

2019

Project Implementation Review (PIR)

**SUCRE**

[Basic Data](#_Toc1)

[Overall Ratings](#_Toc2)

[Development Progress](#_Toc3)

[Implementation Progress](#_Toc4)

[Critical Risk Management](#_Toc5)

[Adjustments](#_Toc6)

[Ratings and Overall Assessments](#_Toc7)

[Gender](#_Toc8)

[Social and Environmental Standards](#_Toc9)

[Communicating Impact](#_Toc10)

[Partnerships](#_Toc11)

[Annex - Ratings Definitions](#_Toc12)

# Basic Data

|  |  |
| --- | --- |
| **Project Information** | |
| UNDP PIMS ID | 3515 |
| GEF ID | 2778 |
| Title | Sugarcane Renewable Electricity (SUCRE) |
| Country(ies) | Brazil, Brazil |
| UNDP-GEF Technical Team | Energy, Infrastructure, Transport and Technology |
| Project Implementing Partner | BRA-CTBE/CNPEM |
| Joint Agencies | *(not set or not applicable)* |
| Project Type | Full Size |

|  |
| --- |
| **Project Description** |
| The aim of the project is to avoid the CO2 emissions maximizing electric power generation in sugarcane mills using trash and bagasse as fuels, substituting the implementation of the corresponding power in thermal generation using fossil fuels (especially natural gas).  Electric power will be generated in conventional systems (boiler/steam-turbine systems ÔÇô preferably 65 to 82 bar boiler and CEST ÔÇô condensing, extraction steam turbine) with the use of sugarcane trash as a supplementary fuel to bagasse, making possible with this extra fuel to have year round generation (season and off-season). Power purchase agreement will be considered, with the energy sold to the final consumer (what would be possible with year round generation), getting better prices for the electricity.  The project will consider the study for a group of 10 sugarcane mills with the purpose of implementing the project in at least 3 mills, with very good perspectives that the technology will be replicated in the near future. The implementation of the project in this 3 mills will lead to a total of 240.000 t of CO2 displacement per year (using natural gas generation as baseline), when the mills reach 50% of the total trash recovery (considering average of 2 million tons of milled cane per implemented project mill).  The project considers the study and implementation of the alternative of ÔÇ£whole material harvestingÔÇØ that considers the transport of trash with the cane in total. The equipment for this alternative permits also the operation in the ÔÇ£partial cleaningÔÇØ mode for particular situations, when it is necessary to leave some trash in the field for agronomic purposes. This can be performed just by adequate operation of the harvester, extracting part of the trash from the harvested material and leaving it in the field.  The main difference in trash cost of the alternatives of ÔÇ£whole material harvestingÔÇØ and ÔÇ£partial cleaningÔÇØ (US$ 31.1 and US$ 13.7 per ton of trash - dry matter - respectively) is due to the greater amount of trash with the cane present in the first, which reduces significantly cane load density, increasing transport costs. The project has the proposition to solve or minimize this problem, reducing significantly trash cost for the whole material harvesting alternative.  On the other hand, the ÔÇ£whole material harvestingÔÇØ alternative has higher recovery efficiency (66%) than the ÔÇ£partial cleaningÔÇØ alternative (50%), bringing therefore more trash to the mill. Besides that, partial cleaning has the disadvantage that in the cleaning process, the part of the trash that is removed and left in the field is the driest and easiest to separate, and that would be the best to be burned at the boilers.  69. The interesting point of these two options is that the field operations are almost the same as for actual sugarcane harvesting, with no specific operations for trash recovery. There is the need to adapt/modify the cane harvester to the condition of no cleaning or partial cleaning. The infield transport equipment and road truck fleet would be modified and its number increased with the purpose of transporting a greater material volume, but no significant change in operations timing, management, type of equipment and maintenance would occur. In summary, trash would be harvested with the cane.  70. The main investment in terms of trash recovery and processing would be performed at the mill site, where a dry cleaning station (for trash and mineral separation from cane) and a trash shredding equipment would be necessary.  The project should provide the means for the development of new equipment that are not available today because no one is recovering trash in these systems (whole material harvesting or partial cleaning), actuating in several fronts to break technological and risk barriers |

|  |  |
| --- | --- |
| **Project Contacts** | |
| UNDP-GEF Regional Technical Adviser | Ms. Ludmilla Diniz (ludmilla.diniz@undp.org) |
| Programme Associate | Mr. Ernesto Kraus (ernesto.kraus@undp.org) |
| Project Manager | Ms. Thayse Aparecida Dourado Hernandes (thayse.hernandes@lnbr.cnpem.br) |
| CO Focal Point | Ms. Rose Diegues (rose.diegues@undp.org) |
| GEF Operational Focal Point | Marcelo Moises de Paula (marcelo.paula@planejamento.gov.br) |
| Project Implementing Partner | Manoel Regis Lima Verde Leal (regis.leal@ctbe.cnpem.br) |
| Other Partners | *(not set or not applicable)* |

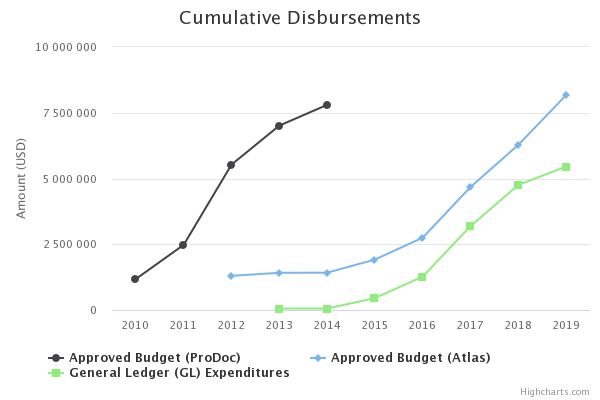
# Overall Ratings

|  |  |
| --- | --- |
| Overall DO Rating | Highly Satisfactory |
| Overall IP Rating | Highly Satisfactory |
| Overall Risk Rating | Moderate |

# Development Progress

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Description** | | | | | | |
| **Objective**  **To create the conditions for sugar mills to increase the export of electricity generated by sugar cane trash and bagasse to the grid.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Trash system implemented and operating | No mills or distilleries are using the trash produced by the green harvesting | *(not set or not applicable)* | Trash system successfully demonstrated in one mill by end of year 3    Trash system successfully operating in 3 mills by end of project | Trash collection, processing and burning system are operational in all four partner mills in Batch 1. Sucre team completed the baseline and the tests in the implemented systems for trash collection and processing for the Batch 1 mills. Technical challenges in sugarcane trash collection, processing and burning were mostly linked to mineral impurities content, particle size and other contaminants, all of them impairing equipment performance and increasing the maintenance costs. Thus, alternative technical solutions are being tested to improve the performance and to avoid cost increases and technical problems in processing and burning equipment. Thus, field and laboratory activities are being focused on tests of an alternative system which consists in washing sugarcane straw and crush it together with sugarcane stalks on the last mill of the tandem. Preliminary results showed that, in addition to the removal of mineral impurities (from 20% to 5%, in average) and other critical contaminants (Cl, S, K), this system delivers sugarcane straw with particle size and moisture content similar to bagasse, which benefits the boiler’s performance. Another significant technical challenge was the Dry-Cleaning systems performance, which presented an efficiency much lower than expected and reported in the literature. In this case, we are adjusting and testing an equipment which works connected to the harvester and chop the sugarcane straw during the harvest process. Among the benefits, we can highlight a possible improvement in Dry-Cleaning systems performance and a gain in density of the load sugarcane stalks + straw transportation, since smaller particle size allows a better accommodation of sugarcane straw amongst stalk gaps. Moreover, regarding collection systems based on bales, operational conditions will be recommended to minimize these problems. As a major result, it is important to highlight that some of the partner mills already implemented changes in operational and equipment configurations based on the recommendations of the Sucre team. | From the beginning of the project the team aligned the expectations with the partner mills and, together with them, set up the collection systems that would be evaluated according to the use and preference of the partners. We evaluated the partial collection system, where the trash is brought to the industry along with the cane stalks, the collection system by bales, where the trash is left in the soil and then windrowed and collected through a baler and the bales are taken later to the industry, and finally the collection system using a hay harvester, where the trash is also left on the soil after the harvest and later windrowed and collected by this equipment. In the case of partial harvesting, a dry cleaning system is required to separate trash from cane stalks prior to crushing and other industrial processes. In this case, the evaluations of the dry cleaning systems available in the partners showed that this equipment operates at very low efficiencies, which in a way would make this collection system unfeasible. To improve this efficiency, project team worked with computational simulations that showed chopped trash could increase the efficiency of these systems. Thus, the team identified an equipment that was developed by the Sugarcane Technology Center and, in partnership with them, this equipment (which operates coupled with a sugar cane harvester and chops the trash, directing different proportions to follow along with the cane stalks or to stay on the ground) is being tested. A first test conducted at a partner mill in Batch 2 showed that the chopped trash doubled the efficiency of the tested dry cleaning system compared to the non-chopped trash. In addition, chopped trash also provided a gain in the transportation costs of the cane + trash mix, as smaller pieces of trash fit into the spaces between the cane billets, which provides that a larger mass can be carried in the same volume of cargo.  Although 3 trash collection systems have been tested, the trash presented the same problems such as a high content of mineral impurities and the presence of some elements that hinder the operation of boilers (such as chlorine, sulfur and potassium). In addition, regardless of the collection system used, the trash arrives in the industry with a very different particle size distribution from that of the bagasse, which causes difficulties in the feeding valve and greatly damages the burning efficiency of the mixture in the boilers. In summary, the content of mineral impurities, harmful elements and particle size distribution showed that trash is very different from bagasse and the boilers that operate in the Brazilian mills were designed to burn bagasse. Since the acquisition of new boilers designed for trash is economically unfeasible due to the high costs, the path chosen by the team was to condition the trash before mixing with the bagasse and then burn the mixture in the boiler, so that characteristics of the trash was as close as possible to the characteristics of the bagasse, thus improving the operation and costs of existing boilers.  In this way, the team evaluated an alternative trash processing system in four partners, which consists of washing the trash, with recycling water the water after treatment, and then milling it together with the cane in the last or second to last mill of the tandem. Field evaluations and also laboratory results showed that in order to remove the harmful elements, it would be necessary to perform a shaking of the already crushed trash in addition to washing it. Thus, the project team has made some modifications and as a result, it is suggesting an adapted form of this system with agitation of already crushed trash before mixing it with the bagasse in the last mill of the tandem. This system is being designed and also evaluated from the point of view of economic viability, and preliminary results have shown that the cost of purchasing it is lower than the cost of purchasing common equipment in unconditioned/traditional trash processing systems. This system is being studied by one of the partners of Batch 2 to be installed in one of its units. |
| Increase in exports of biomass based electricity to the grid | Electricity exports by mills limited to excess generation from sugarcane bagasse; no additional generation using sugarcane trash in place | *(not set or not applicable)* | 70% increase in electricity exports from mills that implemented the trash system    60,000 MWh/yr exported to the grid by mill 1 at end of yr 3    180,000 MWh/yr exported to the grid by mills 1, 2, and 3 at end of project | All mills in Batch 1 have already started collecting and using sugarcane trash in different levels for electricity generation. In 2014/2015 season, Da Pedra, Quatá and Alta Mogiana mills exported together 545,834 MWh to the grid (Alta Mogiana 149,437 MWh, da Pedra 308,603 MWh and Quatá 87,793 MWh) averaging 45 kWh per tonne of processed sugarcane. Numbers will be updated to the 2015/2016 season until December 2018. | The 4 partner mills in batch 1 are exporting together to the grid on average 1 TWh of electricity (1.043 TWh in the last sugarcane season) using bagasse and straw mixture in different proportions. As a target, the project envisaged the adhesion of 3 mills, with a total average processing capacity of 6 million tons of sugarcane per season, which would lead to a production and export to the grid of 180,000 MWh. After 4 years, not 3 but 4 mills joined the project in phase 1 and these partners process together more than 21 million tons of sugarcane per season. Thus, to maintain the expectation of electricity export based on the capacity of sugarcane milling, the partners of Batch 1 would have to export an average of 650,000 MWh per season. Since they are exporting on average more than 1 TWh per season, this indicator has been exceeded by 60%, showing the great potential and reach of the project results. |
| Economic feasibility of increased generation with trash is demonstrated | Electricity sales are a limited operation in sugarcane mills | *(not set or not applicable)* | Increased revenues from additional electricity generation demonstrated in 3 mills    The share of revenues from electricity generation increases in proportion to sugar and ethanol in 3 mills | Economic model for feasibility assessment is operational and was applied in sugarcane trash collection expansion scenarios for mill #1. At the beginning of the evaluations we worked with the operational parameters provided by the partner mills. After the Sucre Workshop, which occurred in December 2017, at CTBE, there was a questioning about some operational parameters (Balers and Hay Harvesters) used to simulate economic feasibility. Thus, Sucre team worked during all the first semester of 2018 in the adjustment of these parameters to reflect realistic ranges of operational conditions applied in the economic assessment. The adjustment will allow to achieve more reliable results for all the mills assessed, either from the Batch 1 or Batch 2. Other important components for economic feasibility assessment are the indirect costs. Increases in transportation, maintenance costs, loss in juice extraction efficiency and other consequences of the sugarcane straw insertion in the electricity production are being quantified and incorporated in the simulation models to give more reliable results. Economic feasibility is strongly linked to electricity sale prices, which present great levels of variation. Therefore, simulations of economic feasibility give to the partner mill the minimum price above which they can operate profitably, based on the production costs of expanding electricity production (investments and biomass costs, essentially). Moreover, other scenarios considering the partial harvest will be simulated for mill #1 conditions, since the partner demonstrated interest in economic feasibility to this collection system. Complete assessment for mills #2 and #3 will be finished until the end of 2018 and will consider local conditions for each one of these partners. Mill #4 will be assessed in 2019 due to the partner delay in providing required data and information to feed the economic model. Preliminary results showed that sugarcane trash electricity production and commercialization seems to be profitable in all the four partner mills, with differences regarding operational particularities such as the sugarcane trash availability, the requirement of buying bagasse, the trash collection system, and others. Besides, economic feasibility is intrinsically linked to electricity sale prices. Batch 1 mills have already made investments, which increases possibilities of positive revenues from sugarcane trash electricity. Therefore, simulations of economic feasibility give to the partner mill the minimum price above which they can operate profitably, based in the production costs of expanding electricity production (investments and biomass costs, essentially). | During the last 4 years, the team created and improved a methodology to assess economic feasibility of sugarcane trash collection and use at mill level. The methodology is based in agronomic, industry and some market parameters for electricity sales. The model can be customized for specific operational conditions of each mill and the economic viability for biomass-based electricity production and sale was demonstrated for 3 of the 4 partners in Batch 1. The mill #4 provided necessary data for simulations with a delay of 2 years, which in turn caused a delay in the assessment and customization of the model for this specific partner. In any case, scenarios of electricity production and sales for the other 3 partners were simulated considering different combinations of operational and market parameters, which were defined according to the partner’s interests. In most of the simulated cases, electricity prices that enable the use of trash as a complement to bagasse for electricity generation were observed during the sugarcane season in some sales alternatives (Spot market), which supports the economic viability. Prices usually are higher during sugarcane season because sugarcane is usually processed in dry months and, since Brazilian energy matrix is essentially based on hydropower, electricity prices tend to increase in those months. |
| Trash system replicated across the sugar sector | No mills or distilleries are using the trash produced by the green harvesting | *(not set or not applicable)* | Investment leveraged for installation of trash system in at least one additional mill by end of project    Trash system feasibility studies for 7 other mills | Seven mills already accepted to be part of Batch 2 (Santa Isabel, São Luiz de Ourinhos, Santa Therezinha, São José da Estiva, Boa Vista, Granbio/Caeté (CESM) and Ferrari) and other 2 mills are interested in economic feasibility evaluations (Jataí and Cerradinho). Regarding collection, processing and burning of sugarcane straw to electricity production, partner mills invested together more than US$ 160,000,000 in new equipment up to 2017. Considering that 2018 drought seems to be worse than in 2014, Brazilian electricity generation and distribution will be harmed (since most of the generation is from hydraulic sources and depends on the reservoir levels) and biomass based electricity probably will emerge as an attractive choice in face of an eventual electricity shortage. In fact, there was an increasing interest in biomass based electricity from important sucroenergetic players, as Raízen Group, pointing to a positive scenario for trash collection and burning to electricity production.  The evaluation of productivity losses and soil erosion for mill #1 was completed and, in this case, a considerable amount of sugarcane trash should be left on the ground to avoid agronomic and environmental constraints. Issues regarding deforestation associated to sugarcane cultivation and expansion and to the potential reduction of GHG emissions were addressed and presented to national and international audience, in meetings, workshops and conferences. In general, results showed that sugarcane expansion occurred over previously deforested areas, not contributing directly to the recent deforestation of Cerrado and Atlantic Forest Biomes. Similar results will be finished for the remaining partner mills and guidelines for trash removal will be made. Based on the analysis of all the data gathered from field trials conducted over the past three years, guidelines are expected to be defined in 2018. Other important output is the Sugarcane straw removal zoning output, which consists in a map that shows suitability of Brazilian Center-South regions to sugarcane straw removal. The map is based on climatic conditions, from more than 3000 monitoring points, that drives mulching effects on sugarcane productivity. Together with the map, Sucre team will release specific guidelines to quantify straw removal, which will be based on local conditions as soil texture, harvest season period, and others. The map with macrozones of suitability for sugarcane straw removal will be finished in 2018.  A comprehensive technical report and a summarized booklet were released in 2017 to support and inform investors and mill Boards about biomass based electricity production and commercialization. Several meetings and workshops with mills and other stakeholder’s representatives (UNICA, CTC, investors, etc…) were conducted by the Project team in partnership with UNICA to disseminate the support material. Project team conducted meetings with government entities and other associations linked to sucroenergetic sector to discuss and suggest improvements and incentives in regulatory and legal framework regarding biomass based electricity production and commercialization. Project team also sent suggestions to a public consultation at the same subject, released by the Brazilian government last year. Results from public consultation seem promising as two biomass based electricity auctions were further promoted in 2017, but the process of revising the Regulatory and Legal framework has stopped due to government inaction. | We updated the co-financing and we have seen that the partners (Batch 1 and 2) invested more than 160 million dollars in equipment related to the production of electricity since 2015. In addition, there are partners in Batch 2 that are already producing and selling electricity to the grid. One partner of Batch 2 is also interested in the Sucre suggestions regarding the trash processing (washing and crushing) and several partners have already adopted technical recommendations for the project team regarding trash collection, processing and burning. |
| Environmental and legal framework in place for electricity generation with bagasse | Environmental and regulatory conditions for increased generation with sugarcane trash not fully defined | *(not set or not applicable)* | Clear, streamlined environmental guidelines and procedures for generation with sugarcane trash    Well defined regulatory framework for generation with sugarcane trash | The evaluation of productivity losses and soil erosion for mill #1 was completed and, in this case, a considerable amount of sugarcane trash should be left on the ground to avoid agronomic and environmental constraints. Issues regarding deforestation associated to sugarcane cultivation and expansion and to the potential reduction of GHG emissions were addressed and presented to national and international audience, in meetings, workshops and conferences. In general, results showed that sugarcane expansion occurred over previously deforested areas, not contributing directly to the recent deforestation of Cerrado and Atlantic Forest Biomes. Similar results will be finished for the remaining partner mills and guidelines for trash removal will be made. Based on the analysis of all the data gathered from field trials conducted over the past three years, guidelines are expected to be defined in 2018. Other important output is the Sugarcane straw removal zoning output, which consists in a map that shows suitability of Brazilian Center-South regions to sugarcane straw removal. The map is based on climatic conditions, from more than 3000 monitoring points, that drives mulching effects on sugarcane productivity. Together with the map, Sucre team will release specific guidelines to quantify straw removal, which will be based on local conditions as soil texture, harvest season period, and others. The map with macrozones of suitability for sugarcane straw removal will be finished in 2018.  A comprehensive technical report and a summarized booklet were released in 2017 to support and inform investors and mill Boards about biomass based electricity production and commercialization. Several meetings and workshops with mills and other stakeholder’s representatives (UNICA, CTC, investors, etc…) were conducted by the Project team in partnership with UNICA to disseminate the support material. Project team conducted meetings with government entities and other associations linked to sucroenergetic sector to discuss and suggest improvements and incentives in regulatory and legal framework regarding biomass based electricity production and commercialization. Project team also sent suggestions to a public consultation at the same subject, released by the Brazilian government last year. Results from public consultation seem promising as two biomass based electricity auctions were further promoted in 2017, but the process of revising the Regulatory and Legal framework has stopped due to government inaction. | We created and improved over these 4 years a model to assess economic and agrienvironmental issues regarding trash collection and use for energy purposes. The model allows to make a customized evaluation of all those aspects for any mill in Brazil, enabling a consideration of various combinations of operational and market parameters. Project team also worked in partnership with the Brazilian Sugarcane Industry Association towards an adequation of the legal and regulatory framework that incentivize biomass-based electricity production and sales. We made that by promoting several meetings and workshops, producing a booklet that can help to understand electricity sales modalities and other questions regarding that and we also send suggestions to a public consultation of the Ministry of Mines and Energy regarding the legal and regulatory framework. However, as a national laboratory, we are able to generate and present to the government the technical, environmental and social advantages of biomass-based electricity, but we have no governance in the consolidation of public policies per se. In this sense, the project's role is to provide an enabling technical environment for the creation of such policy, |
| Information disseminated on project results and the benefits of additional generation with sugarcane trash | Limited information available on potential benefits of sugarcane trash use for electricity generation | *(not set or not applicable)* | Clear guidelines, procedures, and demonstrated benefits of generation with sugarcane trash are published and widely disseminated across the sugarcane sector in Brazil and internationally. | Integrated assessment (technoeconomic, agronomic and environmental issues) was finished for mill #1. On the other hand, they are interested in new simulations considering partial harvest collection system, which will be made in the second semester of 2018. Meetings and workshops were made to present Project results and to rise interest from mills to be partners in Batch 2 activities. Some mills have already signed cooperation agreements and other mills demonstrated clear interest to be a partner and to invest in trash collection, processing and burning systems. Databases were designed and the file repository, the LIMS and BDAgro databases were already implemented. Productivity estimation model was finished and the methodology to estimate sugarcane trash availability will be delivered in 2018. Communication team have intensified the dissemination strategies, reaching significant outputs in different medias, as television shows and press media. The replication of SUCRE news in 2017 jumped from 11 to 120 different sugarcane sector related information sources, when compared to 2016 results. Integrated assessment for mills #2 and #3 will be finished until December 2018. Methodology for the evaluation of Batch 2 mills was defined and will be discussed in two meetings, one in June with the Project Advisory Committee (PAC), and other one in July, with the partner mills. In general, results from the project are gaining the interest from important groups (Raízen, Tereos and São Martinho) that are in touch with the Sucre team looking for specific evaluations and support on decision making. Until the end of the project, it will be released a website tool that will summarize all the Project results, which will allow the users to obtain general outputs (surplus electricity, recovery costs, GHG emissions mitigation, etc…) derived from the insertion of sugarcane straw collection, processing and burning for electricity production. The model to estimate sugarcane productivity based on satellite images was finished. Parameters for sugarcane trash availability estimation are being defined, based on the estimations of the productivity and in actual productivities obtained from field. Specific trash availability maps will be released to the mills that provide required spatial information and data to run the model (shapefiles from the sugarcane production areas and productivity data). Project team is working with 4 databases: a file repository (Sharepoint), a laboratory database system (LIMS), a geographic database (BDGeo) and a field experiments database (BDAgro). All databases are already designed and will be fully implemented until the end of the project. Moreover, in 2017, 4 workshops were organized, 3 to disseminate Outcome 5 results and the other one to present resultss from the whole project. Newsletters and interviews were also part of the dissemination of the project results and were spread over the media (project website, other websites, television, facebook, etc…). Finally, as the evaluations are being finalized, specific meetings with the Board of the partner mills will be scheduled to present and discuss the results and the strategies to increase sugarcane trash use in electricity production. | Besides the model that can be applied to any mill in Brazil, we will release an open access tool named Sucre Calculator that will enable to any user to make a preliminary assessment of trash collection and use for bioenergy purposes. This is part of a wider initiative which consists in create mechanisms to make the project results sustainable. Other initiatives in this sense are the databases: one with all results of field experiments, another one with all the laboratory analysis results and a third one with geographic information and data used during the project development. In addition, we created a simple tool based on Excel spread sheets coupled to a Geographic Information System that allows to any mill to apply the agrienvironmental decision Framework in order to obtain for all the sugarcane plots the amount of trash that can be removed without harming sugarcane productivity and favoring at the same time the soil erosion control. We will offer a training on this tool in August open for any interested mill/people in using it. Finally, we are promoting several workshops in 2019, at least one regarding specific outcomes of the project, in addition to more 2 workshops that will comprise all results obtained over the project execution, one more directed to mills and sugarcane energy sector, and a second one specific to a scientific audience. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 1**  **Technology for sugarcane trash collection and conversion to exported electricity at sugarcane mills is commercially launched.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Trash collection system design finalized and operational | No methodology to define trash to be collected in place    Conceptual design for trash collection system in place | *(not set or not applicable)* | Methodology defined and being used    Final design implemented and operational in mill #1 | Trash collection and processing systems were installed and operational at the four partner mills. Baseline for three of the four partner mills were established and tests are being made to improve trash collection, processing and burning. In 2018, the focus will be the tests at the boilers with different trash/bagasse mixtures and different trash particle size distribution. Thus, the costs related to efficiency and operational losses because of the introduction of sugarcane trash in the system will be quantified and incorporated to the simulation models. Baseline for da Barra mill is being finished. Tests at the boilers with different trash/bagasse mixtures and different trash particle size are being conducted in real and laboratory conditions. Since the available trash collection and Dry-Cleaning systems both demonstrated insufficient performance in terms of mineral impurities (above 10%) and efficiency (less than 30%), respectively, tests in alternative systems for trash collection (chopper) and processing (washing system) are being conducted and conclusive results will be achieved until the end of 2018. | Evaluation and recommendations regarding trash collection systems were finished and disseminated among all the project partners. At this point, all the partners (Batch 1) already have a specific trash collection system operating in their respective areas. |
| Sale of additional 60,000 MWh/yr of electricity (from mill #1) after three years. | No trash system installed | *(not set or not applicable)* | Generation of electricity from trash at mill #1 | Fully accomplished as mill #1 exports more than 89,000 MWh to the grid every year. | Updated numbers regarding the last sugarcane season for mill #1 showed an export to grid of 89,212 MWh. Considering only mill #1 regarding the last 4 years of Sucre project development, export of electricity to the grid achieved more than 350,000 MWh. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 2**  **Economic and financial viability of sugarcane trash collection and utilization for export of electricity from sugarcane mills is commercially demonstrated.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Economic feasibility is fully assessed prior to investment | Limited information on economic and financial viability in place, based on existing R&D | *(not set or not applicable)* | Full feasibility studies and business plans finalized for mills 1, 2, and 3 | Scenarios for sugarcane trash collection and use in electricity production were made for mill #1, regarding the accomplishment of the actual electricity production and a possible expansion. Some parameters should be improved at the economic feasibility model to achieve more reliable results. Assessment for mills #2, #3 and #4 will be finished until 2019. Scenarios of economic feasibility for mills #2 and #3 are scheduled to be finished in 2018. | Project team finished economic viability studies for mills 1, 2 and 3, including particularities in terms of operational conditions and electricity sales contracts. For mill 4, the team is still working on the numbers provided by the partner, since some of them seem to be inconsistent. Regarding the collection, processing and burning of trash in the partners, results have already shown that, even in mills that present bottlenecks regarding sugarcane productivity and then trash availability, there are combinations of operational and market factors that enable partners to profit from the electricity production and sale. |
| Economic/financial performance of mills #1, #2, and #3 evaluated based on actual operating data and costs. | No trash-electricity system available  Electricity exports from mills limited to excess energy generated with sugarcane bagasse without trash | *(not set or not applicable)* | Economic feasibility demonstrated for use of trash to make exportable electricity at mills #1, #2, and #3.    70 % increase in sale of electricity at mills #1, #2, and #3 due to inclusion of additional sugarcane trash | Scenarios of electricity sale and investment were compiled in a booklet and distributed across the sector in 4 workshops. Those scenarios were also incorporated to the economic feasibility assessment for mill #1. Indirect costs related to productivity losses and transportation are being incorporated to the model. In 2018, project team will quantify costs from processing and burning trash at the partner mills. Scenarios of expansion of sugarcane straw collection and burning to generate electricity will be finished for local conditions in mills #2 and #3. The additional electricity produced and sold by the mills will be quantified and delivered until December 2018. Economic feasibility scenarios are being improved by the insertion of more realistic ranges of operational parameters and indirect costs derived from the introduction of sugarcane straw in the electricity production. Focus was given to additional scenarios requested by mill #1 and complete assessment of mills #2 and #3 are expected to be finished in 2018. | In addition to customization, the model to assess economic feasibility allows to make simulations considering various market and operational parameters, such as electricity sales price, distance of trash recovery, diesel prices, bagasse costs, trash collection costs, etc. In the last year, project team visited all the partners of Batch 1 in order to understand the mills’ preferences regarding expansion of electricity production and sales. After that, the team made a set of simulations regarding different combinations of the conditions set by the partners in order to evaluate economic viability in these cases. Results were delivered to the partners and, as already told in outcome 1 indicators, all the four partners are producing and exporting to the grid a considerable amount of electricity, based on the use of different bagasse + trash mixtures. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 3**  **Environmental integrity of the use of biomass for energy is assured.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Guidelines for environmentally acceptable trash utilization completed and distributed | No guidelines required as no trash system is in use | *(not set or not applicable)* | Guidelines completed and in use | All the experimental data gathered over the past years are being processed to identify the main local characteristics linked to environmental and agronomic issues related to sugarcane trash removal. Guidelines will be founded on those parameters in order to mitigate agronomic and environmental constraints. In this semester, Sucre team is working in a Sugarcane straw removal zoning output, which consists of a map that shows the suitability of Brazilian Center-South regions for sustainable sugarcane trash removal. The map is based on climatic conditions, from more than 3000 monitoring points, that drivers mulching effects on sugarcane productivity. Together with the map, Sucre team will release specific guidelines to quantify straw removal, which will be based on onsite conditions as soil texture, harvest season period, and others. The map with macrozones of suitability for sugarcane straw removal will be finished in 2018. | Guidelines for environmentally acceptable trash use were completed and will be presented in a workshop in September. Guidelines were based in the results of more than 30 field experiments conducted in the last 5 years together with similar results from the literature. It was structured in two packages of data, one based in results that can be extrapolated to the Brazilian Centre-South region, regarding the effects of trash mulching on sugarcane productivity based on climatic conditions and in the minimum amount of trash that should be left on the ground to minimize soil erosion. Based on those results we created a decision key that can guide mills on the estimation of the amount of trash that can be removed favoring sugarcane productivity and the control of soil erosion, that can be applied at both regional and mill levels. In addition to the decision key, there are also regional indications of the effects of trash mulching on soil GHG emissions and soil carbon stocks and pests and diseases, which can be used by the mills as a guide for trash management. Guidelines were applied in the estimation of how much trash is available to be collected and use for energy purposes in Brazilian Centre-South, which resulted in different regional amounts of trash according to climatic conditions. In this estimation, 63% of the produced trash can be collected and use even following recommendations of the minimum amounts of trash that should be left on the ground in order to favor sugarcane productivity and soil erosion control. |
| Reduction of net GHG emissions associated with additional electricity generation verified based on actual operating data from mills #1, #2, and #3. | No GHG reductions because no trash system in place | *(not set or not applicable)* | Quantitative understanding of potential net GHG reductions from use of trash for electricity generation.    Sector wide analysis of CDM potential for enhanced trash use. | A study made by the team presented the potential reduction in GHG emissions linked to the use of sugarcane trash available in Center-South Brazil to produce electricity, replacing power generation from natural gas thermoelectric plants. This amount of trash has the potential to supply more than 70% of the residential electricity consumption in Brazil, with a potential reduction of 150 million of tonnes of CO2 eq/year. Field data from three different sites will guide the adjustment of the indicators of Greenhouse Gases emissions from the soil. The values of GHG emissions from the soil were based on IPCC scenarios, which can be very different from the real conditions in Brazilian soils. In general, experiments demonstrated that the trash left on the ground increases the N2O emissions from the soil in sugarcane areas. Considering that N2O is about 300 times more powerful than CO2 for greenhouse effect, it is important to quantify in an accurate way the real emission factors for Brazilian conditions. Thus, more realistic numbers are very important to achieve good results on GHG emissions balance. | Considering the average amount of electricity exported to the grid by the 4 partners mills from Batch 1 and applying the Life Cycle Assessment (LCA) in the GHG balances (considering the replacement of natural gas as an electricity source), they avoid together the emission of more than 500,000 metric tons of CO2 equivalent every year. In the last 4 years, only considering the partner mills, they already contributed to avoid emission of more than 2 million metric tons of CO2 equivalent. By extrapolating the electricity generation to the potential of the sector in Brazil, regarding the use of all the produced bagasse plus 50% of the produced trash (which is actually lower than the 63% estimated in the above indicator) it is possible to generate more than 100 TWh of electricity in Brazil without expanding sugarcane areas. In this case, only biomass-based electricity can supply almost 80% of the household electricity demand in the country and mitigate more than 50 million of metric tons of CO2 equivalent per year, which corresponds to more than 10% of the total GHG emissions from Brazilian Energy Sector. |
| Sugarcane expansion clearly demonstrated as having minimal impact on deforestation rates in Brazil | Studies conducted to date do not link sugar sector to increased deforestation | *(not set or not applicable)* | Specific assessment conducted to demonstrate the potential impacts on deforestation    Mitigation strategy developed and under implementation | A study based on the processing of satellite images quantified deforestation at country and basin level regarding the recent period of sugarcane expansion in Brazil. Results showed that sugarcane displaced essentially pasture and annual crops, with small expansion over native vegetation. Results also demonstrated that the recent sugarcane expansion (around 5 million hectares) was not directly related to deforestation. Sugarcane expansion occurred over Cerrado and Atlantic Forest, however, in areas that have been deforested long time ago, before the evaluated period. In a watershed level case, there was even a reforestation to comply with legal requirements (Forest Code) so that the land owners could have access to rural credit. | Considering that sugarcane areas were already expanded in the last years, we performed a study based on satellite images processing in order to address direct impact of the increase in sugarcane areas on deforestation. We made the assessment regarding the whole country and we also evaluated two Brazilian basins in two different regions of significant expansion in Brazil. In the country evaluation, results showed that 96% of the most recent sugarcane expansion (more than 4 million hectares) occurred within the sugarcane Agroecological Zoning, which means that sugarcane expanded over other crops and pasture areas and did not directly contributed to deforestation. In the regional assessment of the basins, land use change dynamics promoted by the sugarcane expansion were different, showing that in São Paulo state sugarcane replaced mostly pasture land while in Goiás state the land use changes were more diverse. In both cases, sugarcane did not significantly replace natural vegetation, where in the São Paulo basin, while sugarcane areas expanded, reforestation also increased. In this case, reforestation can be related to the adapting of farms to the Forest Code in order to qualify the properties to have access to rural credit. In the case of a new sugarcane expansion drive, for example, by new public policies such as the RenovaBio, project team are finishing an evaluation of the available land for future expansion inside the Agroecological Zoning and avoiding expansion over Environmental Relevant Areas. Results in this case showed that, even being very conservative, there are still more than 20 million hectares available for sugarcane expansion considering only the six states that most produce sugarcane in Brazilian Centre-South (São Paulo, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais e Paraná). Regarding these 20 million hectares, around 50% are currently occupied with pasture lands. |
| Additional removal of trash for electricity generation demonstrated no have negligible detrimental impact on soil | Historical data suggests that additional trash removal does not impact soil quality | *(not set or not applicable)* | Project assessment conducted to further assess impact of trash removal on soil quality | Assessment of the results from mill #1 field trials associated to other experiments pointed to similar results regarding sugarcane trash removal: agronomic and environmental constraints are highly dependent to the soil and climate local conditions. In general, trash removal in sandy soils and tropical savannah climate favors soil erosion and productivity losses when compared to areas with maintenance of soil cover. On the other hand, soils with higher clay contents in milder climates, or in conditions of no water restriction (as in irrigated lands), trash can be collected with no productivity losses or several environmental constraints. In some cases, the soil cover even diminished the sugarcane productivity. For the next semester, results for mills #2 and #3 will be finished. In general, field trials will be ended and the focus of the team will be on the analysis of all the collected data in order to understand and categorize sugarcane straw removal effects in different edaphoclimatic conditions. | A series of more than 30 field experiments conducted in the last 5 years and similar results from the literature are guiding the trash removal oriented by the maintenance of soil quality and sugarcane yields. Results showed that a minimum amount of trash should be left on the ground to favor soil quality in general. However, the minimum amount is dependent on regional conditions such as the soil slope, climatic conditions, and other aspects linked to the sugarcane field management. A special edition of a relevant international journal (BioEnergy Research) will be released until December 2019 with more than 10 papers regarding the project results on soil quality. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 4**  **Dissemination, capacity building, replication strategy across the sugar cane sector is under implementation.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Guidelines issued for general pre feasibility assessment in sugar mills | No existing guidelines or procedures in place | *(not set or not applicable)* | Clear, streamlined guidelines and procedures for assessing potential benefits of additional generation with sugarcane trash | Template has already incorporated productivity and collection costs to the simulations. Other agronomic and environmental issues will be incorporated until the end of 2018. A web tool will be delivered and will serve to make a preliminary assessment for any mill that aims to produce electricity from sugarcane trash and export it to the grid. Indirect costs are being incorporated to the models and integrated assessment for mills #2 and #3 will be finished until December 2018. | Based on the knowledge and lessons learned from the last 4 years of project, the project team adapted a tool that allows to simulate integrated assessment (agrienvironmental impacts, economic viability and environmental benefits) of the collection and use of trash for bioelectricity purposes. This tool is based on the data and information provided by the partner mills and can be customized according to specific operational and market parameters. In addition, it was also designed an open access tool named Sucre Calculator, which is a simplified consolidation of all the project results, that allows a preliminary simulation of the economic viability and environmental impacts of a new initiative regarding trash collection and use for bioelectricity production and sales. This tool will be released soon at the project website and will be available to anyone that has interest in trash for energy purposes. in addition to economic and agrienvironmental assessment, project team is also working in addressing socioeconomic impacts derived from biomass-based electricity in comparison to natural gas. Preliminary results showed that for 1 TWh of electricity generated using sugarcane biomass it is possible to create 5000 more jobs than if this amount of electricity were generated using natural gas. |
| Feasibility studies and basic engineering of 7 mills (beyond the first three) interested in installing the trash system completed | No pre-feasibility studies being made | *(not set or not applicable)* | Guidelines for general pre-feasibility assessment of trash utilization    Feasibility studies for 7 mills (beyond the first three) completed | In 2017 the criteria to select the 7 mills for Batch 2 evaluations was defined (RLT 036). General best practices emerging from previous results are being implemented in an assessment framework and will be applied in evaluation of Batch 2 mills. Seven mills already accepted to be part of Batch 2 (Santa Isabel, São Luiz de Ourinhos, Santa Therezinha, São José da Estiva, Boa Vista, Granbio/Caeté (CESM) and Ferrari) and other 2 mills are interested in economic feasibility evaluations (Jataí and Cerradinho). A meeting will be held in July in order to setup methodology and scenarios for sugarcane trash based electricity production in each one of the new seven partners. | We have already engaged the 7 mills of Batch 2 to produce economic feasibility studies. In the first semester of 2019 the team visited all the 7 mills in order to set up operational parameters required to the assessment and also to consider specific interests of each one of the 7 partners in the simulations. |
| Sale of additional 120,000 MWh/yr (from mills #2, and #3) after five years | No trash system installed | *(not set or not applicable)* | Generation of electricity from trash at mill #2 and #3 | An inventory of the electricity produced and exported to the grid from the four partner mills are being updated considering possible changes implemented as a result of the Sucre outputs. Preliminary results showed that actual electricity export is already well above the expected 120,000 MWh/yr. | Mills of Batch 1 are exporting to the grid more than 1 TWh every year. |
| Mill #4 invests in electricity generation with bagasse | Mill #4 not yet committed to project implementation | *(not set or not applicable)* | Funding is leveraged from mill #4 to implement generation of electricity with trash. | Due to the delays in the testing of the trash systems, beyond our control, Da Barra Mill evaluations are not finished yet. It is expected that a report with final results will be available until the end of 2019. Despite that, Da Barra has already made important investments in sugarcane trash collection and processing systems. Investment in the Dry-Cleaning Systems and auxiliary equipment on trash collection by bales is estimated in US$ 60 million. | Mill #4 is already exporting to the grid on average more than 400,000 MWh per sugarcane season. |
| Expressions of interest (contracted studies, letters of interest, participation at seminars, phone inquiries, etc.) from companies in trash-electricity, indicating market transformation. | No trash system in place in additional mills    No investors interested | *(not set or not applicable)* | Clear demonstration of interest by 7 additional mills in investing in additional electricity generation with trash | Some of the Batch 2 partners have already made investments in dry cleaning systems, trash recovery systems, boilers, turbine generators and other equipment. The required investments and those investments that have already been made will be detailed in the technical reports for each one of the Batch 2 partner mills.  In a recent survey, Sucre team verified that, among the project partners, more than 160 million of US dollars were already invested in equipment related to the collection, processing and burning of sugarcane trash. | Since the beginning of the project, partner mills from Batch 1 and 2 already invested more than US$ 160 million in equipment related to biomass-based electricity generation. Moreover, the major portion of Batch 2 mills are already producing and exporting electricity to grid. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 5**  **Institutional, legal, regulatory framework is in place to promote the sustainable use of biomass for electricity generation and sales to the grid.** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Mutually beneficial regulations fostering increased electricity generation with sugarcane trash are implemented | Current legislation favorable to IPP generation but does not consider technicalities of generation with bagasse | *(not set or not applicable)* | Full knowledge of relevant legislation regulating the electricity sector in Brazil is obtained, including potential solutions to address remaining barriers for generation with trash    Meetings conducted with relevant state entities to discuss new regulatory framework that addresses sugarcane industry trash-to-electricity issues and barriers    Mutually beneficial regulatory reforms agreed between regulating entities and the sugar sector | A comprehensive technical report and a summarized booklet were released in 2017 to support and inform investors and mill Boards about biomass based electricity production and commercialization. Several meetings and workshops with mills and other stakeholder’s representatives (UNICA, CTC, investors, etc…) were conducted by the Project team in partnership with UNICA to disseminate the support material. Project team conducted meetings with government entities and other associations linked to sucroenergetic sector to discuss and suggest improvements and incentives in regulatory and legal framework regarding biomass based electricity production and commercialization. Project team also sent suggestions to a public consultation at the same subject, released by the Brazilian government last year. Results from public consultation seem promising as two biomass based electricity auctions were further promoted in 2017, and two more occurred in 2018. However, the process of revising the Regulatory and Legal framework has stopped due to government inaction. Sucre team in association to MCTIC and UNICA partners will promote meetings and presentations to other government entities to keep the subject in discussion. | The project team in partnership with the Brazilian Sugarcane Industry Association (UNICA) have acted in some initiatives to promote adjustments in the legal and regulatory framework of the electric sector in order to promote the production and sale of biomass-based electricity. Among the actions we can highlight events aimed at engaging the sector, informative booklets to increase knowledge on issues such as interconnection to the national grid, modalities of electricity sales, and a letter with suggestions for changes in the legal and regulatory framework of the sector within of the public consultation number 33 carried out by the Ministry of Mines and Energy in 2017. However, this issue is a key to achieving the generation and export to the grid potential of the sugarcane biomass-based electricity. If the uncertainties and problems with non-compliance of the contracts are not solved with new public policies for overcoming problems and incentivize the sector, it is unlikely that the sugar-energy sector will mobilize as a whole to generate electricity. The potential of generation and distribution can only be achieved if changes in the direction of a more favorable policy to biomass-based electricity are consolidated. We are presenting project results and the potential of the sector on electricity supply to several government agencies, however, as a national laboratory we can generate and present relevant technical, environmental and economic information and data regarding advantages and disadvantages of biomass-based electricity, but we have no governance in the consolidation of public policies in this sense. |
| **The progress of the objective can be described as:** | | **On track** | | | | |
| **Outcome 6**  **Project monitoring, learning, adaptive feedback and evaluation** | | | | | | |
| **Description of Indicator** | **Baseline Level** | **Midterm target level** | **End of project target level** | **Level at 30 June 2018** | **Cumulative progress since project start** |
| Internal monitoring is applied and adaptive feedback mechanisms are implemented | Internal monitoring procedure described in project document  Project document reflects current understanding of best project strategy | *(not set or not applicable)* | Internal monitoring procedures implemented with at least two project reports generated per year    Project implementation strategy is strengthened by continuous integration of lessons learnt during implementation | Two project progress reports prepared by Project Team submitted to UNDP. | Regular Project reports are prepared by the Project Team and presented to UNDP. |
| High quality external evaluations are conducted | No evaluations conducted | *(not set or not applicable)* | One Mid Term evaluation and One Final Evaluation conducted | MTE will be prepared in the second semester of 2018. | Mid Term evaluation was prepared and finalized during this PIR exercise. |
| **The progress of the objective can be described as:** | | **On track** | | | | |

# Implementation Progress



|  |  |
| --- | --- |
| Cumulative GL delivery against total approved amount (in prodoc): | 69.92% |
| Cumulative GL delivery against expected delivery as of this year: | 69.92% |
| Cumulative disbursement as of 30 June (note: amount to be updated in late August): | 5,453,909 |

|  |  |
| --- | --- |
| **Key Financing Amounts** | |
| PPG Amount | 200,000 |
| GEF Grant Amount | 7,800,000 |
| Co-financing | 62,800,000 |

|  |  |
| --- | --- |
| **Key Project Dates** | |
| PIF Approval Date | Aug 30, 2007 |
| CEO Endorsement Date | Mar 3, 2010 |
| Project Document Signature Date (project start date): | Dec 22, 2010 |
| Date of Inception Workshop | Aug 10, 2015 |
| Expected Date of Mid-term Review | Jun 7, 2019 |
| Actual Date of Mid-term Review | Jun 7, 2019 |
| Expected Date of Terminal Evaluation | Jun 30, 2020 |
| Original Planned Closing Date | Dec 1, 2019 |
| Revised Planned Closing Date | Jun 30, 2020 |

|  |
| --- |
| **Dates of Project Steering Committee/Board Meetings during reporting period (30 June 2018 to 1 July 2019)** |
| 2019-06-19 |
| 2018-10-03 |
| 2018-07-05 |
| 2018-11-30 |

# Critical Risk Management

|  |  |
| --- | --- |
| Current Types of Critical Risks | Critical risk management measures undertaken this reporting period |
| Regulatory | Risk: As it stands today, the legal and regulatory framework of the electricity sector does not encourage the production and sale of electricity from sugarcane biomass.  Management:  Although the team has worked on identifying barriers and suggestions for improvements in the legal and regulatory framework to favor the production and sale of biomass-based electricity, as a national laboratory, we have no governance in the implementation of the new regulatory framework. In this way, the project team has participated in meetings in different government agencies, such as the Ministry of Agriculture, Livestock and Supply and Ministry of Science, Technology, Innovation and Communication. Thus, through the dissemination of the results and the impact of the project, it is expected that the competent authorities may have technical basis for implementing the adequacy suggestions. |

# Adjustments

**Comments on delays in key project milestones**

|  |
| --- |
| **Project Manager: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.** |
| Not applicable. |

|  |
| --- |
| **Country Office: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.** |
| There are no delays. However, the MTE has indicated a request for extension of project's activities for 06 months. Therefore, CNPEM has requested an extension until December 2020 for the project in order to do more dissemination of project's activities, with the same budget as previously allocated. |

|  |
| --- |
| **UNDP-GEF Technical Adviser: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.** |
| MTR was delivered in June 2019, basically one year before project official ending date. SUCRE is a 5-year project from GEF 4 cycle (from 10 years ago) which has undertaken a Substantive revision with a new timeline approved by Executive Coordinator and Director of the Global Environmental Finance unit of UNDP. Project team should keep up with the implementation pace and work on the delivering of the remaining outputs and activities considering the current (already granted) extension. |

# Ratings and Overall Assessments

|  |  |  |
| --- | --- | --- |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **Project Manager/Coordinator** | Highly Satisfactory | *- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -* |
| Overall Assessment | The project team was able to find and adapt technological solutions for barriers to the collection and use of straw in the production of electricity, proposing an alternative processing that makes the straw more similar to the bagasse and thus enable its burning in the current boilers without problems. In terms of economic viability, studies have shown that the electricity prices that make attractive investments for electricity generation using straw in addition to bagasse are compatible with those that occur in other selling alternatives. Looking at the indicators and targets, we can see from the numbers that the project exceeded the expected generation of electricity and also in the target of mitigating greenhouse gases emissions. In addition, efforts were made by the team to increase the scope of the project including evaluation of the social sphere, evaluating job creation, quality of jobs, and other indicators. It is clear that the promising bioelectricity potential also shown in this report on supplying domestic demand for electricity and participating with more than 10% in GHG emissions mitigation in the Brazilian energy sector depends on governmental actions and public policies in the direction of encouraging greater participation of the sector in the supply of electricity in Brazil, which is outside the governance of the executing agency. In the meantime, the executing agency has performed its role in generating and providing technical background (environmental, social and economic potential of bioelectricity) with excellence to guide decisions from the government side. | |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **UNDP Country Office Programme Officer** | Highly Satisfactory | Highly Satisfactory |
| Overall Assessment | This year has been the culmination of activities within the SUCRE project. As verified by MTE, this is a highly successful project, with extremelly useful and high quality technical outputs that serve the beneficiary mills participating at the project (Batches 1 and 2) and that is paving the way for transforming the energy market for sugarcane biomass in Brazil. The project is already a reference in the country and, as dissemination of information consolidates in the next semester, abroad. Energy exports and GHG emission reduction have surpassed the original targets of project design. Trash systems have been demonstrated, remodelled for implementation, with innovative sollutions for the market, replicated, and more mills are interested in adopting the several solutions tested within the project. Technical and financial information have been disseminated, such as calculator, models and databases available to the public. The economic feasibility of energy generation has been demonstrated and revenues increased in all project's participating mills, in spite of the difficulties with the contracts in the Brazilian market and regulatory framework. The environmental studies on soil, agronomy, deforestation and other aspects, were undertaken and serve as a reference in Brazil. Thus, in spite of problems with the legal framework, that go beyond project's scope, the Project's has succeeded in every front of work and has established itself as a best practice. In relation to the amount of resources not fully used, it needs to be observed that the Real devaluation has contributed to an increase in purchasing power for the project these last years. In sum, the project will reach its major development goals and objectives by its end with exemplary execution, if we consider it really started after the Substantive Revision held in April 2015. | |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **GEF Operational Focal point** | *(not set or not applicable)* | *- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -* |
| Overall Assessment | *(not set or not applicable)* | |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **Project Implementing Partner** | *(not set or not applicable)* | *- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -* |
| Overall Assessment | *(not set or not applicable)* | |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **Other Partners** | *(not set or not applicable)* | *- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -* |
| Overall Assessment | *(not set or not applicable)* | |
| **Role** | **2019 Development Objective Progress Rating** | **2019 Implementation Progress Rating** |
| **UNDP-GEF Technical Adviser** | Highly Satisfactory | Highly Satisfactory |
| Overall Assessment | This is the 5th and last PIR report of the SUCRE project which main objective is to create the conditions for sugar mills to increase the export of electricity generated by sugar cane trash and bagasse to the grid. Project is in its last year of implementation and has achieved and sometimes exceeded many of its main targets, delivering studies and analysis of a high level of scientific rigor and contributing to technological innovation in the sugar cane sector in Brazil. Executed by the National Laboratory of Bioethanol Science and Technology, SUCRE has achieved great results in energy generation, emissions reductions while providing technical assistance to the sugar cane industry in Brazil  Related to the numbers on energy generation, the increase in exports of biomass based electricity to the grid of Batch 1 has been exceeded by around 60% in relation to the target. Before the project, mills would export an average of 650,000 MWh per season and now they exporting on average more than 1 TWh per season (ca. 350 MW added). Project has managed to engage 4 mills in the project in phase 1 (target 3) and these partners process together more than 21 million tons of sugarcane per season. Hence, project has been successful in leveraging private sector investment as partner mills from Batch 1 and 2 already invested more than US$ 160 million in equipment related to biomass-based electricity generation.  The SUCRE team undertook a series of evaluations of alternative trash processing systems in four partners in order to identify the most economically feasible and efficient mechanism to prepare the trash to the boilers. With field evaluations and laboratory results, the need of other processes in the collection and cleaning of the trash was identified as key to efficiency and maintenance of the boilers. The shaking of the already crushed trash -the additional measure needed - has shown viability in preliminary results (upfront costs for acquisition) and economic viability is being further evaluated. This indicator in on track to be achieved.  Related to the economic feasibility of increased generation with trash, scenarios of electricity production and sales have been developed by SUCRE according the diverse market and operational parameters. This methodology of evaluation is relevant to show the balance of the price of electricity and the total cost of generation including trash treatment and usage. The spot market prices show economic viability that enable the use of trash as a complement to bagasse for electricity generation. However, better prices, regulations and incentives are needed to make electricity from bagasse and trash a viable solution for energy matrix of Brazil. Related to this indicator project has not yet reported on the share of revenues from electricity generation increases in proportion to sugar and ethanol in 3 mills.  The real challenge of the project at this point of implementation is a well-defined regulatory framework for generation with sugarcane trash and the support of the MCTIC is key to push further the agenda with specific governance agents in the regulatory sphere. Project might profit from the RENOVABIO and expansion of sugar cane for fuels to push forward and disseminate the economic and environmental benefits of using trash for electricity generation. Project has also mapped the areas of sugar cane plantation and possible expansion and has deeply researched the best ratio of trash that should stay in the field to protect soil fertility, contributing to streamlined environmental guidelines and procedures for generation with sugarcane trash.  Related to the indicator of - clear guidelines, procedures, and demonstrated benefits of generation with sugarcane trash - the project is finalizing an open access tool named Sucre Calculator that will enable users to make a preliminary assessment of trash collection and use for bioenergy purposes. Other opened resources are the databases (results of field experiments and laboratory analysis) a tool coupled to a Geographic Information System that allows mills to apply the agrienvironmental decision Framework. These are important sustainability and knowledge management measures and project should create more didactic output such as videos (tutorials to the tools) and compilation of main results to be disseminated.  Given the overall results and outcome on the main objective RTA in line with project team rates DO rating as Highly Satisfactory: Project is on track to exceed its end-of-project targets and is likely to achieve transformational change by project closure. The project can be presented as 'outstanding practice' due to its highly scientific results and technical criteria to establish business models and technological routes for the use of trash for electricity generation.  In outcome 1 - Technology for sugarcane trash collection and conversion to exported electricity at sugarcane mills - considering only mill 1 regarding the last 4 years of Sucre implementation, export of electricity to the grid achieved more than 350,000 MWh (target 60,000 MWh/yr). Updated numbers regarding the last sugarcane season for mill #1 showed an export to grid of 89,212 MWh.  IP rating (HS) Highly Satisfactory as implementation is exceeding expectations. Cumulative financial delivery, timing of key implementation milestones, and risk management are fully on track. The project is managed extremely efficiently and effectively. The implementation of the project can be presented as 'outstanding practice' as it has around 70% de los resources delivered. Mid-term review has requested extension of the project for dissemination of activities. However, RTA’s considers that the remaining time shall be enough to end knowledge management, dissemination activities and terminal evaluation since the main technical tasks have been undertaken. SUCRE is a 5-year project from GEF 4 cycle (from 10 years ago) which has undertaken a Substantive revision with a new timeline approved by Executive Coordinator and Director of the Global Environmental Finance unit of UNDP. Project team should keep up with the implementation pace and work on the delivering of the remaining outputs and activities considering the current (already granted) extension.  Outcome 2 - Economic and financial viability of sugarcane trash collection and utilization for export of electricity from sugarcane mills – the economic viability studies for mills 1, 2 and 3 has been implemented, including analysis of operational conditions and electricity sales contracts showing that even in mills that present bottlenecks regarding sugarcane productivity and then trash availability, there are combinations of operational and market factors that enable partners to profit from the electricity production and sale. In this outcome it is important to highlight the amount of energy added to generation due to inclusion of trash mixtures in order to define project borders.  Outcome 3 is related to the assurance of the environmental integrity of the use of biomass for electricity generation. Project has generated high quality analysis related to the potential of CO2 mitigation potential and the optimum level of utilization of trash for soil quality. To the latter, field experiments defined regional elements of the effects of trash mulching on soil GHG emissions and soil carbon stocks and pests and diseases, which can be used by the mills as a guide for trash management. An important output is a sector wide analysis of CDM potential for enhanced trash use applying the Life Cycle Assessment (LCA) in the GHG balances (considering the replacement of natural gas for electricity generation). It is indicated the potential of the sector to generate more than 100 TWh of electricity in Brazil (using 50% of the produced trash), avoiding the emissions of more than 500,000 metric tons of CO2 equivalent (without expanding sugarcane areas). This represents the supply of almost 80% of the household electricity demand in the country and which corresponds to more than 10% of the total GHG emissions from Brazilian Energy Sector (more than 50 million of metric tons of CO2 equ. per year). Hence, project has demonstrated that 96% of the most recent sugarcane expansion (more than 4 million hectares) occurred within the sugarcane Agroecological Zoning, which means that sugarcane expanded over other crops and pasture areas and did not directly contributed to deforestation. This is in important element to prove that the safeguards for project implementation are being monitored.  Outcome 4 has been implemented partially and is going to be finalized in the last year of implementation when dissemination, capacity building and replication strategies are consolidated. However, the bigger challenge of the project remains the outcome 5 related to institutional, legal, regulatory framework to promote the sustainable use of biomass for electricity generation and sales to the grid. Changes in policies are essential to allow the potential electricity generation of biomass-based electricity. The support of MCTIC is key to bring the topic higher in the agenda with a consistent set of evaluation, studies and tests. Project should also evaluate the results of the last auctions of 2019 to update data regarding prices and conditions for electricity generation from bioenergy.  In order to deliver the final remaining outcomes and activities to structure a sustainable finalization of project, Implementing Partner (IP) shall evaluate the pros to engage a Responsible Party in implementation. An IP may enter into a written agreement with other organizations, known as responsible parties, to provide goods and/or services to the project, carry out project activities and/or produce outputs using the project budget. Implementing partners use responsible parties to take advantage of their specialized skills, to mitigate risk and to relieve administrative burdens. Responsible parties are directly accountable to the implementing partner in accordance with the terms of their agreement or contract. There are two approaches to engage civil society organizations, including NGOs and foundations, as well as duly accredited academia and state-sponsored actors as responsible parties: Collaborative advantage (programmatic activities that are uniquely positioned in terms of their value, legitimacy and/or access to particular groups of beneficiaries or geographic areas) or Competitive selection (also used for private sector) with which organizations provide specific project inputs and/or undertake well-defined project activities. This last modality the selection can be based on: quality-based fixed budget selection, a competitive procurement or Direct contracting using the UNDP policy for justifying direct contracting. | |

# Gender

**Progress in Advancing Gender Equality and Women's Empowerment**

This information is used in the UNDP-GEF Annual Performance Report, UNDP-GEF Annual Gender Report, reporting to the UNDP Gender Steering and Implementation Committee and for other internal and external communications and learning.  The Project Manager and/or Project Gender Officer should complete this section with support from the UNDP Country Office.

|  |
| --- |
| **Gender Analysis and Action Plan:** *not available* |
| **Please review the project's Gender Analysis and Action Plan. If the document is not attached or an updated Gender Analysis and/or Gender Action Plan is available please upload the document below or send to the Regional Programme Associate to upload in PIMS+. Please note that all projects approved since 1 July 2014 are required to carry out a gender analysis and all projects approved since 1 July 2018 are required to have a gender analysis and action plan.** |
| *(not set or not applicable)* |

|  |
| --- |
| **Please indicate in which results areas the project is contributing to gender equality (you may select more than one results area, or select not applicable):** |
| Contributing to closing gender gaps in access to and control over resources: No |
| Improving the participation and decision-making of women in natural resource governance: No |
| Targeting socio-economic benefits and services for women: No |
| Not applicable: Yes |

|  |
| --- |
| **Atlas Gender Marker Rating** |
| **GEN0:** no noticeable contribution to gender equality |

|  |
| --- |
| **Please describe any experiences or linkages (direct or indirect) between project activities and gender-based violence (GBV). This information is for UNDP use only and will not be shared with GEF Secretariat.** |
| Not applicable. |

|  |
| --- |
| **Please specify results achieved this reporting period that focus on increasing gender equality and the empowerment of women.**    **Please explain how the results reported addressed the different needs of men or women, changed norms, values, and power structures, and/or contributed to transforming or challenging gender inequalities and discrimination.** |
| This project was not elaborated taking into perspective gender issues, given that this was not a prerrogative at the time of project preparation. However, a study is under elaboration trying to capture the gender issues and the participation of women in the sugar cane sector with the use of trash in electricity generation and the agribusiness in Brazil. |

|  |
| --- |
| **Please describe how work to advance gender equality and women's empowerment enhanced the project's environmental and/or resilience outcomes.** |
| *(not set or not applicable)* |

# Social and Environmental Standards

**Social and Environmental Standards (Safeguards)**

The Project Manager and/or the project’s Safeguards Officer should complete this section of the PIR with support from the UNDP Country Office. The UNDP-GEF RTA should review to ensure it is complete and accurate.

|  |
| --- |
| **1) Have any new social and/or environmental risks been identified during project implementation?** |
| No |

|  |
| --- |
| **If any new social and/or environmental risks have been identified during project implementation please describe the new risk(s) and the response to it.** |
| Not applicable. |

|  |
| --- |
| **2) Have any existing social and/or environmental risks been escalated during the reporting period? For example, when a low risk increased to moderate, or a moderate risk increased to high.** |
| No |

|  |
| --- |
| **If any existing social and/or environmental risks have been escalated during implementation please describe the change(s) and the response to it.** |
| Not applicable. |

|  |
| --- |
| **SESP:** *not available*  **Environmental and Social Management Plan/Framework:** *not available* |
| **For reference, please find below the project's safeguards screening (Social and Environmental Screening Procedure (SESP) or the old ESSP tool); management plans (if any); and its SESP categorization above. Please note that the SESP categorization might have been corrected during a centralized review.** |
| *(not set or not applicable)* |

|  |
| --- |
| **3) Have any required social and environmental assessments and/or management plans been prepared in the reporting period? For example, an updated Stakeholder Engagement Plan, Environmental and Social Impact Assessment (ESIA) or Indigenous Peoples Plan.** |
| Not Applicable |

|  |
| --- |
| **If yes, please upload the document(s) above. If no, please explain when the required documents will be prepared.** |
| Not applicable. |

|  |
| --- |
| **4) Has the project received complaints related to social and/or environmental impacts (actual or potential )?** |
| No |

|  |
| --- |
| **If yes, please describe the complaint(s) or grievance(s) in detail including the status, significance, who was involved and what action was taken.** |
| Not applicable. |

# Communicating Impact

|  |
| --- |
| **Tell us the story of the project focusing on how the project has helped to improve people’s lives.**  **(This text will be used for UNDP corporate communications, the UNDP-GEF website, and/or other internal and external knowledge and learning efforts.)** |
| The work developed over all the past 4 years of SUCRE Project enables the electricity generation from the straw to become full and systematic, while maintaining soil quality, ensuring that there is no deforestation and also contributing to achieve the Paris Agreement goals (United Nations Conference on Climate Change 2015 - COP21). If the potential of more than 100 TWh, possible to generated from sugarcane biomass, is achieved, it would contribute to mitigate more than 50 million tons of CO2 equivalent, which represents more than 10% of the greenhouse gas emissions of the Brazilian energy sector. If it reaches its potential, this energy source is capable of supplying 80% of the household electricity demand in Brazil, generating around a half million jobs more than if that same amount of electricity were generated by natural gas thermoelectric plants. Thus, the project is fully aligned with the sustainable development agenda promoted by the United Nations, addressing directly the Sustainable Development Goals (SDG) regarding Affordable and Clean Energy (7), Decent Work and Economic Growth (8), Responsible Production and Consumption (12), Climate Action (13) and Life on Land (15). |

**Knowledge Management, Project Links and Social Media**

|  |
| --- |
| **Please describe knowledge activities / products as outlined in knowledge management approved at CEO Endorsement /Approval.**    **Please also include: project's website, project page on the UNDP website, blogs, photos stories (e.g. Exposure), Facebook, Twitter, Flickr, YouTube, as well as hyperlinks to any media coverage of the project, for example, stories written by an outside source. Please upload any supporting files, including photos, videos, stories, and other documents using the 'file lirbary' button in the top right of the PIR.** |
| https://lnbr.cnpem.br/en/research/technological-challenges/sucre-project/  http://pages.cnpem.br/sucre/  http://www.br.undp.org/content/brazil/pt/home/projects/Sucre.html  https://www.facebook.com/ProjetoSUCRE/    Press:  https://www.valor.com.br/agro/6214889/expansao-da-bioeletricidade-pode-reduzir-emissoes  https://www.udop.com.br/index.php?item=noticias&cod=1177982  http://www.biocana.com.br/index.php/noticia/visualizar/expansao-da-bioeletricidade-pode-reduzir-emissoes-  https://digital.agrishow.com.br/gerar-energia-pelo-bagaco-de-cana-de-acucar-seria-o-futuro-2/  http://radios.ebc.com.br/brasil-rural/2018/11/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais?fbclid=IwAR3GnZBo4k\_pyPN5UL9aW-CeEgDRrzd\_EhGW0EjXR0YKvRLeS\_Tbv-BwNbY  http://www.agronovas.com.br/bagaco-da-cana/  http://onordeste.com.br/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica/  https://www.canamix.com.br/conteudo/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais  http://www.siamig.com.br/noticias/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais  https://www.revistacanavieiros.com.br/conteudo/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais-  http://www.biocana.com.br/index.php/noticia/visualizar/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais-  http://www.ideaonline.com.br/conteudo/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais.html  https://revistarpanews.com.br/noticias/8101-bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais-2  https://www.copercana.com.br/noticias/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais-  http://www.consecti.org.br/noticias/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais/  https://www.udop.com.br/index.php?item=noticias&cod=1172661  http://www.canaonline.com.br/conteudo/bagaco-da-cana-de-acucar-um-potencial-na-geracao-de-energia-eletrica-do-pais.html#.XC9YZM9KhTY  http://ipesi.com.br/bioeletricidade-gerada-a-partir-da-palha-e-bagaco-de-cana-de-acucar-poderia-suprir-78-da-demanda-residencial/  https://revistarpanews.com.br/noticias/7298-quase-80-do-consumo-de-energia-eletrica-residencial-no-brasil-poderia-ser-suprido-pela-bioeletricidade-gerada-a-partir-da-palha-e-bagaco-de-cana-de-acucar  https://www.novacana.com/n/cana/plantio/cinzas-palha-impactos-resultados-quatro-safras-projeto-sucre-010318  https://www.udop.com.br/index.php?item=noticias&cod=1160896  https://www.canamix.com.br/conteudo/estudo-revela-impurezas-minerais-da-palha-de-cana-de-acucar-recebida-pelas-usinas-e-os-efeitos-no-processamento-na-industria  http://www.canaonline.com.br/conteudo/ctbe-realiza-evento-sobre-manejo-da-palha-da-cana-de-acucar.html#.XC9Wac9KhTa  https://www.novacana.com/n/industria/pesquisa/ctbe-parceria-pesquisa-zilor-240418/  http://www.ideaonline.com.br/conteudo/ctbe-firma-parceria-de-pesquisa-com-a-zilor.html  http://www.canaonline.com.br/conteudo/ctbe-firma-parceria-de-pesquisa-com-a-zilor.html#.WzObaRJKiV5  http://www.revistarpanews.com.br/index.php/noticias/5852-ctbe-firma-parceria-de-pesquisa-com-a-zilor  https://www.novacana.com/n/cana/plantio/cinzas-palha-impactos-resultados-quatro-safras-projeto-sucre-010318/  http://www.udop.com.br/index.php?item=noticias&cod=1160896  http://www.canamix.com.br/conteudo/estudo-revela-impurezas-minerais-da-palha-de-cana-de-acucar-recebida-pelas-usinas-e-os-efeitos-no-processamento-na-industria  http://www.canaonline.com.br/conteudo/estudo-revela-impurezas-minerais-da-palha-de-cana-e-os-efeitos-no-processamento-na-industria.html#.WzObbhJKiV7  http://www.revistarpanews.com.br/index.php/noticias/4798-estudo-revela-impurezas-minerais-da-palha-de-cana-de-acucar-recebida-pelas-usinas-e-os-efeitos-no-processamento-na-industria  http://tvterraviva.band.uol.com.br/videos/ultimos-videos/16353661/terraviva-sustentavel-geracao-de-energia-a-partir-da-palha-da-cana.html  http://tvterraviva.band.uol.com.br/noticia/100000886818/terraviva-sustentavel-geracao-de-energia-a-partir-da-palha-da-cana.html  https://www.novacana.com/n/etanol/2-geracao-celulose/etanol-celulosico-apresentacoes-seminario-ctbe-201217/  http://www.sna.agr.br/palha-de-cana-pode-gerar-energia-para-suprir-70-do-consumo-residencial-no-pais/  https://www.douradosagora.com.br/noticias/tecnologia/palha-de-cana-pode-gerar-energia-para-suprir-70-do-consumo-residencial-no-pais  https://www.comprerural.com/palha-de-cana-pode-gerar-energia-para-suprir-70-do-consumo-residencial/  http://www.safraes.com.br/site/conteudo.asp?codigo=3532  https://www.campomais.com.br/inovacao/palha\_de\_cana\_pode\_gerar\_energia\_para\_suprir\_70\_do\_consumo\_residencial\_no\_pais.html  https://sfagro.uol.com.br/cana-energia-obtida-a-partir-da-palha-pode-suprir-27-do-consumo-no-pais/  http://www.revistarpanews.com.br/noticias/3362-eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil  https://www.jornalcana.com.br/eletricidade-gerada-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil/  http://www.biocana.com.br/index.php/noticia/visualizar/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil-  http://www.udop.com.br/index.php?item=noticias&cod=1155733  http://www.ideaonline.com.br/conteudo/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir27-do-consumo-residencial-no-brasil.html  http://www.canaonline.com.br/conteudo/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir27-do-consumo-residencial-no-brasil.html#.WzObhhJKiV5  http://www.canamix.com.br/conteudo/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir27-do-consumo-residencial-no-brasil  http://www.esalq.usp.br/cprural/informacoes/mostra/240  https://diarioms.com.br/eletricidade-gerada-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil/  https://www.grupocultivar.com.br/noticias/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil  http://www.canaonline.com.br/conteudo/palha-da-cana-pode-gerar355-twh-de-energia.html#.WzObkBJKiV5  http://www.ceisebr.com/conteudo/palha-da-cana-pode-gerar-355-twh-de-energia.html  http://www.bioagencia.com.br/noticias/8683/energia-do-bagaco-pode-atender-25-das-residencias-brasileiras.html  https://www.jornalcana.com.br/raio-x-do-recolhimento-da-palha-de-cana-sai-ate-o-fim-de-2018/  https://www.jornalcana.com.br/exclusivo-termicas-biomassa-reduzem-producao-e-queda-chega-14/  http://sucroenergetico.revistaopinioes.com.br/revista/detalhes/14-0-impacto-na-industria-com-mecanizacao-da-colhe/  http://www.udop.com.br/index.php?item=noticias&cod=1155260  http://www.canaonline.com.br/conteudo/o-impacto-na-industria-com-a-mecanizacao-da-colheita.html#.WzObsRJKiV7  http://www.udop.com.br/index.php?item=noticias&cod=1155141  http://www.revistarpanews.com.br/noticias-news/articulistas/3237-em-2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-a-roda  http://www.canaonline.com.br/conteudo/em2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-a-roda.html#.WzObtBJKiV5  http://www.diarioinduscom.com/em-2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-a-roda/  http://tnpetroleo.com.br/noticia/em-2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-a-roda-por-zilmar-de-souza/  http://www.canalbioenergia.com.br/artigoem-2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-roda/  http://www.udop.com.br/index.php?item=noticias&cod=1153397  http://www.udop.com.br/index.php?item=noticias&cod=1153396  http://www.udop.com.br/index.php?item=noticias&cod=1152555  http://www.revistarpanews.com.br/noticias/2670-bioeletricidade-a-partir-da-palha-de-cana-de-acucar-reflexoes-sobre-o-marco-regulatorio  http://www.canaonline.com.br/conteudo/bioeletricidade-a-partir-da-palha-de-cana-de-acucar-reflexoes-sobre-o-marco-regulatorio.html#.WzObvhJKiV7  http://www.canaonline.com.br/conteudo/projeto-sucre-avalia-os-impactos-tecnicos-e-economicos-do-recolhimento-de-palha-por-fardos.html#.WzObvxJKiV6  http://www.ideaonline.com.br/conteudo/projeto-sucre-avalia-os-impactos-tecnicos-e-economicos-do-recolhimento-de-palha-por-fardos.html  http://www.revistarpanews.com.br/noticias/3368-projeto-sucre-propoe-sinalizacoes-de-preco-mais-eficientes-para-a-energia-de-biomassa-no-setor-eletrico  https://portaldbo.com.br/palha-da-cana-pode-gerar-355-twh-de-energia/  http://www.biomassabr.com/bio/resultadonoticias.asp?id=4364    Sucre Website:  http://pages.cnpem.br/sucre/2018/05/17/uma-visao-geral-do-projeto-sucre-avancos-e-proximos-passos/  http://pages.cnpem.br/sucre/2018/03/29/bancos-de-dados-oferecem-suporte-para-resultados-de-pesquisas-no-projeto-sucre/  http://pages.cnpem.br/sucre/2018/03/29/manejo-adequado-da-palha-aumenta-a-produtividade-do-canavial-indicam-estudos-do-sucre/  http://pages.cnpem.br/sucre/2018/03/07/sucre-inicia-novos-trabalhos-de-avaliacao-de-viabilidade-do-uso-da-palha-para-geracao-de-bioeletricidade-em-7-usinas/  http://pages.cnpem.br/sucre/2018/01/31/estudo-revela-impurezas-minerais-da-palha-de-cana-de-acucar-recebida-nas-usinas-e-os-efeitos-no-processamento-na-industria/  http://pages.cnpem.br/sucre/2018/01/31/gravacao-das-palestras-do-workshop-de-resultados-do-projeto-sucre-foi-disponibilizada/  http://pages.cnpem.br/sucre/2017/12/07/solucoes-para-geracao-de-bioeletricidade-partir-da-palha-de-cana-de-acucar-sao-apresentadas-no-workshop-do-sucre/  http://pages.cnpem.br/sucre/2017/12/05/tendencias-do-mercado-de-energia-influenciam-estudo-de-viabilidade-de-geracao-partir-da-palha-da-cana-de-acucar/  http://pages.cnpem.br/sucre/2017/11/24/evento-traz-resultados-sobre-o-uso-da-palha-para-bioeletricidade/  http://pages.cnpem.br/sucre/2017/11/23/sucre-tema-programa-terraviva-sustentavel/  http://pages.cnpem.br/sucre/2017/11/17/sucre-se-reune-com-pnud-e-ministerios-na-casa-da-onu/  http://pages.cnpem.br/sucre/2017/10/26/impacto-da-remocao-da-palha-nos-estoques-de-carbono-do-solo-e-assunto-de-pesquisa-do-projeto-sucre-apresentada-no-bbest/  http://pages.cnpem.br/sucre/2017/09/21/eletricidade-gerada-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil/  http://pages.cnpem.br/sucre/2017/09/06/sucre-participa-de-workshop-nos-eua-sobre-remocao-de-palha-de-milho/  http://pages.cnpem.br/sucre/2017/08/27/projeto-sucre-propoe-sinalizacoes-de-preco-mais-eficientes-para-energia-de-biomassa-no-setor-eletrico/  http://pages.cnpem.br/sucre/2017/08/09/triturador-de-palha-na-colhedora-e-aposta-do-projeto-sucre/  http://pages.cnpem.br/sucre/2017/07/31/estudo-do-sucre-demonstra-que-expansao-dos-canaviais-nao-tem-relacao-com-o-desmatamento-no-brasil/  http://pages.cnpem.br/sucre/2017/07/31/sucre-apresenta-estrategias-de-remocao-de-palha-para-bioenergia-em-simposio-da-esalq/  http://pages.cnpem.br/sucre/2017/07/28/confira-as-fotos-do-workshop-bioeletricidade/    https://mailchi.mp/cnpem/yuaxobx414-2491933  https://mailchi.mp/99ffce8abf54/yuaxobx414-2513641?e=ed02dd009a  https://mailchi.mp/cnpem/yuaxobx414-2540013?e=ed02dd009a  https://mailchi.mp/cnpem/yuaxobx414-2540397?e=%5bUNIQID%5d  https://mailchi.mp/cnpem/yuaxobx414-2698625?e=ed02dd009a  https://us8.campaign-archive.com/?e=&u=a1e316fe81da1c1f675a31868&id=7b120966fd    LNBR Website:    http://ctbe.cnpem.br/ctbe-firma-parceria-de-pesquisa-com-a-zilor/  http://ctbe.cnpem.br/sensores-de-agricultura-de-precisao-e-triturador-de-palha-sao-tecnologias-apresentadas-no-inovacana/  http://ctbe.cnpem.br/bioeletricidade-partir-da-biomassa-de-cana-esta-no-radar-de-players-geradores-que-agora-miram-marco-regulatorio/  http://ctbe.cnpem.br/ctbe-organiza-workshop-de-bioeletricidade-e-discute-marco-regulatorio-setor-eletrico/  http://ctbe.cnpem.br/participacao-ctbe-no-ethanol-summit-ratifica-importancia-laboratorio-para-o-setor/    CNEPM Website:    http://cnpem.br/ctbe-firma-parceria-de-pesquisa-com-a-zilor/  http://cnpem.br/estudo-revela-impurezas-minerais-da-palha-de-cana-de-acucar-recebida-pelas-usinas-e-os-efeitos-no-processamento-na-industria/  http://cnpem.br/terraviva-sustentavel-geracao-de-energia-a-partir-da-palha-da-cana/  http://cnpem.br/projeto-sucre-promove-geracao-de-energia-sustentavel/  http://cnpem.br/etanol-celulosico-apresentacoes-realizadas-no-seminario-do-ctbe/  http://cnpem.br/palha-de-cana-pode-gerar-energia-para-suprir-70-do-consumo-residencial-no-pais/  http://cnpem.br/energia-do-bagaco-pode-atender-25-das-residencias-brasileiras/  http://cnpem.br/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil-3/  http://cnpem.br/energia-do-bagaco-pode-atender-25-das-residencias-brasileiras/  http://cnpem.br/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil-2/  http://cnpem.br/eletricidade-gerada-a-partir-da-palha-de-cana-de-acucar-pode-suprir-27-do-consumo-residencial-no-brasil/  http://cnpem.br/palha-da-cana-pode-gerar-355-twh-de-energia/  http://cnpem.br/energia-do-bagaco-pode-atender-25-das-residencias-brasileiras/  http://cnpem.br/raio-x-do-recolhimento-da-palha-de-cana-sai-ate-o-fim-de-2018/  http://cnpem.br/exclusivo-termicas-a-biomassa-reduzem-a-producao-e-queda-chega-a-14/  http://cnpem.br/o-impacto-na-industria-com-a-mecanizacao-da-colheita/  http://cnpem.br/sucre-apresenta-estrategias-de-remocao-de-palha-para-bioenergia-em-simposio-da-esalq/  http://cnpem.br/em-2017-dois-leiloes-de-energia-eletrica-para-fazer-girar-a-roda/  http://cnpem.br/sucre-apresenta-estrategias-de-remocao-de-palha-para-bioenergia-em-simposio-da-esalq/  http://cnpem.br/estudo-do-projeto-sucre-demonstra-que-a-expansao-dos-canaviais-nao-tem-relacao-com-o-desmatamento-no-brasil/  http://cnpem.br/bioeletricidade-a-partir-da-palha-de-cana-de-acucar-reflexoes-sobre-o-marco-regulatorio/  http://cnpem.br/projeto-sucre-avalia-os-impactos-tecnicos-e-economicos-do-recolhimento-de-palha-por-fardos/  http://cnpem.br/palha-da-cana-pode-gerar-355-twh-de-energia/  http://cnpem.br/representantes-apontam-entraves-e-propoem-melhorias-para-o-setor-sucroenergetico/  http://cnpem.br/no-lugar-das-cinzas-surgiu-a-palha-impactos-e-resultados-das-quatro-safras-do-projeto-sucre/      LNBR Youtube Channel:  https://www.youtube.com/watch?v=VlIC8WToGVc  https://www.youtube.com/watch?v=c7hulnSB54M  https://www.youtube.com/watch?v=6wE3fuKkqkU  https://www.youtube.com/watch?v=\_C7qNgIvGU0  https://www.youtube.com/watch?v=S5djgvCoK2U  https://www.youtube.com/watch?v=sbS-CizYiPg  https://www.youtube.com/watch?v=-YPsrkwKNbs  https://www.youtube.com/watch?v=XUKvGLEl-NY |

# Partnerships

**Partnerships & Stakeholder Engagment**

Please select yes or no whether the project is working with any of the following partners. Please also provide an update on stakeholder engagement. This information is used by the GEF and UNDP for reporting and is therefore very important!  All sections must be completed by the Project Manager and reviewed by the CO and RTA.

|  |
| --- |
| **Does the project work with any Civil Society Organisations and/or NGOs?** |
| Yes |

|  |
| --- |
| **Does the project work with any Indigenous Peoples?** |
| No |

|  |
| --- |
| **Does the project work with the Private Sector?** |
| Yes |

|  |
| --- |
| **Does the project work with the GEF Small Grants Programme?** |
| No |

|  |
| --- |
| **Does the project work with UN Volunteers?** |
| No |

|  |
| --- |
| **Did the project support South-South Cooperation and/or Triangular Cooperation efforts in the reporting year?** |
| Yes |

|  |
| --- |
| **CEO Endorsement Request:** [UNDP ID 3515 SUCRE CEO Endorsement Request resubmitted on Dec 21 2009.doc](https://undpgefpims.org/attachments/3515/212669/1630186/1630479/UNDP%20ID%203515%20SUCRE%20CEO%20Endorsement%20Request%20resubmitted%20on%20Dec%2021%202009.doc) |
| **Provide an update on progress, challenges and outcomes related to stakeholder engagement based on the description of the Stakeholder Engagement Plan as documented at CEO endorsement/approval (see document below). If any surveys have been conducted please upload all survey documents to the PIR file library.** |
| As Sucre works on a partnership approach with the mills, the engagement of these partners (Batch 1 and 2) was essential in the process to obtaining the technical results of the project. All inputs of field data and information that supported the economic, environmental and social results and assessments were only possible due to the commitment of these partners to the LNBR team and the project. Another important partnership, mainly in Outcome 5, refers to the active participation of UNICA in the project, where UNICA always acting for the achievement of results and also in more political spheres, precisely where the LNBR has no governance. Regarding South-South cooperation, this was a key year because we finished the scope of partnerships between the project and entities such as Centro de Investigación de la Caña de Azúcar de Colombia (CENICAÑA) and Centro Guatemalteco de Investigación y Capacitación de la Caña de Azúcar (CENGICAÑA) in Guatemala. The agreements will be signed soon by the two parties and it is about the exchange of experiences and results of the project. Another entity that has been engaged in South-South cooperation is the Agroindustrial Experimental Station Obispo Colombres (EEAOC) in Argentina. |

# Annex - Ratings Definitions

**Development Objective Progress Ratings Definitions**

(HS) Highly Satisfactory: Project is on track to exceed its end-of-project targets, and is likely to achieve transformational change by project closure. The project can be presented as 'outstanding practice'.

(S) Satisfactory: Project is on track to fully achieve its end-of-project targets by project closure. The project can be presented as 'good practice'.

(MS) Moderately Satisfactory: Project is on track to achieve its end-of-project targets by project closure with minor shortcomings only.

(MU) Moderately Unsatisfactory: Project is off track and is expected to partially achieve its end-of-project targets by project closure with significant shortcomings. Project results might be fully achieved by project closure if adaptive management is undertaken immediately.

(U) Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets by project closure. Project results might be partially achieved by project closure if major adaptive management is undertaken immediately.

(HU) Highly Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets without major restructuring.

**Implementation Progress Ratings Definitions**

(HS) Highly Satisfactory: Implementation is exceeding expectations. Cumulative financial delivery, timing of key implementation milestones, and risk management are fully on track. The project is managed extremely efficiently and effectively. The implementation of the project can be presented as 'outstanding practice'.

(S) Satisfactory: Implementation is proceeding as planned. Cumulative financial delivery, timing of key implementation milestones, and risk management are on track. The project is managed efficiently and effectively. The implementation of the project can be presented as 'good practice'.

(MS) Moderately Satisfactory: Implementation is proceeding as planned with minor deviations. Cumulative financial delivery and management of risks are mostly on track, with minor delays. The project is managed well.

(MU) Moderately Unsatisfactory: Implementation is not proceeding as planned and faces significant implementation issues. Implementation progress could be improved if adaptive management is undertaken immediately. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are significantly off track. The project is not fully or well supported.

(U) Unsatisfactory: Implementation is not proceeding as planned and faces major implementation issues and restructuring may be necessary. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are off track with major issues and/or concerns. The project is not fully or well supported.

(HU) Highly Unsatisfactory: Implementation is seriously under performing and major restructuring is required. Cumulative financial delivery, timing of key implementation milestones (e.g. start of activities), and management of critical risks are severely off track with severe issues and/or concerns. The project is not effectively or efficiently supported.