implementation technique and operative due at thepandemic Covid-19?

(C) What measures of driving adaptive and of resilience I know adopted with reason of the pandemicCovid-19? Which was the effectiveness of these measures?

Questions on possible effects external plus there of Project

(AD) What additional outcomes (environmental and otherwise) can be directly associated with the Project backed up for him GEF?

(RC) I know they have replicated the results of the experiences and contributions methodological of Projectin other geographical areas of the country? Have the results of the project experiences been replicated?In the same areas, but financed by others sources?

Questions to cross-cutting issues of the project: human development, equity, gender, rights humans

(T) To what degree has the human rights and development approach been incorporated into theinterventions made? Which were their effects positive?

(T) In terms of promoting equity, at what level were the needs ofsectors excluded and the groups vulnerable? Which were the effects positive?

(G) How has women been involved in the project? In what activities orroles they have dyed an activity highlighted? Reveal especially:

- Character of the stake of women
- Treatment of the women in the Project

- Quantity of Projects led by women

(G) What positive changes has UNDP supported in terms of gender equality in theproducts generated? He had somewhere effect unexpected?

Thematic Script groups business

Categories coming from of the matrix of evaluation:

1. Design of Project (D)
2. Relevance (R)
3. Effectiveness (EFE)
4. Efficiency (IFE)
5. Sustainability (S)
6. Impact and results (I)
7. Covid-19 (C)
8. Appropriation National (AP)
9. Approach of Gender and empowerment of the Women (G)
10. issues Transverse (T)
11. additionality of GEF (AD)
12. Role Catalyst/Effect replicator (RC)
13. Worth Aggregate (GOES)
14. Advantage Comparatives (VC)

Questions about the design and execution of the project (in general for the participating companies, inthe components that is participated)

(D) It is correct the identification of problems that I know he has done in the Project? *(A combination of problems of food vulnerability, energy vulnerability and degradation of soils)*
(D) Are adequate the proposed solutions to the problems identified? *(Deployment, dissemination and investment in bioenergy technology at the national level, which allows promoting local food production systems to generate energy inputs, sell energy to others end users)*
(D) It is coherent the ID of issue with the results planned in the Project?
(D) The success of Project supposed a set of conditions basic Are correct the assumptions that it established in the Project? If they are not, how did they impact on the execution of Project? *(The project assumes that it can collaborate to overcome barriers and limitations in terms of 1) Lack of specific regulation in the promotion and commercialization of bioenergy and its inputs at the level of small producers; 2) Difficulties in accessing supplies for the construction of bio digesters and biodiesel plants; 3) Ignorance of the potential benefit of the development and production of bioenergy by small producers; 4) Insufficient technological capabilities for the developing of bioenergies, so much of professionals technicians experts in developing, facility and management, bidders of equipment and supplies, advisers in matter of integration of production agronomic and Energy; 5) Insufficient ability institutional for manage bioenergies ….Come in others…)*
(VA) What input strategic he has done the UNDP what partner of developing? Which he has been its input to the expected effects of Project?

Questions about the results obtained: achievements and difficulties, factors that influenced, roles ofthe different actors, etc. Take into account results of the three components (for institutions) and in everybody the components that they have participated (Business)

(EFE) Was the project able to be effective in its objective of increasing the access of smallproducers to technologies of bioenergy?

(R) Does the project contribute to the productive and environmental management priorities and strategies of thelittle ones producers involved in the project?

(R) Has the project contributed to the development of the supply chain link and technology specialized in biodigesters and biodiesel?

(EFE) Which are the main difficulties found in the developing of Project?

Precisely focus in:

- *Limited training/skills in the theme*
- *Resources (not only financial, time, personnel, modificationsregulations, of processes, etc.)*
- *Management operational/administrative of Project*
- *Sustainability of the Actions implemented*
- *Lack of accompaniment*

(EFE) What factors (internal and external) explain the level of achievement or the lack of achievement ofresults?

Questions referred a the management and execution of Project

(IFE) The developing of Project I know he has given within of the deadlines planned? If there was some delay

Which were the Causes?

(EFI)Is it adequate the management financial of Project?

(R) Does the project provide relevant lessons and experiences for other similar projects in thefuture?

Questions on the sustainability of the results of Project

(S)Which were the main capabilities developed/strengthened by the parts involved?

Were existing capacities strengthened or new capacities developed? Consider not only capabilities in terms of equipment, techniques, but also institutional, resource humans, innovation, transfers technological, etc.).

(S) What are the main challenges that could affect the sustainability of the results of the project (financial, institutional, socioeconomic, and environmental)? Have they been addressed during the management of the project?

(S) Is the level of stakeholder involvement sufficient to allow the continuation of the Benefits of Project? What difficulties either tensions will evidence?

(E) Do stakeholders continue to play an active role in the decision-making of the project that supports the implementation efficient and effective of the project?

(S) What potential measures could contribute to the sustainability of the results achieved by the Project?

(S) What lessons learned they can derive of the execution of Project?

Questions on the results and impacts derivatives of Project

(I) He has accomplished the Project boost the developing and transfer of technologies of biogas and biodiesel for little ones rural producers in Cuba?

(I) He has accomplished the Project contribute to the establishment of policies public that contribute to the transfer and diffusion of technologies in matter of biogas and biodiesel?

(I) What improvements social, environmental and economic local I know they have identified derivatives of theimplementation of Project?

Questions on appropriation of Project a level national and local

(AP) How incorporates the Project the agendas local, regional and global environmental and ofdevelopment in achievement his objectives?

(C) They have emerged others effects (direct either indirect) derivatives of the situation arisen in Cuba by thepandemic Covid-19?

Questions on the impact of the pandemic covid 19 in the developing of Project

(C) In what measure the Project I know he saw affected in its implementation technique and operative due at thepandemic Covid-19?

(C) What measures of driving adaptive and of resilience I know adopted with reason of the pandemicCovid-19? Which was the effectiveness of these measures?

Questions on possible effects external plus there of Project

(AD) What additional outcomes (environmental and otherwise) can be directly associated with the Project?

(RC) I know they have replicated the results of the experiences and contributions methodological of Projectin other geographical areas of the country? Have the results of the project experiences been replicated?In the same areas, but financed by others sources?

Questions a issues transverse of Project: developing human, equity, gender, Rightshumans

(T) In terms of promoting equity, at what level were the needs ofsectors excluded and the groups vulnerable? Which were the effects positive?

(G) How I know he has given the involvement of the women in the Project? In what activities either rolesthey have had one exercise featured? Did it take place some effect unexpected? *Reveal especially:*

- *Character of the stake of women*
- *Treatment of the women in the Project*
- *Quantity of Projects led by women*

<u>Script Thematic producers Agricultural</u>

Categories coming from of the matrix of evaluation:

1. Design of Project (D)
2. Relevance (R)
3. Effectiveness (EFE)

4. Efficiency (IFE)
5. Sustainability (S)
6. Impact and results (I)
7. Covid-19 (C)
8. Appropriation National (AP)
9. Approach of Gender and empowerment of the Women (G)
10. issues Transverse (T)
11. Additionality of GEF (AD)
12. Role Catalyst/Effect replicator (RC)
13. Worth Aggregate (GOES)
14. Advantage Comparatives (VC)

Questions about the design and execution of the project (in general for participants, in the components that is participated)

(D) Is the identification of problems that has been carried out in the project correct? *(Remember that it identified a combination of problems of food vulnerability, energy vulnerability and degradation of soils)*

(D) Are the proposed solutions adequate to the identified problems? *(Deployment, diffusion and investment in technology bioenergetics a level national, that allow enhance the systems of local food production to generate energy inputs, sell energy to other users late)*

Questions about the results obtained: achievements and difficulties, factors that influenced, roles ofthe different actors, etc.

(EFE) Was the project able to be effective in its objective of increasing the access of smallproducers to technologies of bioenergy?
(R) Has the project contributed to the productive and environmental management priorities and strategies of thelittle ones producers involved in the project?
(EFE) Which were the main difficulties found in the developing of Project?

Precisely focus in:

- *Limited training/skills in the theme*
- *Means (No single financial, weather, staff, etc.)*
- *Lack of accompaniment*
- *Uncertainty (prices of commercialization, potentials Benefits) and Risk productive (derivative of the production of Jatropha)*

(EFE) What factors (internal and external) explain the level of achievement or the lack of achievement ofresults? Point the main strengths and weaknesses

Questions referred a the management and execution of Project

(IFE) The developing of Project I know he has given within of the deadlines planned? If there was some delay
Which were the Causes?
(IFE) It is adequate the management financial of Project?
(R) Does the project provide relevant lessons and experiences for other similar projects in

thefuture?

Questions on the sustainability of the results of Project

(S) What were the main capabilities developed/strengthened by the parts involved?
Were existing capacities strengthened or new capacities developed? Consider not only capabilities in terms of equipment, techniques, but also institutional, resource humans, innovation, transfers technological, etc.).
(S) What are the main challenges that could affect the sustainability of the results of the project (financial, institutional, socioeconomic, and environmental)? Have they been addressed during themanagement of the project?

(S) It is enough the level of involvement of the parts interested for allow the continuationof the Benefits of Project? What difficulties either tensions will evidence?
(S) What potentials measures could contribute to the sustainability of the results achieved bythe Project?
(S) Which were the learned lessons derivatives of the execution of Project?

Questions on the results and impacts derivatives of Project

(I) He has accomplished the Project boost the developing and transfer of technologies of biogas and biodieselfor little ones rural producers in Cuba?
(I) He has accomplished the Project contribute to the establishment of policies public that contribute to the transfer Y diffusion of technologies in matter of biogas and biodiesel?
(I) What impacts social, environmental and cheap local I know they have identified derivatives of theimplementation of Project

Questions on the impact of the pandemic covid 19 in the developing of Project

(C) In what measure the Project I know he saw affected in its implementation technique and operative due at the pandemicCovid-19?
(C) What measures of driving adaptive and of resilience I know adopted with reason of the pandemicCovid-19? Which was the effectiveness of these measures?

Questions to cross-cutting issues of the project: human development, equity, gender, rights humans

(T) In terms of promoting equity, at what level were the needs ofsectors excluded and the groups vulnerable? Which were the effects positive?
(G) How has women been involved in the project? Was there any effect unexpected? In what activities or roles they have dyed an exercise highlighted? *Relieve especially:*

- *Character of the stake of women*
- *Treatment of the women in the Project*
- *Quantity of Projects led by women*

Annex 7 - Timeline of Activities of Evaluation Mission

PERIOD OF WEATHER	ACTIVITIES
fifteen of April of 2021	Ending of Report of Start
18 to 26 of April	Developing of process of interviews. you include possible visits of countryside by part of consultant local, according to I know confirm in the Report of Start

Proposal of timeline of interviews

Monday 18 of April of 2022	People a to interview	Place	Objectives
9 o'clock A.M. Presentation ofProject a evaluators	• Gricel Acosta, Official of Program UNDP Cuba • Yamilka Caraballo, Analyst of Program UNDP • Patricia Fernandez, Associate of Program UNDP • Luis Hernandez, Director EEPF Indian Hatuey • Jesus Suarez, Director Project, Indian Hatuey • Alfred Curbelo, Coord. Result I, Cubaenergy • Francisco Kings, Coord. Result II, Indian Hatuey • Oniel Suarez, Coord. Result III, Indian Hatuey • Yunia Milian, Administrator Project, Indian Hatuey • Raul Hernandez, Collaboration DRI-MONTH	Office of MONTH	Submit to Evaluators until where you have arrived, according to foreseen in the Project, what is missingto be accomplished and what is planned for achieve it. Strategy of exit

	• Odalys Alonzo, Projects DRI-MONTH • Beatrice Crespin, DOEI-MINCEX • Pedro J. Ruiz, DRI-CITMA • Roselle War, Director DER-MINEM • Mario Hernandez, Director Developing GESIME • Ramon blacksmith, Director Energy MINAG • Aimee Cosculluela, ONEI National • Henry Richard, Director Cubaenergy		
10:30 A.M. Meeting with Unit of Driving of Project	• Luis Hernandez, Director EEPF Indian Hatuey • Jesus Suarez, Director Project, Indian Hatuey • Alfred Curbelo, Coord. Result I, Cubaenergy • Francisco Kings, Coord. Result II, Indian Hatuey • Oniel Suarez, Coord. Result III, Indian Hatuey • Yunia Milian, Administrator Project, Indian Hatuey	Office of MONTH	Clarify, with Dr. Project I oord. Results. aspects related topics previous
2:00 p.m. Interview with DOEI-MINCEX	• Beatrice Crespin, DOEI-MINCEX	mincex	Know its vision on the executionof the project, the monitoring of the implementation and management measures of risks and of mitigation of these
Tuesday 19 of April of 2022	**People a to interview**	**Place**	**Objectives**
9:00 am. Interview with Address of relation International CITMA	• Ulises Fernandez, Director DRI-CITMA pt. Focal GEF • Pedro J. Ruiz, DRI-CITMA	DRI-CITMA	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of Project

11:30 A.M. Interview to Address relation International MONTH	• Maria Victory Villavicencio, Director DRI-MONTH • Maiky Diaz, Boss Dept. affairs multilateral, DRI-MONTH • Raul Hernandez, Collaboration DRI-MONTH • Odalys Alonzo, Projects DRI-MONTH	DRI-MONTH	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of Project. Paperplayed by Indian Hatuey
2:00 p.m. Interview with UNDPCuba[6]	• Gricel Acosta, Official of Program UNDP Cuba • Maria Pink Dark, Official of monitoring UNDP • Yamilka Caraballo, Analyst of Program UNDP • Patricia Fernandez, Associate of Program UNDP	Office UNDP Cuba	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of Project
Wednesday twenty of April of 2022	**People a to interview**	**Place**	**Objectives**
9 o'clock. Interview with AddressEnergy renewable MINEM	• Roselle War, Director DER-MINEM • Marlenes Eagle, DER-MINEM • Joseph Cabrera, DER-MINEM • Jorge L. Isaac, DER-MINEM	DER-MINEM	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of the project. Contribution to the incidence in policies, results achieved, Prestige for the min. Relations

[6] Also will be interviewed Mrs. Ludmilla Diniz, adviser Regional Technique of UNDP for Energy Y Change Climate / Area Nature, Climate Y Energy

			with min. Synergies with Program UE-Minem
10:00 a.m. Energy Interview MINAG	• Ramon blacksmith, Director of Energy MINAG	DER-MINEM	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of the project. Contribution to the incidence in policies, results achieved, Prestige for the Minag. Relationswith Minag.
11:00 am. Interview to Developing Gesime	• Mario Hernandez, Director of Developing GESIME	DER-MINEM	Know your vision on execution of the project, monitoring execution and measures of driving ofrisks and of mitigation of these. Importance of the project. Contribution to the incidence in policies, results achieved, Prestige for Mindus. Relations with mindus. ER Fair 2022
2:00 p.m.	• Return of evaluator National a killings		
Sunday 1 of May of 2022	Transfer a the Province The prickly pears		

6 o'clock A.M. Departure since Indian Hatuey	• Dariel del León, evaluator national • Jesus Suarez, Project Director, Indian Hatuey • Francisco Kings, Coord. Result II, Indian Hatuey		
Monday two of May of 2022	**People a to interview**	**Place**	**Objectives**
9 o'clock A.M. Visit a sea cow	• Abel Grief, Coordinator Local of Project • Luis Towers, Coordinator Project UEB Agricultural • Tanya Rodriguez, Government Municipal • Miguel Angel Cartaya, Government Municipal • Reynaldo Leyva, Director UEB Agricultural	Center of Des. Local, productive areas, Estate of seedWork. seeds	Interview local actors. Interaction Project - municipality. Visit to nurseries, seed farm, and laboratory and plant premises biodiesel in remodeling and plantations. Design of biodigester.
Tuesday 3 of May from 2022	**People a to interview**	**Place**	**Goal**
9 o'clock A.M. Visit a Yaguajay	• Sinai Bofill, coordinator Local of Project • Gustavo Carballe, Coordinator Project MINAG Mcpal. • Idalberto Rodriguez, Mayor • Reinier Gomez, Government Municipal • Carlos Moon, Director Empr. Agricultural Obdulio Morales • Bladimir Davila, Director Attach Business Agricultural	areas productive seed farm Laboratory of seeds	Interview local actors. Interaction Project - municipality. Visit to nurseries, seed farm, laboratory premises in remodeling Y plantations. Designof biodigester.
2:30 p.m. Visit a INPUD, holy clear	• Leonel Veitia, Director of Developing INPUD • Juan b. Rodriguez, Address of Developing INPUD	Test laboratory,Lines of production	Interviews a actors. Interaction Company – Project. What has been done and what is missing. Program of developing perspective

Monday 9 of May of 2022	People a to interview	Place	Goal
8:30 A.M. Visit a UEB Conrad Pineapple, Empr. of the Rubber	• Jorge L. Richard, Director Techn. and Developing, Empr. Rubber • Thomas loves, Company Development of the Rubber • Mario Hernandez, Director of Developing GESIME	Work. Quality, Line productive Warehouse	Interviews to actors. Interaction Company – Project. What has been done and what is missing. Program of developing perspective
10:30 a.m. Company visit Mechanics Male	• Jorge Perez, Director Business • Vanet Barcelo, Director of Developing Business • Leonel Laura, Developing of the Business • Mario Hernandez, Director of Developing GESIME	Line of production	Interviews a actors. Interaction Company – Project. What has been done and what is missing. Program of developing perspective
1:00 p.m. Visit a UEB Cuban of Steel, EMTA	• Boris Tamayo, Dr. Attach Empr. Turned Steel • Richard Lasso, Director of Developing UEB • Mario Hernandez, Director of Developing GESIME	installed equipment, Warehouse of metals	Interviews to actors. Interaction Company – Project. what has been done and what is missing. Program of developing perspective
3:00 p.m. Interview in ONEI	• Mercedes Gonzalez, Vice Boss ONEI National • Aimee cosculluela, ONEI National • Thomas Gonzalez, Boss Office of Energy	ONEI National	Interviews to actors. Interaction Company – Project. What has been done and what is missing. Program of developing perspective

Source: Own elaboration base in the diary elaborate by the Unit of Driving of Project

Annex 8 – Program of Workshop of Closing

Date	Exercise	Responsible
18 May	**Trip towards hotel**	
8 p.m.	Meeting of participants to explain the program, Lobbyof hotel	Dr. Jesus Suarez
19 May	**Compliance of the Results of Project**	
9 o'clock – 9:10 A.M	Opening of Workshop	Dr. Luis Hernandez
9:10 – 10:00 A.M	Condition of compliance of Result I	Dr. Alfred Curbelo
10:00 - 11:00 A.M	Debate	Eng. Ariel rose bushes
11:00 – 11:40 A.M	Condition of compliance of Result II (seeds, jatropha, evaluation of blends with biodiesel)	M. SC Francisco Kings
11:40 A.M – 12:30 p.m.	Debate	Dr. Ramon Pilot
12:30 – 2:00 p.m.	Lunch	
2:00 – 2:40 p.m.	Condition of compliance of Result II (industries)	Dr. Jesus Suarez
2:40 – 3:30 p.m.	Debate	Eng. Mario Hernandez
3:30 – 4:10 p.m.	Condition of compliance of Result III	Bc. Oniel Suarez
4:10 – 4:50 p.m.	Debate	Dr. Saray Sanchez
4:50 – 5 o'clock p.m.	Accuracies for Session of day Next	Dr. Jesus Suarez
Day twenty	**Evaluation and approval of strategy of sustainability post-closing**	
9 o'clock – 9:40 A.M	Lessons learned. Potentials risks for the sustainability.	Dr. c. Barbara Garea
9:40 – 10:30 A.M	Strategy of sustainability for secure the compliance ofthe goals of the Project and favor the extension of the results	Dr. Jesus Suarez
10:30 -11:30	Debate	Dr. Alfred Curbelo
11:30 A.M – 12:30 p.m.	Worked in equipment	
12:30 – 2:00 p.m.	Lunch	
2:00 -3:30 p.m.	Worked in equipment	

Date	Exercise	Responsible
3:30 – 4:30 p.m.	Presentation of the results of worked in equipment	
4:30 p.m.	Signature of conventions with Business and Closure	Dr. Luis Hernandez

Annex 9 – Field work

This annex contains a backup of the audiovisual resources collected and used during the carrying out the planned activities in the field work. Contains 3 folders: “Images”, "Presentations" and “Recordings and Interviews” where I know host the respective resources.

- drive link: https://drive.google.com/drive/folders/1SUYMs6yaeNpUxC5Ee23YzrCrFvUJODH1?usp=sharing

Annex 10 – Analysis of surveys

Poll to Institutions No business– Project bioenergy CUBA

10 answers

The Institution which it represents it is:

- CUBAENERGY
- University Technological of Havana
- Ministry of the Agriculture
- MINEM
- Center academic Municipal of Yaguajay
- Assembly Municipality of Can Popular sea cow
- Address of Relations international of CITMA
- MONTH
- Ministry of Education Higher
- Station Experimental of grasses and Indian fodder Hatuey

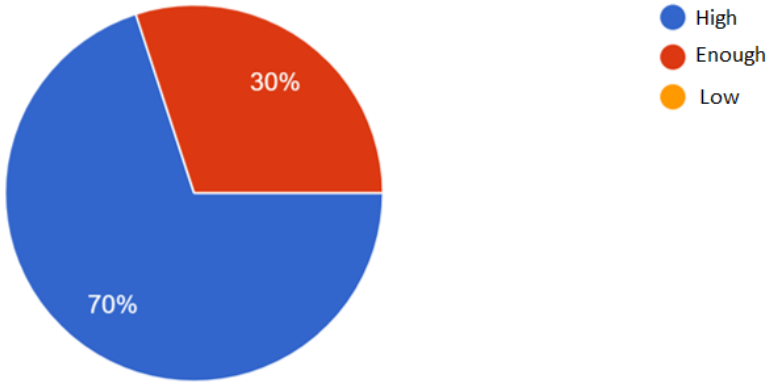
1. **The position either position that occupies currently it is:**
   - DIRECTOR ENERGY RENEWABLE and EFFICIENCY ENERGY
   - Professor Headline
   - Specialist Use Rational of the Energy
   - Specialist
   - coordinator Program master's degree Management Developing Local
   - Director of Project
   - Specialist Major
   - Head of Multilateral Affairs Department of Relations DirectorateInternational, dpma@mes.gob.cu
   - a Higher in management of Projects
   - Director General

2. **What degree of knowledge have of the features of Project bioenergy in general?**
   a. COORDINATOR COMPONENT 1
   b. Investigator in the theme of biodiesel, its quality and the impact of its use in engines
   c. What expert in the topics of biogas, support for in the implementation of Project and theirresults
   d. In visits to the beneficiary families, nurseries of Jatropha Curcas seedlings, to the laboratory investments, national workshops for the exchange of experiences, in the establishment of regulations on prices, on statistics, installation of technologies for production in the domestic equipment industry,

pieces and accessories.

e. coordinator local Project bioenergy
f. Coordinator Municipal
g. Representative of Focal point political and Operational of the GEF in Cuba
h. THE MONTH IS A SIGNATORY OF THE TERMS OF REFERENCE WITH RESPONSIBILITIES ESTABLISHED
i. He participated in the Management of project from its elaboration in
j. Co-director of Project

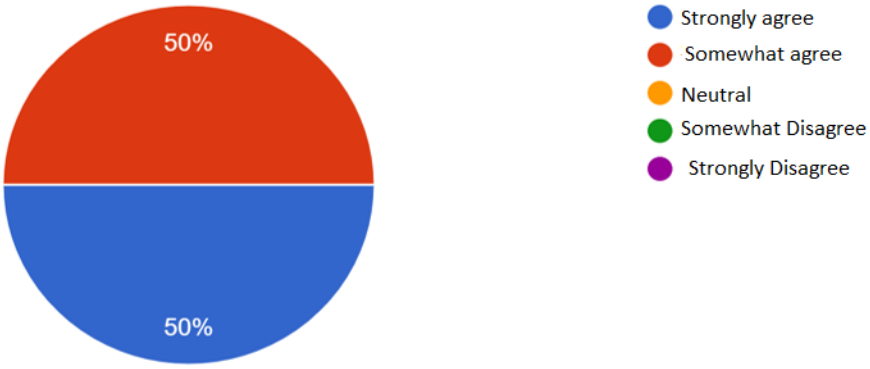
3. How much knowledge do you have of the Bioenergy Project characteristics in general?



Source: Own elaboration based on the results of the Survey. N=10

Project Overview

1. The Bioenergy Project made it possible to overcome the technological barriers to bioenergy access and development in Cuba



Source: Own elaboration based on Survey results. N=10

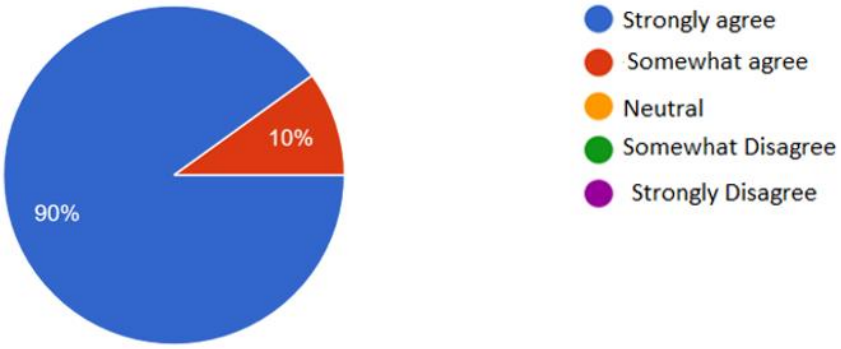
3. The Bioenergy Project provided feasible technological solutions to small farmers

Source: Own elaboration based on Survey results. N=10

4. The Bioenergy Project has been able to promote the formulation and recommendation of policy instruments (information tools, strategies, recommendations for policy reforms, institutional or regulatory framework) to support the development of small-scale bioenergy

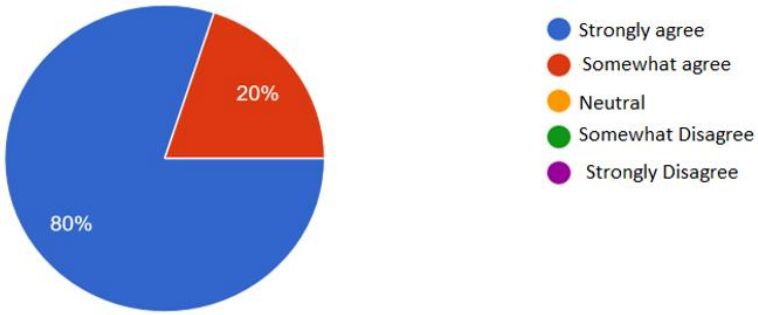
Source: Own elaboration based on Survey results. N=10

5. The Bioenergy Project has succeeded in transferring and incorporating new technologies, with tangible material results, for the operation of small-scale biodiesel and biogas systems



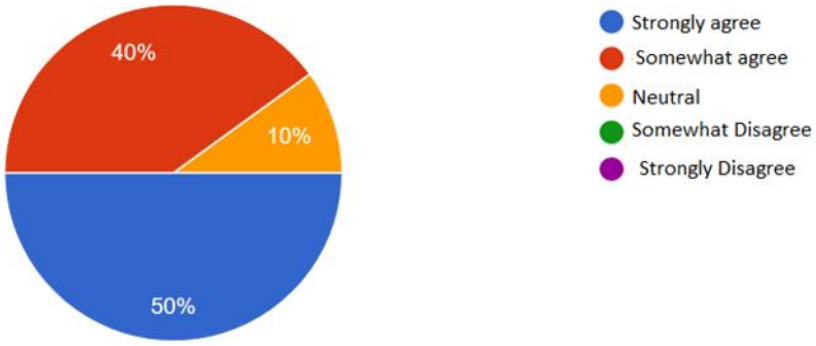
Source: Own elaboration based on Survey results. N=10

6. **The Bioenergy Project has succeeded in disseminating bioenergy technologies through increased knowledge of biodiesel and biogas systems, both at the institutional level and among companies and small-scale producers**



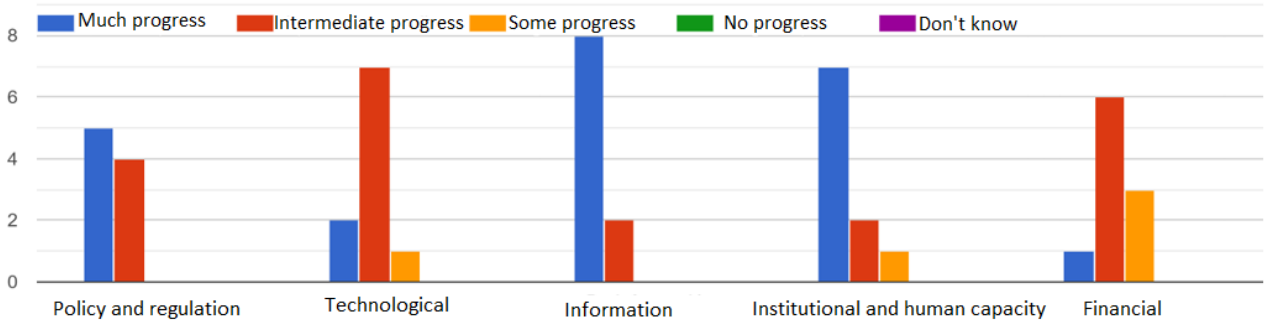
Source: Own elaboration based on Survey results. N=10

7. **The Bioenergy Project has established a network of project designers, maintenance, repair and extension services for small producers**



Source: Own elaboration based on the Survey results. N=10

8. **What has been the degree of progress in overcoming the following barriers to bioenergy development in Cuba?**



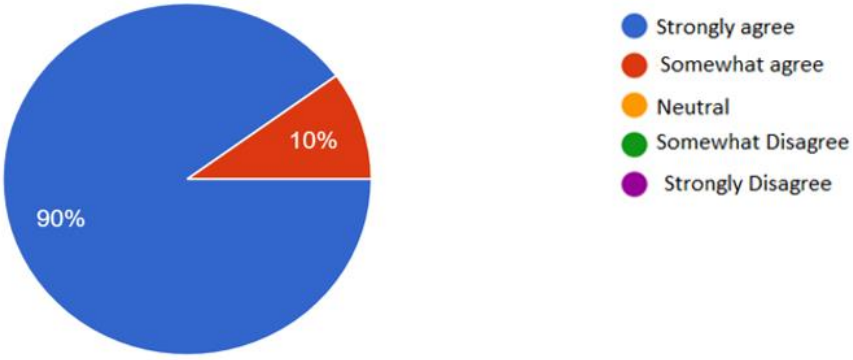
Source: Own elaboration based on the Survey results. N=10

Vision as a participant in the Project

9. **The Bioenergy Project Board (integrated by: MES, CITMA, MINCEX, UNDP, MINEM, MINAG, MINDUS) has provided adequate political support and successful technical-strategic implementation**

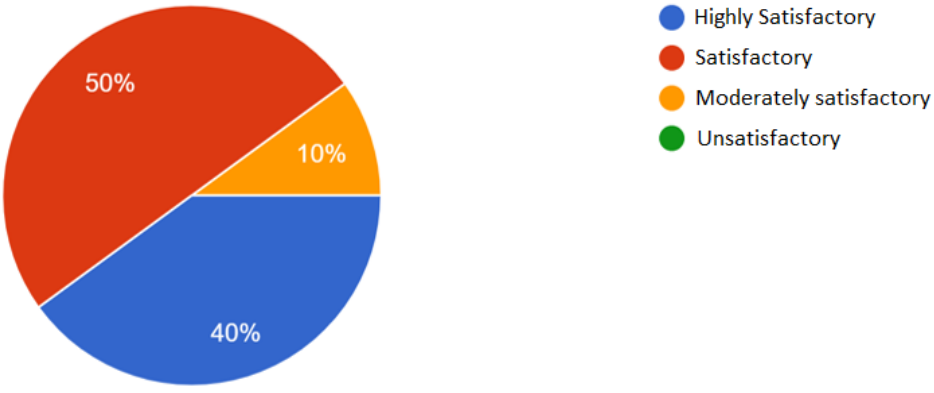
Source: Own elaboration based on the Survey results. N=10

10. The Project Management Unit has provided a high level of support and accompaniment to agricultural and industrial companies for the Bioenergy Project implementation



Source: Own elaboration based on Survey results. N=10

11. Coordination and complementarity among participating institutions and companies during the project development have been:



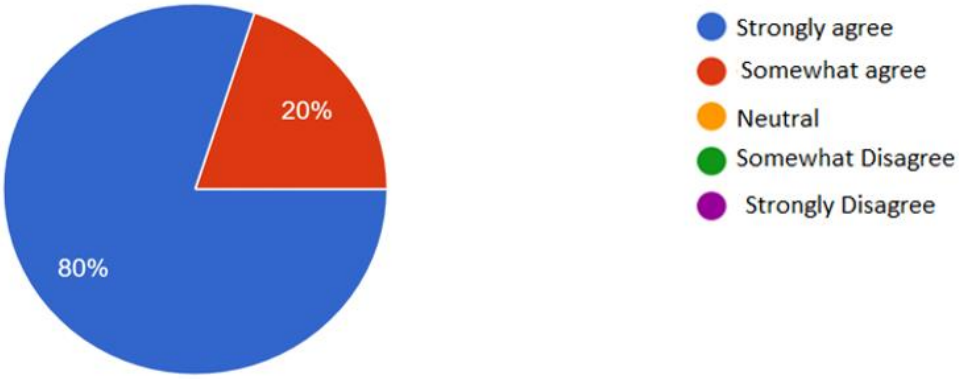
Source: Own elaboration based on Survey results. N=10

Vision from the Institution participating in the Project

12. The Institution is committed to and actively supports the Bioenergy Project development

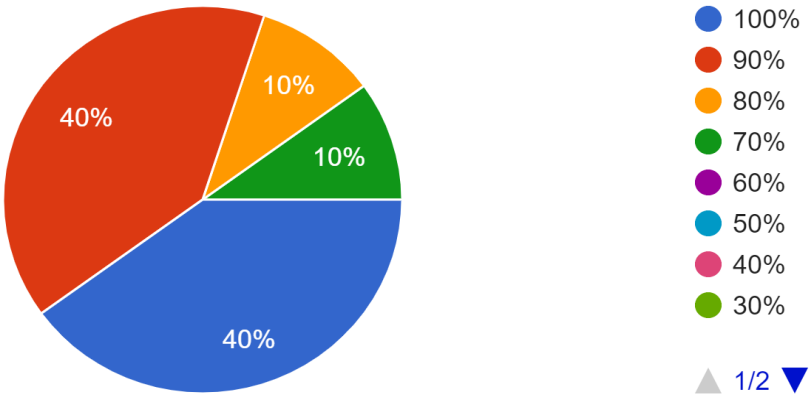
Source: Own elaboration based on Survey results. N=10

13. The Institution has carried out an adequate planning, logistical and execution analysis to achieve the committed objectives of the project in a timely manner



Source: Own elaboration based on Survey results. N=10

14. At the end of project implementation, the set of actions committed to by your institution in the project will have reached a degree of progress of approximately:



Source: Own elaboration based on Survey results. N=10

15. The estimated date on which the Institution will reach 100% completion of the commitments assumed in the project is as follows:

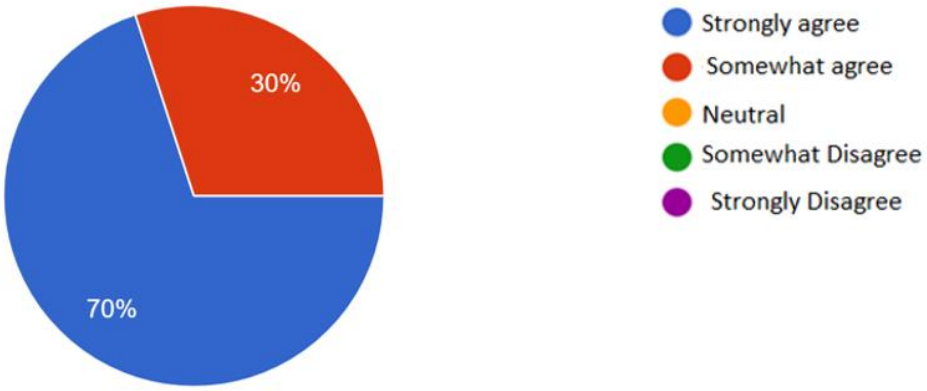
- December 2022
- Already achieved
- December 2022.
- 2 years
- September,2022
- December 2022
- Next year, once the "0" productions are finalized
- Months according to supplement
- June-24
- March 2023

16. Which specific activities and products have been more difficult to carry out and/or achieve by your Institution?

- Bioenergy atlas
- Cultivation of Jatropha Curcas
- Changing the culture of biogas use, complex process of importing technologies due to COVID affectation, has been positive in a general sense, we must follow the domestic production of equipment for biogas end use.
- The CUM and the government coordinate the project in Yaguajay. The greatest difficulties in the biodiesel chain are centered on the planting process of the plantations due to the delay in the delivery of the irrigation systems and the fuel deficit; fundamentally. In the Biogas chain, the difficulties were centered on the delay of the Agriculture System Project Company (EMPA) to deliver the technical project of the Laguna Tapada in Porcino Carbó, which prevented the work from being undertaken for the period contemplated by the project.
- The construction of Covered Lagoon
- Does not apply
- The assembly of components for prototype manufacturing
- Cultivation of the total number of plants, closing of the technological process
- Biodiesel

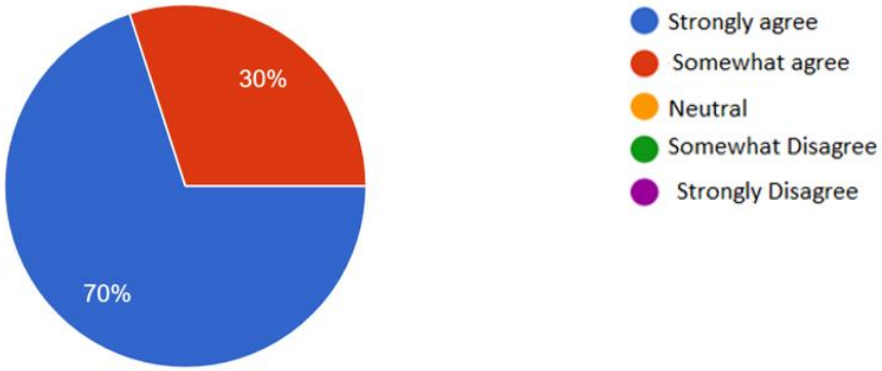
Future vision

17. The Project sustainability strategy is realistic in terms of actions to be implemented



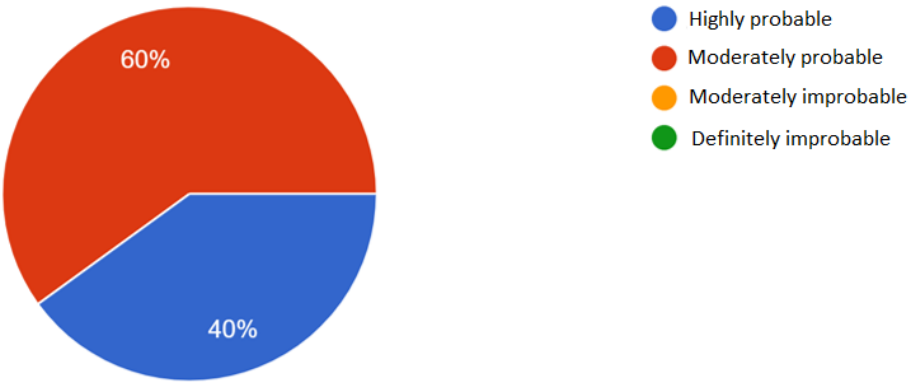
Source: Own elaboration based on Survey results. N=10

18. The project sustainability strategy is realistic in terms of the time allocated to the pending actions



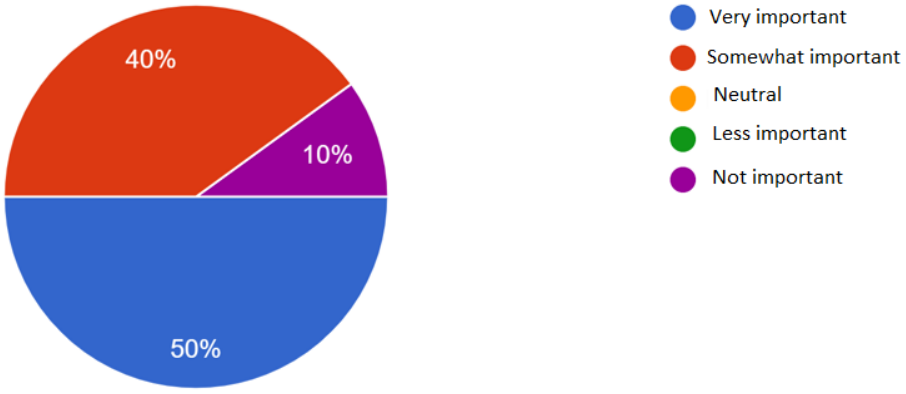
Source: Own elaboration based on Survey results. N=10

19. The possibility that the Institution will obtain in due time and form the necessary cash funding to comply with the Bioenergy Project sustainability strategy after its completion is:



Source: Own elaboration based on Survey results. N=10

20. The Institution considers that the risks affecting the sustainability of Bioenergy Project results and continuity beyond the end of its execution are as follows:



Source: Own elaboration based on Survey results. N=10

21. Indicate, in general terms, the critical factors that, in your opinion, have hindered the adequate Bioenergy Project execution

- The systematicity of the work by the institutions of the municipalities to carry out the demonstrative actions to which they were committed.
- Economic and commercial blockade of the U.S. against Cuba. Covid 19 pandemic.
- The importation of technologies for their multiplication in the national industry and the financing for their production, the search for other markets and exportation.
- Biodiesel technology is not a priority for the Ministry of Agriculture, the goals of the project are too ambitious without considering the high risk for its fulfillment, delay in imports, the situation of the world pandemic with Covid 19, the situation of the economic and financial blockade to the country that threatens the availability of fuel and technical availability of equipment necessary for the completion of the works.
- The restrictions caused by Covid-19.
- The lack of resources caused by the economic crisis.
- Delay in imports of technologies to be installed in the municipality.
- Blockage, COVID 19, Expensive freight, equipment and materials.
- Climatic, epidemiological and ecological events that occurred in the Cuban context.
- Risks that were not taken into account in the elaboration of the project.
- Inclement weather conditions.
- Delays with the guarantees to be able to contract with the importing company.
- Delays with the contracting in the acquisition of the equipment.
- Complexity in product diversity and quantity.
- COVID-19
- Importation of resources

22. Indicate, in particular terms, the most important factors that, in your opinion, may have an impact on the adequate execution and completion of the commitments assumed by your Institution as part of the sustainability plan.

- Assignment of higher priority tasks.
- Responsibility of the beneficiaries in the sustainability of the technologies acquired by the project.
- Continued monitoring system, control over the technologies that are being installed, that culminate and initiate their production and sale to biogas producers.
- Adequate understanding of the technology and the impact achieved to date, integration of local stakeholders, motivation and commitments made to the project, having a project management office at the CUM converted into a Technology Transfer Unit with a training and transportation classroom to continue building local capacity in bioenergy technologies, as well as following up on the project's objectives, still in progress. Also, the opportunity to develop new projects in the Framework of the European Union-Cuba Multiannual Indicative Program (2021-2027), taking advantage of the resources, technologies and equipment assigned by the Bioenergy Project, which will guarantee the continuity of the actions,
- It is important that the necessary financing be arranged for the importation of the resources that are still pending (electricity generation equipment for Covered Lagoon
- That the commitments made by the entities involved are not fulfilled.
- Existence of local innovation systems.
- Implement and verify technological processes.

23. Please provide any other comments you consider valuable regarding the design, planning, implementation, monitoring and completion of the Bioenergy Project

- No comments
- The professional, organizational, communicational quality of the project work team.
- The management and monitoring of this project has been an example in the person of Chuchy, which should be taken as a reference for the execution of other projects.
- The project has contributed, from the national to the local level, with the design of bioenergy policies to be considered by decision makers at those levels and in favor of sustainable development. The project has faced serious difficulties and threats that prevented it from achieving 100% of the proposed objectives; however, even so, it still reflects valuable impacts (environmental, social, and economic) that make it a project of great value for the country and the municipality. The project mobilized the capacities of local stakeholders and enabled the integration of the university, government, companies, NGOs and other institutions to join forces to achieve the agreed goals.

- All participating institutions have systematically advised and monitored the implementation of pending actions.
- The project has increased the existing culture on bioenergy associated with circular economy in the plan of the economy and the biogas and biodiesel value chains, for the transfer of bioenergy technology.
- Very valuable was to be able to Supplement the project in time.

Survey to business- Bioenergy Project CUBA

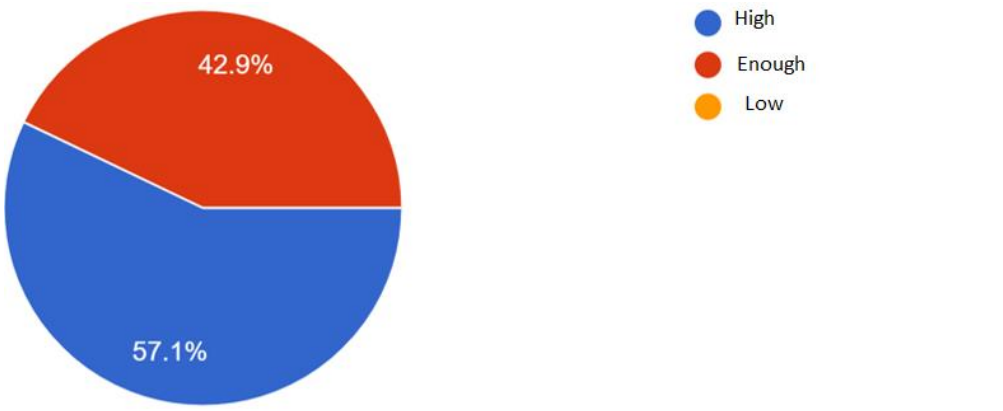
7 responses

1. **The company you represent is:**
   - Matanzas Conformation Company (CONFORMAT)
   - De la Goma Company (Poligom)
   - UEB Integral Agropecuary Manatí
   - Metalmechanic Company Varona
   - Delegation of agriculture Yaguajay
   - National Industry Company of Household Appliances Production (INPUD)
   - GESIME

2. **The position you currently held is:**
   - Mechanical Specialist
   - Specialist
   - Investment and Energy Specialist
   - Project Specialist
   - Head of Agricultural and Forestry Development Department
   - Head of Technical Group
   - Technical and Development Director

3. **Your role or participation in the Bioenergy project is:**
   - Manufacture of filters of different sizes or capacities for biogas and biogas accumulators
   - Project manager in my company
   - Project Coordinator in the Municipality for Agriculture
   - Development and execution of the Bioenergy project
   - Coordinator at MINAGRI
   - Project Manager at INPUD
   - Industry representative

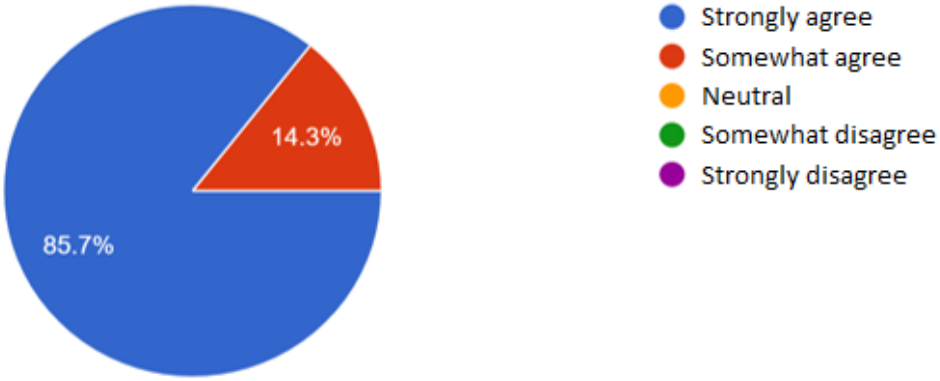
4. **What knowledge degree do you have of the Bioenergy Project characteristics in general?**



Source: Own elaboration based on Survey results. N=7

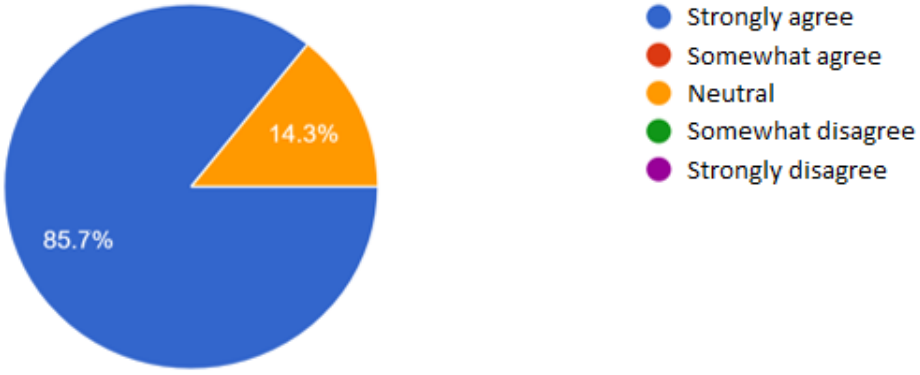
Project overview

5. **The Bioenergy Project made it possible to overcome technological barriers for accessing and developing bioenergies in Cuba**



Source: Own elaboration based on Survey results. N=7

6. **The Bioenergy Project provided feasible technological solutions to small agricultural producers**



Source: Own elaboration based on Survey results. N=7

7. **The Bioenergy Project has managed to promote the formulation and recommendation of policy instruments (information tools, strategies, recommendations for reform of**

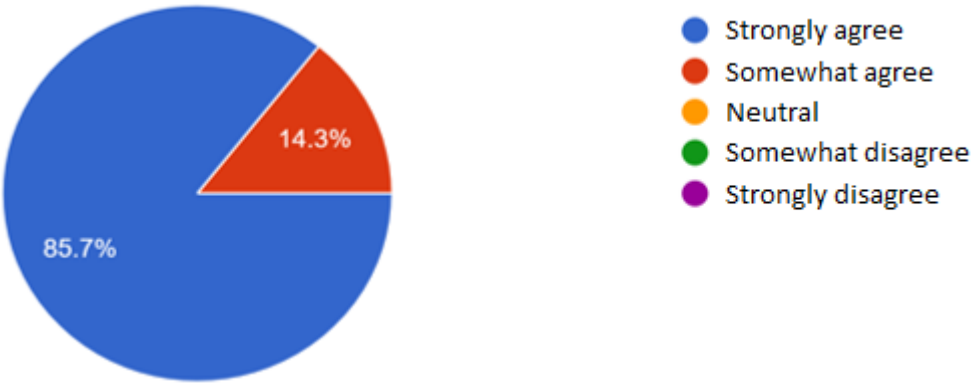
the normative, institutional or regulatory framework) to support the development of small-scale bioenergy

Source: Own elaboration based on Survey results. N=7

8. **The Bioenergy Project has managed to transfer and incorporate new technologies, with tangible material results, for the operation of small-scale biodiesel and biogas systems**

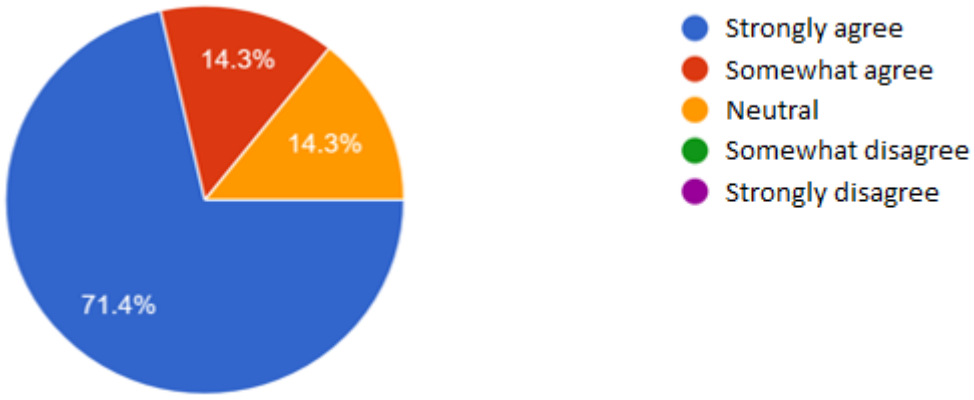
Source: Own elaboration based on Survey results. N=7

9. **The Bioenergy Project has succeeded in disseminating bioenergy technologies through an increased knowledge of biodesel and biogas systems, both at the institutional level, as well as by companies and small producers**



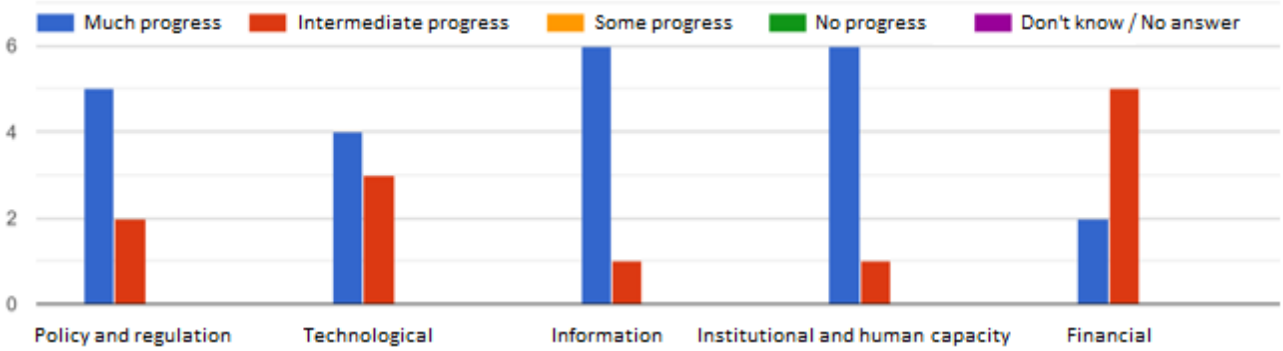
Source: Own elaboration based on Survey results. N=7

10. **The Bioenergy Project has established a network of Project designers, maintenance, repair and extension services for small producers**



Source: Own elaboration based on Survey results N=7

11. What has been the progress degree in overcoming the following barriers to bioenergy development in Cuba



Source: Own elaboration based on Survey results. N=7

Vision as participating actor of the Project

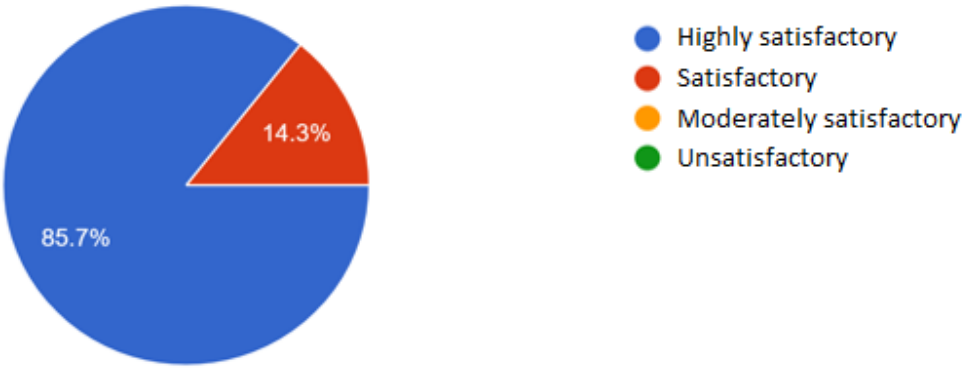
12. The Project Board of the Bioenergy Project (consisting of: MES, CITMA, MINCEX, UNDP, MINEM, MINAG, MINDUS) has provided adequate political support and successful technical-strategic implementation

Source: Own elaboration based on Survey results. N=7

13. The Project Management Unit has given high support and accompaniment to agricultural and industrial companies in the Bioenergy Project execution

Source: Own elaboration based on Survey results. N=7

14. **Coordination and complementarity between participating institutions and companies during the Project development has been:**



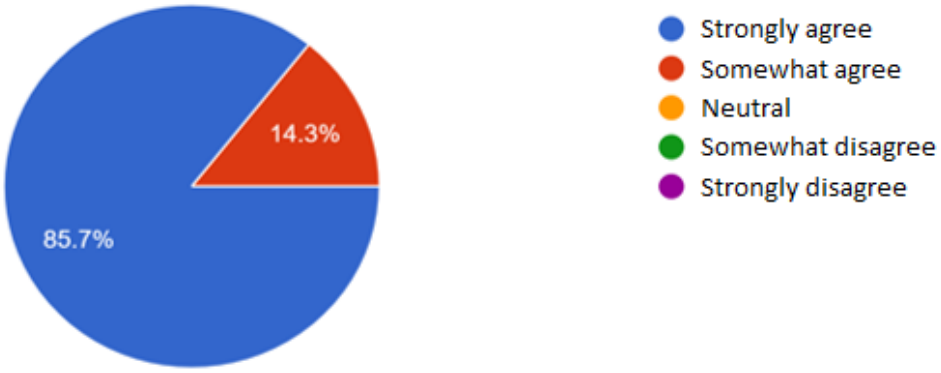
Source: Own elaboration based on Survey results. N=7

Vision from the participating company of the Project

15. **The company has committed and actively supported the development of the Bioenergy project**

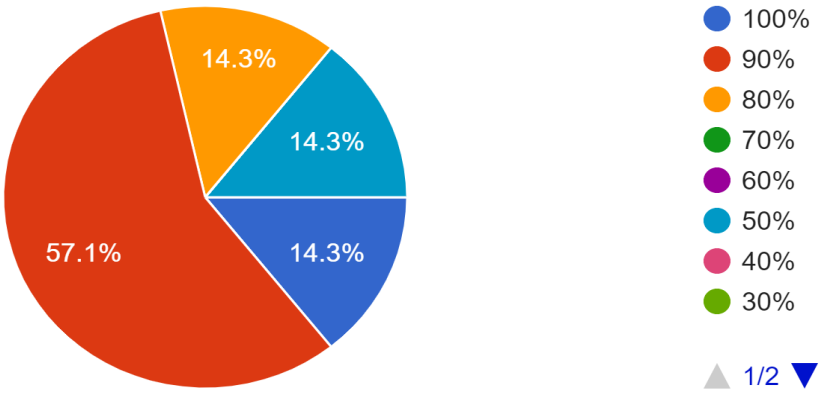
Source: Own elaboration based on Survey results. N=7

16. **The company has carried out an adequate economic-productive analysis (planning, logistics, cost effectiveness of technological development, acquisition of components and supplies) to achieve the objectives committed to in the project and allow its sustainability and continuity**



Source: Own elaboration based on Survey results. N=7

17. **At the end of the Project execution, the set of actions committed by your company in the Project will have reached a progress degree of approximately:**



Source: Own elaboration based on Survey results. N=7

18. **It is expected that the estimated date on which the company will reach 100% progress of the commitments assumed in the project will be:**

- June 2022 (1 answer)
- September 2022 (2 answers)
- December 2022 (4 answers)

19. **Which specific activities and products have been most difficult for your company to carry out/achieve?**
    - Accumulators for biogas, due to their high storage pressures and high safety and protection requirements and standards, and because biogas and its gases and liquids are chemical components and derivatives of the process that are highly corrosive to metals or special steels, but not stainless with those of us who work
    - Imports and national inputs
    - Comply on time with the construction of the premises for the seed certification laboratory and the biodiesel plant, because the Project did not provide all the resources and they have to be managed by the company
    - The agitation system for some covers, due to the technology used
    - The commissioning of irrigation systems

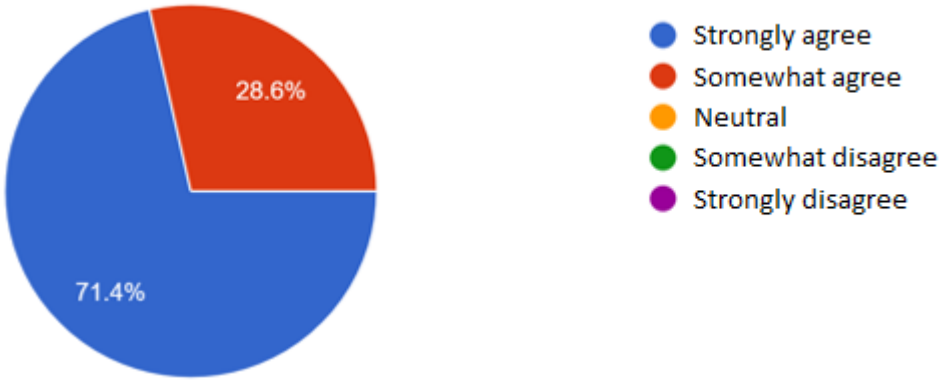
- Development of the Feeding Lines of the Biodigester to the final use equipment of the Biogas, the Rice Cooker and the Water Heater
- Due to the novelty of some technical definitions, import processes of raw materials and components

Future vision

20. The project's sustainability strategy is realistic in terms of actions to be executed

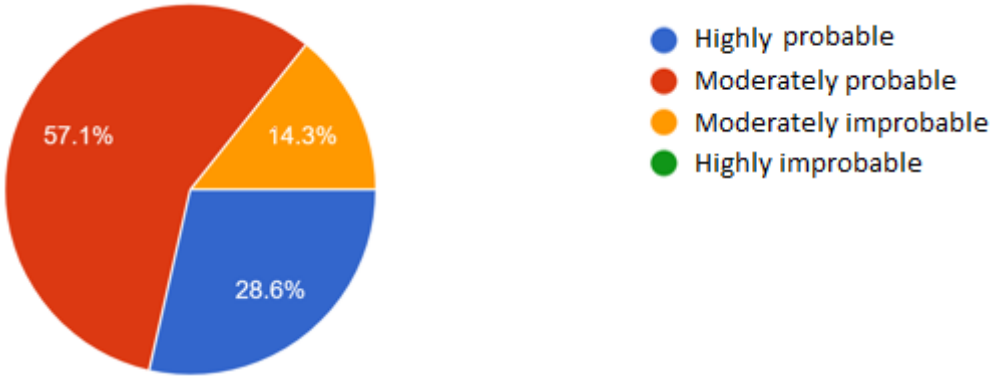
Source: Own elaboration based on Survey results. N=7

21. The project's sustainability strategy is realistic in terms of the times assigned to pending actions



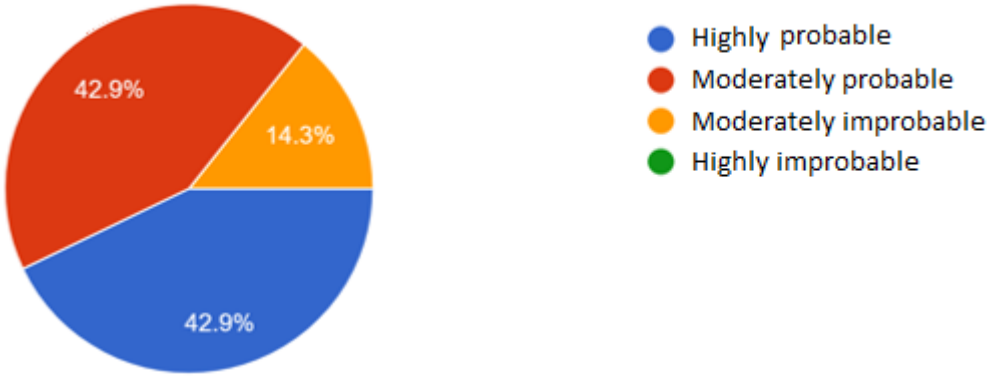
Source: Own elaboration based on Survey results. N=7

22. The possibility that the necessary financing to comply with the sustainability strategy of the project after its completion is obtained in a timely manner is:



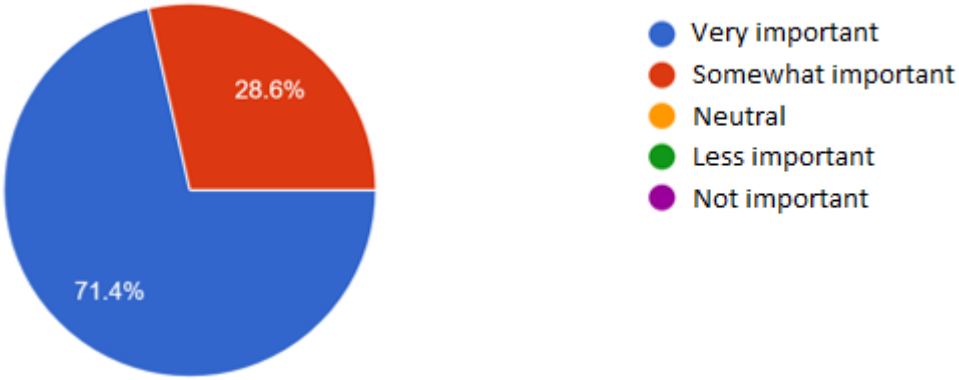
Source: Own elaboration based on Survey results. N=7

23. The possibility of obtaining the necessary imported components and supplies to comply with the sustainability strategy of the project after its completion is:



Source: Own elaboration based on Survey results. N=7

24. The company estimates that the risks that affect the sustainability of the results of the Bioenergy project and its continuity beyond the completion of its execution are:



Source: Own elaboration based on Survey results. N=7

25. Indicate, in general terms, the critical factors that in your opinion have hindered the adequate execution of the Bioenergy project

- Lack or instability in raw material in my company to manufacture the clynders for LPG liquefied gas, because with this raw material (in the factory and the CUPET clynders to repair) we can manufacture the different filters for biogas and biogas accumulators, whether they are manufactured with new or recovered raw material
- Process Investors and equipment importation
- The delay in entry of resources, equipment and other inputs that were imported.
- The timely entry of import resources were issues that delayed the planned investments and decisions had to be made along the way
- COVID Pandemic, delay in imports and staff training
- Being a large-scale and complex project, as well as COVID-19

26. Indicate, in particular terms, the most important factors that, in your opinion, may impact the proper execution and completion of the commitments assumed by your company as part of the sustainability plan

- The constant support of the company's CEO and board of directors in communication with other workers, so that everyone becomes aware of the importance of this task for the development of our country and food sovereignty, since this is a project of a person or a group of persons, this is a development project of the company as important as an internal project, make all workers understand the importance of this project for the development of the country and food sovereignty.
- Financing
- The Company has the staff for the operation of the biodiesel plant as well as the qualified force to work in the seed certification laboratory and in the cultural attention to the plantations
- Obtaining financing for the purchase of raw materials and other materials
- Creation of new employment sources, knowledge of the benefits of using the Jatropha Curcas plantation and its derivatives from the by-products obtained from it, etc.
- Financing
- Pending imports

27. Below, you can indicate other comments you consider valuable about the design, planning, execution, monitoring and completion of the Bioenergy project

- I would like to point out that despite the technological and economic difficulties that we may encounter along the way during the project's development, the advice of colleagues who lead this Bioenergy project is very good. We have constant communication by mail and WhatsApp to clarifying questions, we have received workshops in which we have learned a lot about the Bioenergy project in general and it has helped us a lot to exchange knowledge and give many ideas and technological solutions to improve the prototypes, colleagues visiting our company; testing the prototypes with the producers makes you learn a lot, and from there proposed improvements arise, passing the results of these tests to make corrections and improvements, and with all that information we can gradually achieve and shape a prototype that meets all the requirements, and above all that has good functionality, accessibility and durability adapted to the conditions of the client or producer, and the conditions of Cuba. The project is always in a continuous improvement of designs and development to achieve or continue to achieve a better-quality product in all senses, the accompaniment of the CONFORMAT Company by the project leaders is very good.
- The design should have foreseen the creation of an integral Working Group of the Industries and the importer with a Leader, including investors and designers, whose fundamental work was the Project.

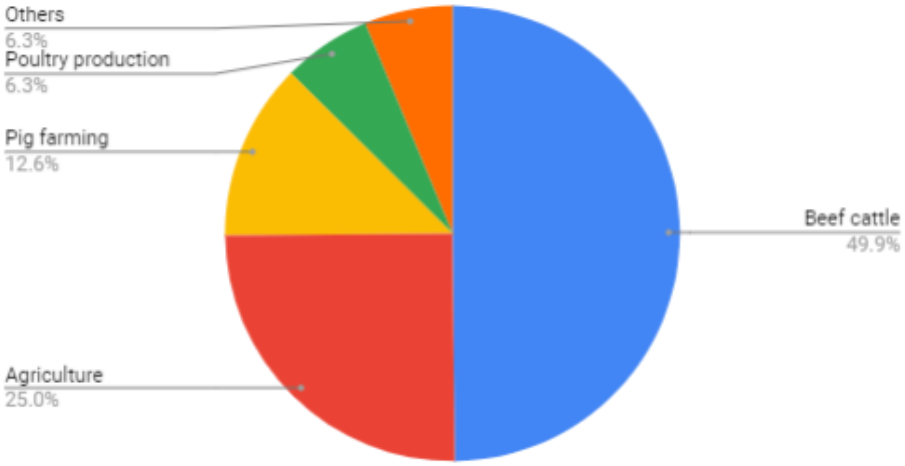
- Taking into account the complexity of the Project, it has been well managed. All the actors that have a direct impact on it, as well as the different beneficiaries, have been trained.
- The Company is ready to receive the demands and begin the contracting and manufacturing processes
- Very in tune with these times
- There was an excellent synergy between the Management Unit and the participating actors of the industry in the project in each of the conceived stages

Survey for Small Producers – CUBA Bioenergy Project

11 responses

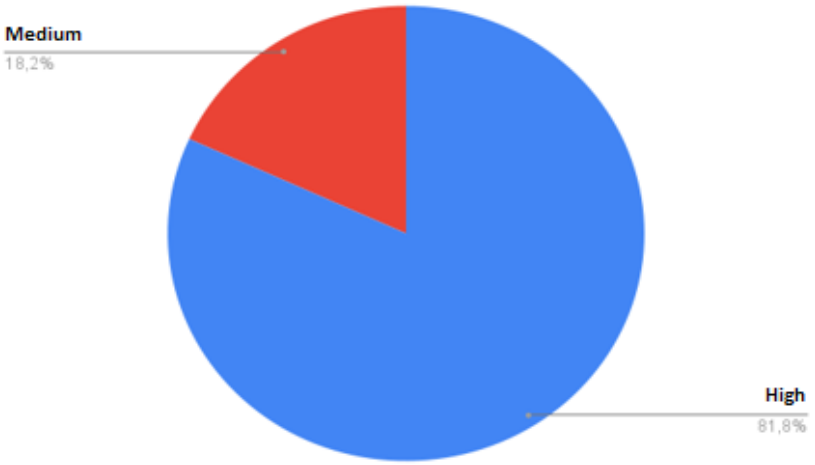
1. **Municipality**
   - Municipality of Yaguajay (6)
   - Municipality of Manatí (5)

2. **Your main productive activity is (mark with a cross):**



Source: Own elaboration based on Survey results. N=11.

3. **What knowledge degree about the general characteristics of the Project do you have?**



Source: Own elaboration based on Survey results. N=11

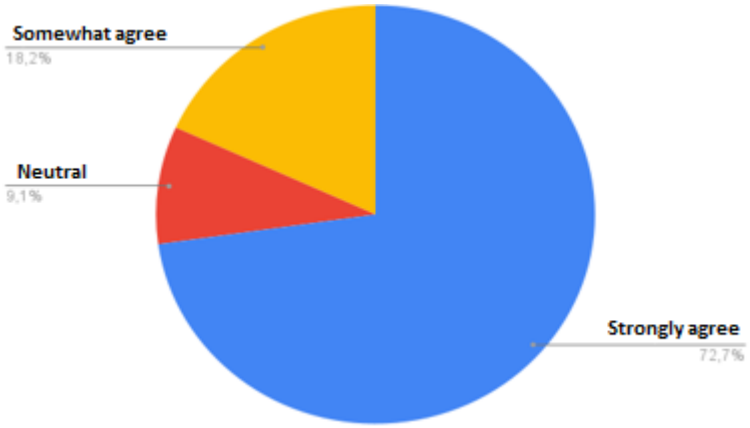
4. **The Bioenergy Project provides concrete solutions to small agricultural producers**
    - Strongly agree (11)

5. **Small producers participating in the Bioenergy project have committed themselves and supported the project development**
    - Strongly agree (11)

6. **The team that develops the Bioenergy project brought high support and accompaniment to small producers**
    - Strongly agree (11)

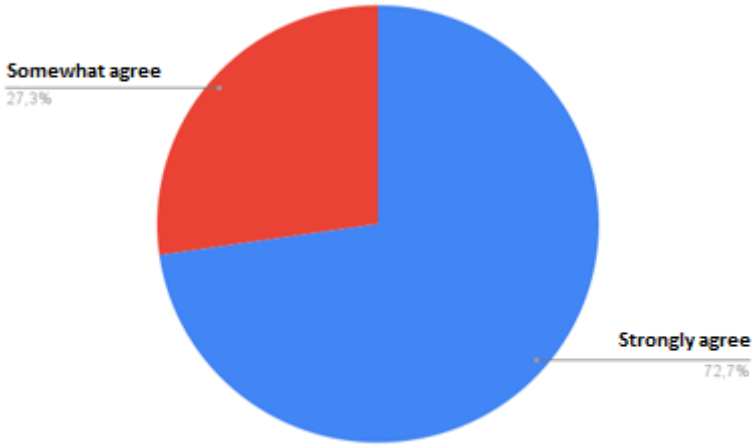
7. **Small producers participating in the Bioenergy project increased their knowledge about Jatropha Curcas production**
    - Strongly agree (11)

8. **Small producers participating in the Bioenergy project know are familiar with alternative energies such as biogas and biodiesel, and know how to manage them**



Source: Own elaboration based on Survey results. N=11

9. **The Bioenergy Project takes into account and contributes to satisfying current needs of agricultural producers**



Source: Own elaboration based on Survey results. N=11

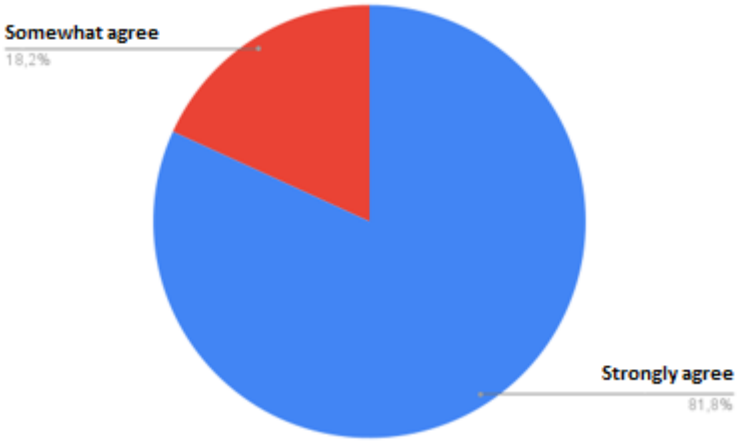
10. The Bioenergy Project collaborates in increasing small agricultural producers' income

- Strongly agree (11)

11. The Bioenergy project collaborates in increasing alternative energies availability for small agricultural producers

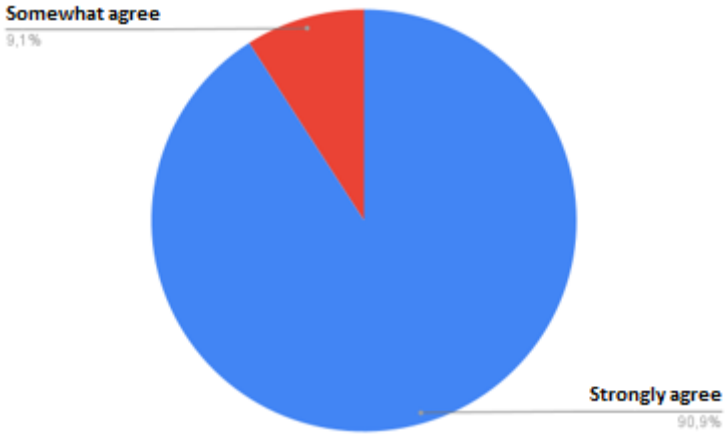
- Strongly agree (11)

12. The Bioenergy project collaborates in increasing the fertilizers availability and/or by the incorporation and improvement of degraded lands for production



Source: Own elaboration based on Survey results. N=11

13. The Bioenergy Project contributes to diversifying agricultural production through the cultivation of Jatropha



Source: Own elaboration from Survey results. N=11

14. The Bioenergy Project specifically contributes to solving energy availability problems in rural areas through biogas or biodiesel production

- Strongly agree (11)

Annex 11 – Data Base of Answers of the Surveys

In this annex in Excel format are detailed the answers of the surveys carried out to institutions, Business and little ones producers in the framework of the Consultancy for the Evaluation Final of the "Clean Energy Technologies Project for Rural Areas in Cuba (BIOENERGY)", PIMS 4899.

Two pages make up this annex. The first, "Survey Responses to Companies and Institutions" It contains the questions asked in the columns and the respective answers in the rows. For another On the other hand, the sheet "Survey Response to Small Producers" orders the information with the same logic.

- drive link: https://docs.google.com/spreadsheets/d/1_Jkq711dqGqueTv5Q6DnEx_jORQgwbMn/edit?usp=sharing&ouid=110486193952225604537&rtpof=true&sd=tru_

Annex 12 – Eraser Presentation of the Final Report

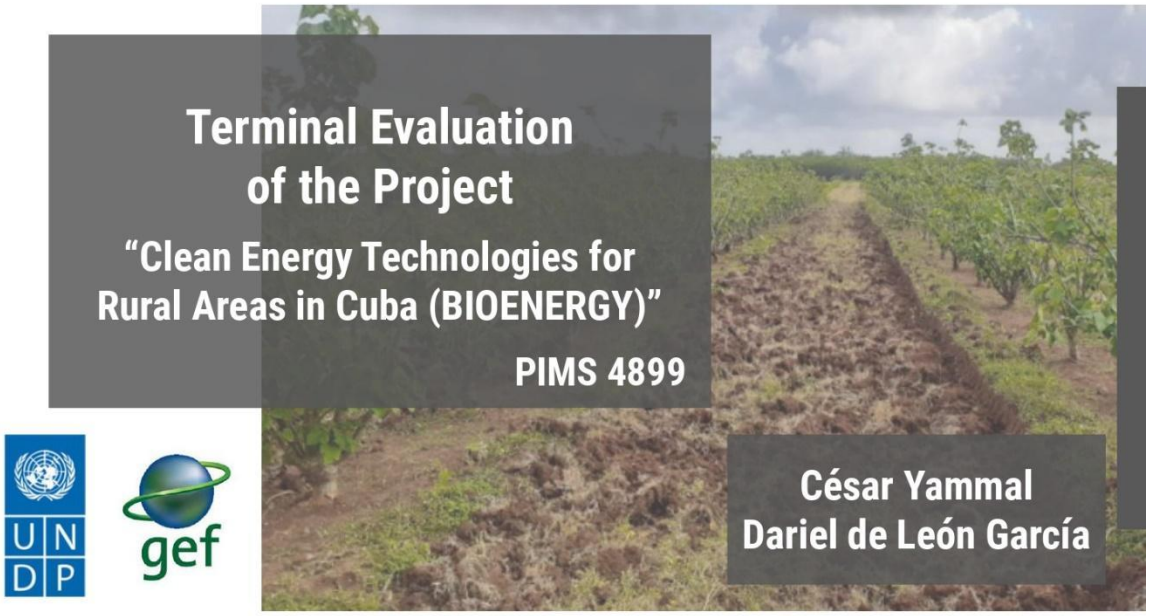


Table of Contents

Introduction

Purpose of the evaluation

- Evaluate the project's **achievements**
- Identify **lessons** for improving the sustainability of benefits and contributing with UNDP performance
- Promote **accountability** and **transparency** and **replicability** of the project achievements

Methodology

- Criteria: relevance, effectiveness, efficiency, sustainability and impact

Data Collection Techniques

- Collection of bibliographical material
- Interviews (government institutions: 11)
- Fieldwork (government business and institutions: 10)
  - **Manatí**: Agricultural Base Business Unit (UEB), Municipal Government, Center of Capacity Creation, rural producers
  - **Yaguajay**: Agricultural Business Obdulio Morales, Center of Capacity Creations, rural producers
  - **Calixo García**: Cornelio Rojas Farm, LABIOFAM
  - **Placetas**: Base Pig Business Unit Placetas
- Surveys (Institutions 10; Enterprises 7, Small Producers: Yaguajay 7 y Manatí 5)




1

Design and relevance

Design → It was too ambitious for Cuba's geo-political context

The complexity of the project and its high sensitivity to changes in macroeconomic conditions were underestimated, leaving the design without space for unforeseen events (which later materialized)

Too high for the development priorities of Cuba and its inhabitants ← **Relevance**

- Socioeconomic
- Climate change-related
- High level political objectives
  - Reduce dependence on imported fossil fuels and substitute imports of manufactured goods.

Strengths

- **Incorporation of relevant actors** for the project's development
- Significant degree of **complementarity and collaboration**
- **Formal commitment** to project execution despite difficulties of the context

Weaknesses

- Incomplete determination of:
  - **assumptions**
  - **risks**
  - **mitigation actions**

2

Execution

The project execution improved **from the midterm evaluation**, since from there more systematic monitoring and planning actions were implemented, with the creation of the Project Offices in Indio Hatuey Experimental Station (EEIH)

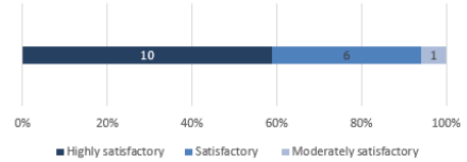
Roles

EEPF Indio Hatuey	• Trusted partner, for its articulating role among allies • Choosing it as a leader in industrial components was not the most suitable idea
Allies	• Active participation • High level of commitment • Optimistic about obtaining financial resources
UNPD	• Very detailed monitoring and facilitation of project implementation

Satisfaction with the coordination and complementarity between participating institutions and companies during the project development

94%

Were satisfied or very satisfied



Source: Own elaboration based on surveys made to participating institutions and enterprises. N= Institutions=10; Enterprises=7

3

Execution

General results

Indicators	Baseline	Goal	Rating
Project objective: Increase access to bioenergy in Cuba by promoting the use of biodiesel and biogas technologies by farmers			
Products based in TT and approved by authorities	Do not exist (0)	4 products	MU
Policies and mechanisms for TT		4 policies and mechanisms	HS
MWh/year produced using biogas and biodiesel		1,540.1 MWh/year	U
Number of beneficiaries (direct or indirect)		88.100 people	MS
GHG emissions avoided (L CO^2eq)		6.7 kt CO^2eq (direct) y 199.4 CO2eq (indirect) of avoided emissions	MU

Source: Own elaboration based on the Results Framework of the Clean Energy Technologies Project for Rural Areas in Cuba (BIOENERGY)" PIMS 4899

4

Execution

Specific results

Indicators	Baseline	Goal	Rating
Outcome 1: Policy instruments to support small-scale bioenergy development were formulated and recommended for their adoption.			
Information tools for policy and strategy elaboration	Do not exist (0)	Tools developed in, 3 levels: collection, information, processing and compilation	HS
Draft of small-scale bioenergy strategy consulting with authorities		Draft	S
Supplies and policy recommendations for small-scale bioenergy strategy implementation		Supplies and recommendations presented to authorities involved	HS
Outcome 2: The knowledge state of biogas and biodiesel small-scale systems has been transferred and assimilated..			
Productive capacity of biodiesel plants (small scale)	No production (0)	Production capacity of small biodiesel plants: 10 units per year	U
Flexible geomembrane production (m2/year)		Flexible geomembrane production capacity: 68.000 m^2/year	MU
Liters of biodiesel produced in demonstration and commissioning pilot plants (l/year)		127.500 l/year	U
Cubic meters of biogas generated in pilot demonstrations and available for use (m^3/year)		39.400 m^3/year of biogas produced	U

Source: Own elaboration based on the Results Framework of the Project Clean Energy Technologies for Rural Areas in Cuba (BIOENERGY)" PIMS 4899

5

Execution

Specific results

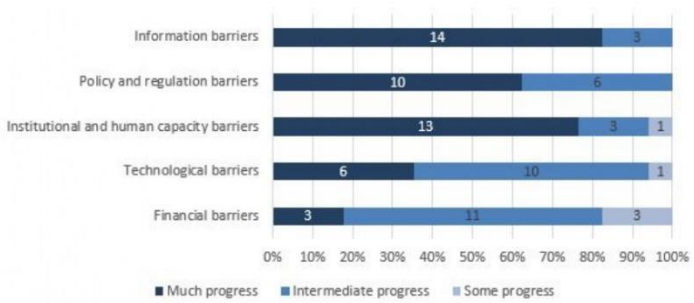
Indicators	Baseline	Goal	Rating
Outcome 3: Bioenergy technologies disseminated through the increased knowledge and systems of biodiesel and biogas demonstrations.			
Expert center in bioenergy established in the EEIH	Good records and individual competencies on bioenergy at EEIH	Expert center in bioenergy enabled in EEIH	HS
Number of farmers (m/f) supported in bioenergy	Do not exist (0)	120 farmers	S
Number of advisory/consulting services provided by Cubaenergy for decision makers in bioenergy	Annual average: 3 services	8 annual services	HS

Source: Own elaboration based on the Results Framework of the Project Clean Energy Technologies for Rural Areas in Cuba (BIOENERGY)" PIMS 4899

6

Effectiveness

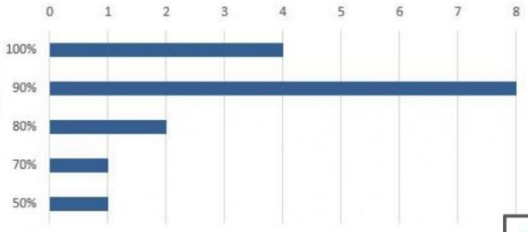
Progress in overcoming barriers to the development of bioenergy in Cuba



Information barriers

Further progress in overcoming it

Progress degree of the set of actions committed by your company/institution at the end of the project execution



90% Progress degree in actions

Option that obtained the greatest agreement

Fuente: Elaboración propia en base a encuestas realizadas a instituciones y empresas participantes. N= Instituciones=10; Empresas=7

7

Effectiveness

Outcome 1 → The goal was exceeded

Policy instruments to support small-scale bioenergy development have been formulated and recommended for adoption

- Most relevant product: first **National Bioenergy Atlas** (which contains valuable information on national potentials for bioenergy production and is a valuable decision-making tool).
- Policy instruments **approved, adopted and implemented** by the different ministries and entrepreneurial groups.
- Contributed with **technical inputs** for the elaboration of two key legal documents (approved at the end of 2019)
  - Decree-Law No. 345 "On the Development of Renewable Sources and the Efficient Use of Energy", issued by State Council of the Cuban Republic
  - Resolution No. 123 del Ministry of Energy and Mines (MINEM).
- Development of **"Improvements to the Territorial Statistical Information System"** in partnership with ONEI

→ Companies are implementing renewable energy introduction plans in their work programmes

8

Efectividad

Outcome 2

The state of knowledge on the application of small-scale biodiesel and biogas systems has been **transferred and assimilated**. However, **they have not been finalised and are at different development stages**.

Progress in the development of plantations in Jatropha Curcas (Jc) at the end of the evaluation

	Committed hectares	Planted hectares	Nursery Units	Progress in construction of the seed certification laboratory	Space adaptation for the biodiesel plant	Energy Project for biogas	Estimated date of finalization
Manatí	100 Há	56 Há	• 5.650 seed bags • 6.350 seedlings	85%	50%	Comprehensive Engineering Project completed in January 2021	April 2023
Yaguajay	100 Há	97 Há	• 12 greenhouses • 8.580 seed bags • 495 seedlings	100%	To be reallocated in Calixto García Municipality	Decision not to make the biodigester for the lack of an engineering project	September 2022 (limited to cultivation of Jatropha)

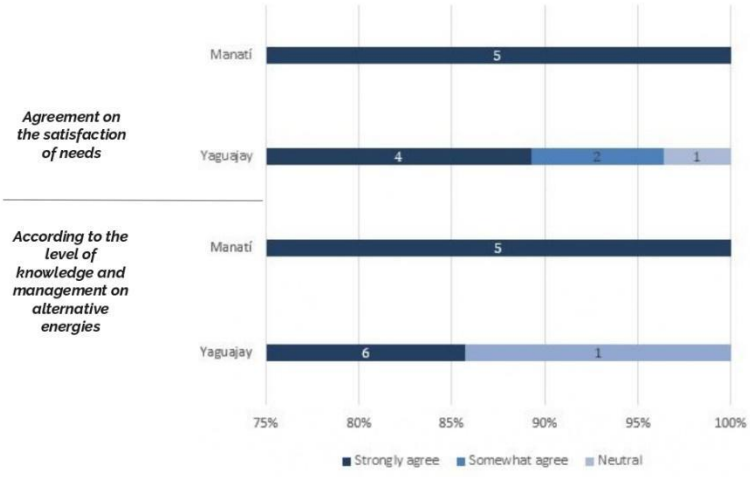
Source: Own elaboration based on reports by Manatí Integral Agricultural UEB and Agronomy of Yaguajay

9

Effectiveness

Agricultural producers

The self-assessments on knowledge and benefits of the project in both municipalities are very positive, but they reflect the **development differences**



Source: Own elaboration based on surveys conducted to small producers in the municipalities of Yaguajay and Manatí. N=Yaguajay=7; Manatee=5

10

Efectividad

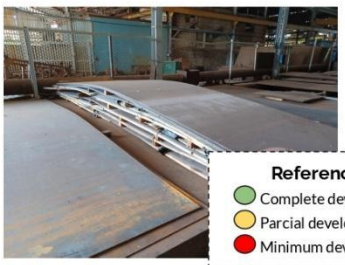
Advances in prototype development

Biogas

Firm	Functional prototypes
Varona	Three agitation systems for lagoon biodigesters
	Two torches for burning unused biogas for the lagoon biodigesters
	A 500 liter capacity milk cooling tank
Poligom	11.000 m² of synthetic geomembrane
Matanzas Conformat Company	Filters for biogas purification
INPUD	Kitchens with 1 and 2 burners, industrial and lighting lamp
	Refrigerator and 1-burner domestic kitchens
	Other household equipment: rice cooker, water heater

Biodiesel

Firm	Functional Prototypes
Mechanical Enterprise for Steel Transformation (EMTA)	Two biodiesel plants
EEIH	Formulation of fuel mixtures



References
- Complete development
- Parcial development
- Minimum development

11

Effectiveness

Outcome 3

Disseminated Bioenergy Technologies: Increased Knowledge and Demonstrations of Biodiesel and Biogas Systems

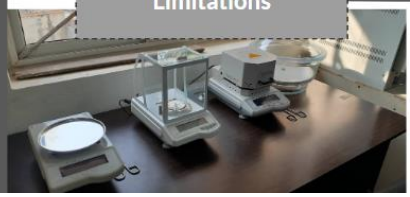
Strengthening and projection of the **EEIH** and **Cubaenergy** as reference centers for **knowledge** and **technology transfer** related to bioenergy.

Achievements

- Creation of an **Expert Center in Bioenergy**
- Formation of **BIOENERGY Technology Transfer Unit**
- **Increase in Cubaenergy's supply of technical services**
- **Training** 422 bioenergy municipal actors (161 women)

Limitations

- The units created:
  - Do not count with their own **legal status**
  - There is no clear vision of **responsibilities**
  - Do not count with cuentan an **online independent presence**

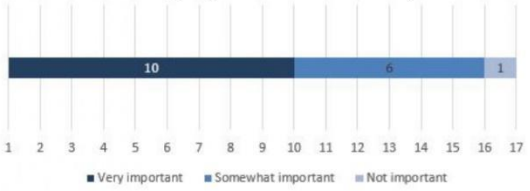


12

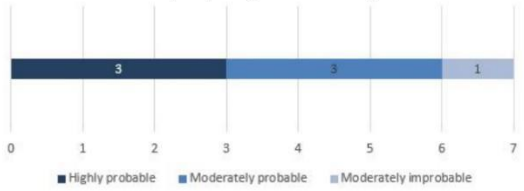
Sustainability

The project's sustainability plan is based on **seven cooperation** contracts that are being signed by EEIH and the companies participating on the project.

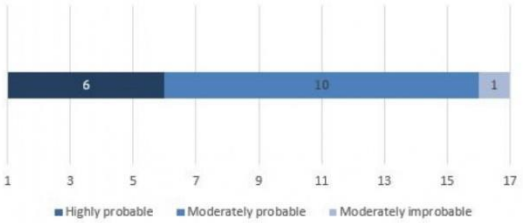
Importance of risks that affect the sustainability of the Bioenergy Project results and its continuity



Probability of obtaining necessary imported components and inputs for Project sustainability



Probability of obtaining financing in time and form for Project sustainability

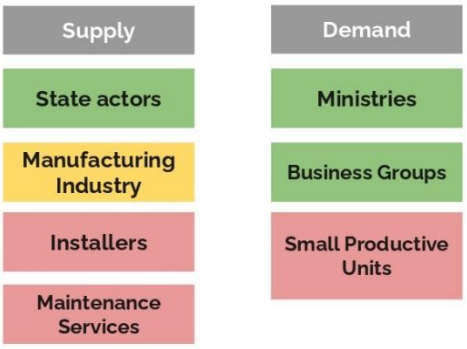


13

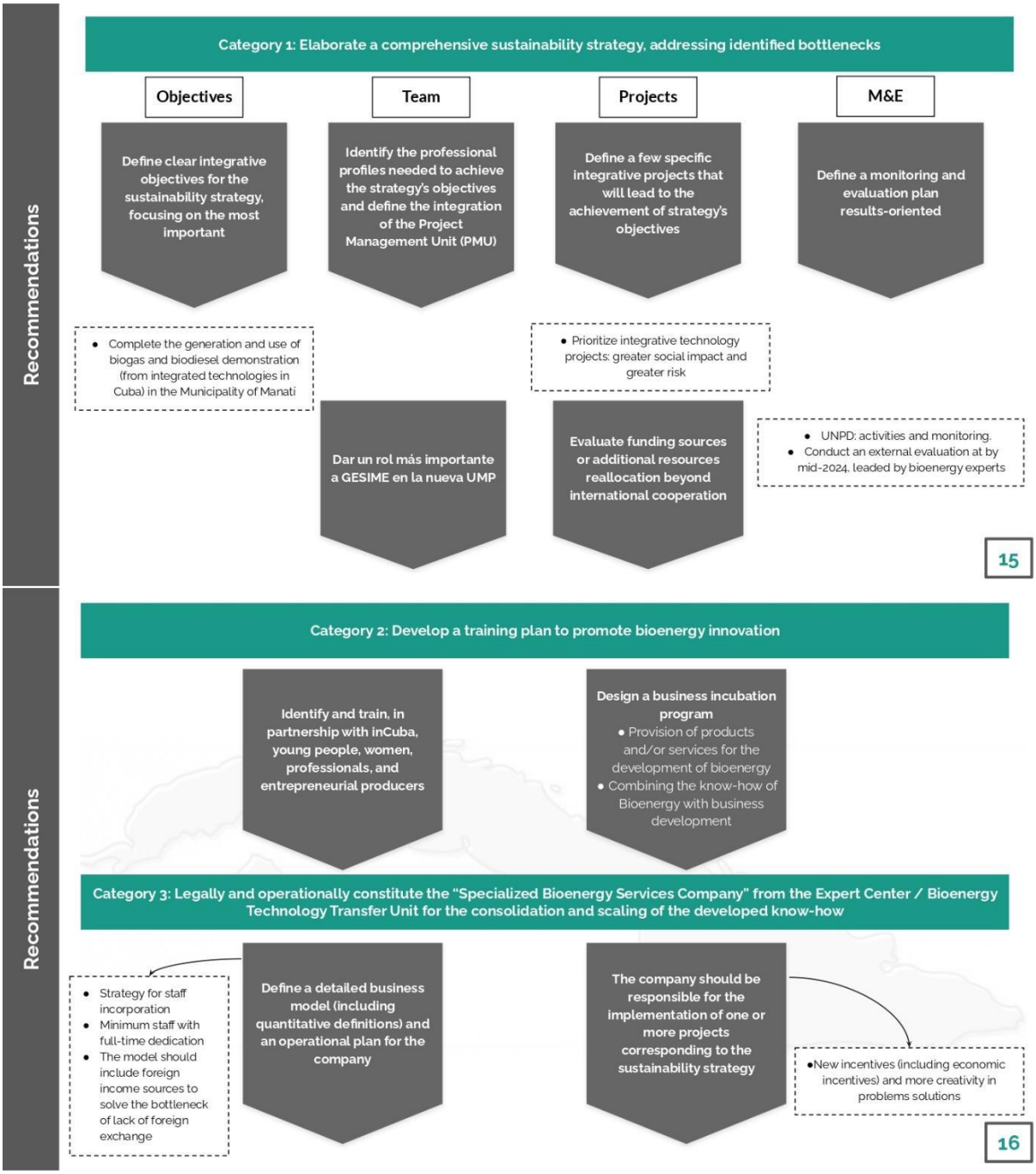
Source: Prepared by the authors based on surveys conducted with participating institutions and companies. N= Institutions=10; Companies=7

General conclusions

Elements needed to consolidate project innovations



14


Recommendations
Category 1: Elaborate a comprehensive sustainability strategy, addressing identified bottlenecks
Objectives
Define clear integrative objectives for the sustainability strategy, focusing on the most important
Team
Identify the professional profiles needed to achieve the strategy's objectives and define the integration of the Project Management Unit (PMU)
Projects
Define a few specific integrative projects that will lead to the achievement of strategy's objectives
M&E
Define a monitoring and evaluation plan results-oriented
• Complete the generation and use of biogas and biodiesel demonstration (from integrated technologies in Cuba) in the Municipality of Manati
• Prioritize integrative technology projects: greater social impact and greater risk
Dar un rol más importante a GESIME en la nueva UMP
Evaluate funding sources or additional resources reallocation beyond international cooperation
• UNPD: activities and monitoring.
• Conduct an external evaluation at by mid-2024, leaded by bioenergy experts
15
Recommendations
Category 2: Develop a training plan to promote bioenergy innovation
Identify and train, in partnership with inCuba, young people, women, professionals, and entrepreneurial producers
Design a business incubation program
• Provision of products and/or services for the development of bioenergy
• Combining the know-how of Bioenergy with business development
Category 3: Legally and operationally constitute the "Specialized Bioenergy Services Company" from the Expert Center / Bioenergy Technology Transfer Unit for the consolidation and scaling of the developed know-how
• Strategy for staff incorporation
• Minimum staff with full-time dedication
• The model should include foreign income sources to solve the bottleneck of lack of foreign exchange
Define a detailed business model (including quantitative definitions) and an operational plan for the company
The company should be responsible for the implementation of one or more projects corresponding to the sustainability strategy
•New incentives (including economic incentives) and more creativity in problems solutions
16

Lessons learned

1

Clearly define what needs to be demonstrated and limit to that.

- Bioenergy needed to demonstrate the technical-economic feasibility of biodiesel production with plants manufactured in Cuba.
- Coupling biodiesel plant to an active crop of Jatropha: replacement of Yaguajay for Calixto García.

2

Focus on one type of technology and master it.

- Do not disperse efforts and take the risk that the demonstration is not blunt.
- More resoluteness by choosing a single renewable option: biogas or biodiesel.

3

If risks are important and expected, the most relevant mitigation action is the simplification of the project design or the reduction of the project's ambition level.

- It is important to fully identify the assumptions, risks and mitigation measures to be taken.

4

Define a priori the criteria for selecting beneficiaries taking into account the sustainability dimension

- Municipality of Yaguajay met criteria at local government level
- The direct beneficiary was the company "Agronomy": non-priority local development

5

Ensure an implementation team with sufficient staff, with all necessary and complementary skills and full-time dedication to the project.

- Consider providing external expertise
- Bioenergy would have benefited from technical assistance with supplier and import logistics

17

¡Thank you!

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Annex 13 – Tracking tools

This annex is an Excel document that contains the monitoring tools corresponding to the Final Evaluation of the Project "Clean Energy Technology for Rural Areas in Cuba (BIOENERGIA)", PIMS 4899. The document is called "Cuba PIMS 4899 Clean Energy CCMTT 11 4 2022 FINAL". In addition, a document is added to clarify the calculations made (named: "Calculation of emissions avoided 11 4 2022 FINAL (Ob. 1)").

- Cuba PIMS 4899 Clean Energy CCMTT 11 4 2022 FINAL: https://docs.google.com/spreadsheets/d/1jlhIDZqV2dEtABnHCPMnGyygBaYxIR15/edit?usp=sharing&ouid=101710266788113782489&rtpof=true&sd=true
- Calculation of avoided emissions 11 4 2022 FINAL (Ob. 1): https://docs.google.com/spreadsheets/d/1lPRs78lC8TVyKa9_iGssbl5_Fzd1S6k8/edit?usp=sharing&ouid=101710266788113782489&rtpof=true&sd=true

Annex 14–Audit Trail

The following is a template for the Final Evaluation Team to show how the comments received on the draft evaluation report final I know they have Incorporated (either No) to the report final. The Present clue of audit must appear what exhibit in the report final of evaluation, but No attach to the record of evaluation.

A the comments received the 05/25 of the evaluation final of Project "Technologies energy clean for the areas rural in Cuba (BIOENERGY)" (UNDP Project, PIMS 4899).

In Table 6, you will find the comments that were provided to the draft final evaluation report, which are referenced by institution/organization (not include the name of the commentator) and the number of comment from change of clue ("#" column).

Table 6- Audit Trail

Institution/ organization	Number	Paragraph number/ Comment location	Comment/Feedback on the Draft Report	Final Evaluation Team Response and actions taken
PSU	1	Paragraph 1 of the Draft Final Report	The project began to be implemented at the beginning of January 2017, when the signing of the ToR was completed.	Text corrected according to comments (in reference to implementation dates)
UNDP Cuba	2	Paragraph 1	For GEF purposes, the start of implementation is determined by the date of signature of the project document.	The project start date was corrected, specifying in a footnote the established clarification
PSU	3	Table 1; row 6, column 5 of the Draft Final Report	Co-financing is higher: USD 26,061,236, of which USD 24,454,611 before 2021, when the realignment and currency change occurred	The number was corrected according to the final version of the co-financing table (in reference to the amount of co-financing)
PSU	4	Table 2; row 9, column 2 of the Draft Final Report	It had to be a 3. Since mid-2017, SDA began to be delivered to Consumimport, imports were even made with the previous EMED. The large delays were caused by the slow and complex Cuban import system, and it becomes more complex with the arrival of the Covid	The comment was considered and the rating was maintained following the criteria of the evaluation team: there were important deficiencies in the implementation, which was due to multiple causes

PSU	5	Table 2; row 11, column 2 of the Draft Final Report	we will reach them	The comment does not imply making a change (in reference to the critical goals of the project)
PSU	6	Table 2; row 17, column 3 of the Draft Final Report	I don't think it's 2 Moderately unlikely, we already have a national PNCTI Energy project for 5,168,170 CUP, and three territorial projects in Matanzas, which start in 2022 or 2023, for 3,849,635, between the three; Negotiations are made with the French Embassy, a project of 70,000 euros for German cooperation was delivered, one of 50,000 USD for solar irrigation with India was approved; the SDC will contribute 45,000 USD to support the purchase of pending supplies	The score was modified from 2 to 3 points in reference to the sustainability of financial resources, based on the additional information provided.
UNDP Cuba	7	Table 2, row 23, column 2	If there are environmental risks. -The environmental and social safeguards tool was updated in 2022 in view of the project's Sustainability Strategy, taking into account that the installation, start-up and operation process of the biogas and biodiesel technological solutions, which These are risky activities. In this sense, please take into account that: -The first time the project's safeguards were applied was during its formulation (2014) -In 2019 the safeguards tool was updated and in 2022 it was updated again for the project closure process. -The recommendations / measures to be applied in terms of Environmental and Social Safeguards constitute an annex to the Project's Sustainability Strategy.	The comment referring to the environmental category, within sustainability, was modified. The score was modified from 4 to 3 in relation to the established modification. Paragraphs 160 and 170 were added in relation to the development of environmental risks
PSU	8	Paragraph 7 of the Draft Final Report	The complexity of the Cuban context and how complicated it is	Text corrected based on comments (referring to context and project complexities)

PSU	9	Paragraph 10 of the Draft Final Report	For this there is the complementarity between institutions. There is no institution or organization in Cuba that had a capacity for excellence that covered all aspects of the project	The original text was kept
PSU	10	Paragraph 11 of the Draft Final Report	Since mid-2017, two months after the signing of the ToR, SDA began to be delivered to Consumimport, imports were even made with the previous EMED. What happened is that from that moment on, the complexity of the import process in Cuba began to be understood, experiences began to be gained, regular monitoring was carried out personally by me, and a negotiation process with the importer began, and in influencing with mitigation measures in a better performance of the same. But it was not that there was no planning	Replaced the word “planning” with the word “management” (referring to the planning and execution of the project)
UNDP Cuba	11	paragraph 11	Note that it is an additional mechanism of the EEIH so that it is not confused with the UMP	A footnote was added establishing the indicated distinction (referring to the Project Office in the EEIH)
UNDP Regional Office	12	Paragraph 14	Add “with”	The wording was modified according to the comment made
PSU	13	Paragraph 16 of the Draft Final Report	Topic to attend	The comment does not imply making a change (in reference to legal status and division of responsibilities of the institutions)
UNDP Cuba	14	Paragraph 18	Add, perhaps at the bottom of the page, that it is a project led by the University of Havana in cooperation with the University of Berlin.	A footnote was added establishing the indicated distinction (About the InCuba project)
PSU	15	Paragraph 19 of the Draft Final Report	I find them excellent	The comment does not imply making a change (in reference to the lessons learned)
UNDP Regional Office	16	Paragraph 19	Know or implemented? This statement is not very clear	The wording was modified according to the comment made
UNDP Regional Office	17	Paragraph 24	Please explain acronym for the first time	The wording was modified according to the comment made (in reference to the acronym EEIH)

UNDP Regional Office	18	Paragraph 26	Change FE to TE	The wording was modified according to the comment made (in reference to the acronym in English corresponding to Final Evaluation)
UNDP Regional Office	19	Paragraph 32	Please provide these translated documents for QA.	The annexes were translated
UNDP Regional Office	20	Paragraph 34	TOR? PRODUC?	We refer to the approval of the Terms of Reference (TOR) of the national project, we do not refer to the Project Document (ProDoc). The TORs exist (item "Critical Risk Management" of the PIR: Insufficient execution of GEF funds, due to: 1) delays in the national approval of the project (GEF approval May 4, 2015; approval of the Cuban Government to start the signing process of Terms of Reference, October 8, 2016; signing of Terms January 4, 2017 that defines the start date of project execution)
PSU	21	Paragraph 35 of the Draft Final Report	In practice, the ToR were approved in January 2017 and the first actions in April 2017, when the first national contracts began, in short, a year after the one reflected here	Text corrected based on comments (referring to project start and end dates)
UNDP Regional Office	22	Paragraph 48	Review translation	The wording was modified according to the comment made
UNDP Regional Office	23	Paragraph 54	Change: Bio-energies to Bioenergy	The wording was modified according to the comment made
UNDP Cuba	24	Paragraph 55	Given that these actors are mentioned for the first time in this paragraph, we suggest placing the full name of these institutions and acronyms in parentheses, with the exception of UNDP and MES, which are already mentioned earlier in the report.	The text was corrected according to comments (in reference to the actors of the project)
UNDP Regional Office	25	Paragraph 56	Is it possible to differentiate the institutions according to the working groups?	The relationship of each expected result with the institutions that have participated in its achievement was established.

UNDP Regional Office	26	Paragraph 58	Delete “of”	The wording was modified according to the comment made
PSU	27	Paragraph 65 of the Draft Final Report	They are totally right about this.	The comment does not imply making a change (in reference to the indicator “C. MWh/years produced using biogas and biodiesel”)
PSU	28	Paragraph 66 of the Draft Final Report	Totally right. How they are written makes it difficult for us to comply	The comment does not imply making a change (in reference to indicators 2c and 2d)
PSU	29	Paragraph 67 of the Draft Final Report	They are right	The comment does not imply making a change (in reference to the goals of the indicators)
UNDP Regional Office	30	Paragraph 68	Change establishment to established	The wording was modified according to the comment made
PSU	31	Paragraph 69 of the Draft Final Report	Very right. How good that perspective would have been for us in the formulation of the PRODOC	The comment does not imply making a change (in reference to the goals of the indicators)
UNDP Regional Office	32	paragraph 70	Indeed it has changed since GEF5	Added text related to comment
PSU	33	Paragraph 77 of the Draft Final Report (Current version: paragraph 76 in the Final Report)	The Bioenergy team has gender embedded in its DNA with a coordinator of this transversal axis	The paragraph was further elaborated as a result of the comment (in reference to the gender approach)
PSU	3. 4	Paragraph 78 of the Draft Final Report	Aspect to attend for new projects and the completion of this	The comment does not imply making a change (in reference to assumptions and risks of the project)
PSU	35	Paragraph 79 of the Draft Final Report	We will review current risks	The comment does not imply making a change (in reference to assumptions and risks of the project)
PSU	36	Paragraph 80 of the Draft Final Report	Idem	The comment does not imply making a change (in reference to assumptions and risks of the project)

PSU	37	Paragraph 81 of the Draft Final Report (Current version: paragraph 76 in the Final Report)	At that time there were still large import arrears	Text corrected based on comments (referring to project assumptions and risks)
PSU	38	Paragraph 87 of the Draft Final Report (Current version: paragraph 86 in the Final Report)	This is NOT left over. Biomas has been an important source of lessons learned, as well as a prior training platform for many members of the UMP and of the Bioenergy project itself.	Text corrected according to comments; it was a bug (referring to lessons from other projects)
UNDP Regional Office	39	paragraph 90	Please review language… not clear what this paragraph wants to communicate.	The wording was modified according to the comment made
UNDP Regional Office	40	Paragraph 93	Delete: “It is considered”; “which”	The wording was modified according to the comment made
UNDP Regional Office	41	Paragraph 93	Has this happened in this project? Procurement and contracting? ; I understand this is full nim modality, right?	The text was modified in relation to the established comment
UNDP Cuba	42	Paragraph 97	the full name and acronyms must have been placed in parentheses the first time it is mentioned	The modification has not been made since the full name was specified on page 15 (prior to this comment)
PSU	43	Paragraph 99 of the Draft Final Report	milk	Text corrected according to comments (referring to project results during execution)
UNDP Regional Office	44	Paragraph 100 (Current version: paragraph 98 in the Final Report)	Guidance to implementation? What is meant by operational implementation, execution? Please use the correct GEF or UNDPO language. I understand EEIH was the IP. This section is confusing.	Changed text and wording based on established comment

PSU	45	Paragraph 101 of the Draft Final Report	Remove this. The tanks are biogas	Text corrected according to comments (referring to project results during execution)
PSU	46	Paragraph 101 of the Draft Final Report	are installed	Text corrected according to comments (referring to project results during execution)
UNDP Regional Office	47	Paragraph 103 (Current version: paragraph 99 in the Final Report)	This section seems poor, lacks content. Are these the only adaptive management activities? What have been done to correct the course of implementation? Also very little was spoken about MTR, to which extent this milestone contributed to adaptive management and to finetune priorities. Please provide a more in-depth analysis. It seems IP followed the outputs defined in PRODOC to strictly, even though assumptions and risks proved not to be completely accurate.	The section under the title "ADAPTIVE MANAGEMENT" was modified. Additional paragraphs added
UNDP Cuba	48	Paragraph 106	add to acronyms and abbreviations section	The acronyms were added to the corresponding table
PSU	49	Paragraph 106 of the Draft Final Report	Already signed with all the industrial and agricultural companies in the closing workshop	Text corrected according to comments (in reference to association agreements)
UNDP Regional Office	50	Paragraph 111	Please review all paragraph	The wording was modified according to the comment made
UNDP Cuba	51	Subtitle D "Co-financing of the project"	This section should include information on the status of execution of national co-financing based on the executed co-financing report.	An explanatory paragraph on co-financing has been added
UNDP Regional Office	52	Paragraph 114	Delete "contribution"	The wording was modified according to the comment made
UNDP Regional Office	53	Paragraph 115	Delete "the life of the"	The wording was modified according to the comment made
UNDP Cuba	54	Paragraph 116 (Current version: paragraph 115 of the Final Report)	specify that it is an additional structure of India Hatuey to ensure that it is not confused with the project management unit (MEP)	Footnote added in previous section (page 7)

PSU	55	Paragraph 123 of the Draft Final Report	To consider per project	The comment does not imply making a change (in reference to the coordination of the application and execution of UNDP and the partner)
UNDP Regional Office	56	Paragraph 123	Review. Do not cite specific stakeholder comments	The paragraph was modified avoiding naming the companies
PSU	57	Paragraph 124 of the Draft Final Report	Idem	The comment does not imply making a change (in reference to the coordination of the application and execution of UNDP and the partner)
UNDP Regional Office	58	Table 6; row 1, column 4	This is not clear, please review thoroughly. The points presented related to what was achieved or not achieved?	Proceeded to redraft
UNDP Regional Office	59	Table 6; row 2, column 5	Is this a policy/mechanism? review	The reference was removed, since it is not effectively a policy or mechanism (referring to ""Opportunities and limitations for the development of bio-energy, with medium and small producers in Cuba")
UNDP Regional Office	60	Table 6; row 3, column 5	Review the wording and narrative. Please be objective, are the systems in place/the supplied material able to achieve the initial energy generation estimated???	Completely revised wording. In addition, a sentence was added in paragraph 65, which related to the second paragraph of the comment in the table
PSU	61	Table 6; row 3, column 5 of the Draft Final Report	They already arrived	The text was corrected according to comments (in reference to the goals achieved in the products based on technology transfer)
PSU	62	Table 6; row 3, column 4 of the Draft Final Report	It is ready and has been marketed	The text was corrected according to comments (in reference to the goals achieved in the products based on technology transfer)

PSU	63	Table 6; row 3, column 4 of the Draft Final Report	ready prototype	The text was corrected according to comments (in reference to the goals achieved in the products based on technology transfer)
PSU	64	Table 6; row 3, column 5 of the Draft Final Report	include refrigerator	The text was corrected according to comments (in reference to the goals achieved in the products based on technology transfer)
UNDP Regional Office	65	Table 6; row 4, column 5	??? Are those included? This table seems not to be final...	The final part of the comment that may seem imprecise was deleted. Although they can be counted as direct and indirect beneficiaries, in the project they have not been adequately quantified, therefore we do not include them in the indicator.
UNDP Regional Office	66	Table 6; row 5, column 4	This seems not to be considering the full life time of 10 years (direct emissions), please confirm	The calculation made is correct. At the beginning there are tons of CO2 and then there are kt of CO2. Likewise, the correction was modified, replacing "3.5 kt CO2eq captured at the end of the project" by "500 tn CO2eq captured at the end of the project"
UNDP Regional Office	67	Table 6; row 5, column 5	This is not the place for such info, add this to project design session. Do you mean we should increase the target? This is the capacity to be generated by the project and should be translated to CO2	Removed text highlighted and added a sentence in paragraph 68 summarizing the idea
UNDP Regional Office	68	Table 6; row 6, column 5	Which kind of information tool does has this evaluation generated	This document focuses on the evaluation of existing opportunities and limitations in terms of public policies, technological, economic-financial, environmental and social environments. For each dimension, conclusions and policy recommendations are offered. The Project, the Minag and its business groups and research centers, the Minem, several universities, the Society for the Promotion of Renewable Energies and Environmental Culture (Cubasolar), the Ministry of Finance and Prices (MFP), and the

				Directorate of Agricultural Credits of the Bank of Credit and Commerce (Bandec).
PSU	69	Table 6; row 7, column 5 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the calculation of GHG emission goals)
UNDP Regional Office	70	Table 6; row 7, column 4 and 5	Please be more objective here in reporting results. Report what is there to date	Text corrected according to comments
UNDP Regional Office	71	Table 6; Title Result 2/Outcome 2	Please present the estimated productive capacity to all systems that have not been finalized. If it won't generate it, please state clearly.	Explanatory paragraphs added. It is assumed that due to its size, the UEB Cubana de Acero company has excess production capacity to reach the set goal.
				A paragraph was added and another was reformulated to specify the estimated productive capacity.
				The comment does not apply to the comments of this indicator
				The comment does not apply to the comments of this indicator
PSU	72	Table 6; row 9, column 5 of the Draft Final Report	Nationwide expansion started	Text corrected according to comments (referring to info tools)
UNDP Regional Office	73	Table 6; row 13, column 5	Complete final comments	Final comments were written.
PSU	74	Table 6; row 14, column 5 of the Draft Final Report	review by project	The comment does not imply making a change (in reference to the production of flexible geomembrane)

PSU	75	Table 6; row 15, column 5 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the liters of biodiesel produced)
PSU	76	Table 6; row 16, column 5 of the Draft Final Report	Idem	The comment does not imply making a change (in reference to the cubic meters of biogas generated)
UNDP Regional Office	77	Paragraph 126	Add "with"	The wording of the paragraph was adapted
UNDP Regional Office	78	Paragraph 127	Review	The wording was modified according to the comment made
UNDP Regional Office	79	After Paragraph 127, title: Effectiveness	Please state the rating for easy reference.	Added rating number (modification replicated in each title)
UNDP Regional Office	80	Paragraph 129	Review	The wording was modified according to the comment made
UNDP Regional Office	81	Paragraph 130	Please clarify samples	The text was redrafted
UNDP Regional Office	82	Chart 3	This graph does not show much, we need evaluator review of effectiveness, not the perception of stakeholders involved in Project implementation. Consider excluding	Chart 3 removed
UNDP Regional Office	83	Paragraph 134	Review	The wording was modified according to the comment made

UNDP Regional Office	84	Paragraph 135	Add: was planned	The wording was modified according to the comment made
UNDP Cuba	85	Paragraph 139	add to acronyms (MEP)	Acronym added in the corresponding section
UNDP Cuba	86	Paragraph 137	This was the closing workshop or which workshop???	The comment does not imply making a change. Answer: yes, it was the closing workshop (in relation to the Project Closing Workshop).
UNDP Regional Office	87	Paragraph 139; section c)	Change subsidy to GEF grant	The wording was modified according to the comment made
UNDP Regional Office	88	Paragraph 139; section d)	??	The wording of the section was modified
UNDP Regional Office	89	Paragraph 140	Co finance?	The wording of the section was modified. "Contribution" replaced by "co-finance"
PSU	90	Paragraph 145 of the Draft Final Report (current version: paragraph 143 of the Final Report)	And planting 150 ha	Text corrected according to comments (referring to Jatropha planting)
UNDP Regional Office	91	Chart 5	Please elaborate the info of the graphs, suggest excluding as these are opinions of stakeholders.	Chart 5 removed
PSU	92	Paragraph 148 of the Draft Final Report (current version: paragraph 145 of the Final Report)	In engine test bench evaluations	Text corrected based on comments (referring to laboratory evaluations of diesel blends with biodiesel)

PSU	93	Paragraph 151 of the Draft Final Report (current version: paragraph 148 of the Final Report)	Marti	The text was corrected according to comments (in reference to the municipalities involved in the production of biogas)
UNDP Cuba	94	Title Table 8	Chuchy, of all this what supplies are missing? The idea is that if we put 2022, it is because the industry already has everything that Indian Hatuey had to give it, right? Because we have three contracts locked x shipping and 1 supplier that has not finished delivery.	The comment does not imply making a change
PSU	95	Table 8; row 4, column 3 of the Draft Final Report	It has already arrived in Indio Hatuey	Text corrected according to comments (in reference to the required generator)
PSU	96	Paragraph 155 of the Draft Final Report	Attend by project	The comment does not imply making a change (in reference to the execution of result 3)
UNDP Regional Office	97	Paragraph 158 (Current version: paragraph 1155 of the Final Report)	It seems the sequencing of activities and prioritization of enabling tasks (such as the technical projects of plants) were also an issue influencing efficiency. Have the evaluators assessed this?	The planned sequential order of execution of activities did not affect efficiency. It was the problems that arose during the execution that affected the efficiency. These problems had to do both with the emergence of the Covid-19 Pandemic and problems of the Cuban context that were already identified as risky. Among the latter are processes of purchase and import of supplies, increase in the euro-dollar exchange rate, logistics problems of agricultural and industrial production during the first half of the project, devaluation of the Cuban currency, difficulty of access to foreign currency by of partner institutions
PSU	98	Paragraph 162 of the Draft Final Report (Current version: paragraph 158 of the Final Report)	The project has a gender coordinator and various actions were carried out, among them for empowerment, masculinities and publications	The text was corrected according to comments (in reference to the gender approach, women's empowerment and cross-cutting problems)

UNDP Regional Office	99	Paragraph 163 of the Draft Final Report (Current version: paragraph 160 of the Final Report)	Review	The wording was modified according to the comment made
UNDP Regional Office	100	Chart 7	Is this a topic to be evaluated by the survey or by the concrete review of inputs needed/purchased? Suggest excluding this graph	Chart 7 removed
PSU	101	Paragraph 165 of the Draft Final Report	It's true	The comment does not imply making a change (in reference to the resolution of obstacles)
PSU	102	Paragraph 165 of the Draft Final Report (Current version: paragraph 162 of the Final Report)	Project was already approved this month, I mentioned before, of more than 5 million CUP	The text was corrected according to comments (in reference to an EEIH project proposal)
PSU	103	Paragraph 168 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the institutional framework and governance risks)
UNDP Regional Office	104	Paragraph 171 (Current version: paragraph 168 of the Final Report)	Suggested removal: on its contribution; dimension.	The wording of the paragraph was adapted
PSU	105	Paragraphs 174 and 175 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the main findings and conclusions)
UNDP Regional Office	106	Paragraph 185 (Current version: paragraph 182 of the Final Report)	Suggestion to change “are” to “is”.	The wording of the paragraph was adapted

UNDP Regional Office	107	Table 9; row 2; column 2	Review	The wording of the paragraph was adapted
UNDP Regional Office	108	Table 9; row 4; column 2	Vulnerable?	"Most risk" was changed to "greatest risk", a phrase that refers to "greater risk"
PSU	109	Paragraph 186 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the recommendations)
PSU	110	Paragraph 187 of the Draft Final Report	Consider by project	The comment does not imply making a change (in reference to the lessons learned)
PSU	111	Paragraph 188 of the Draft Final Report	Consider	The comment does not imply making a change (in reference to the lessons learned)
PSU	112	Paragraph 189 of the Draft Final Report	Consider	The comment does not imply making a change (in reference to the lessons learned)
UNDP Cuba	113	Annex 7	Does this include the list of people interviewed?	The comment does not imply making a change. Answer: if, annex 7 includes the people interviewed (referring to the annex "Schedule of Evaluation Mission Activities")